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JOHNSON'S
(REVISED)
UNIVERSAL CYCLOPÆDIA:
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TREASURY
OF
USEFUL KNOWLEDGE.

ILLUSTRATED WITH MAPS, PLANS, AND ENGRAVINGS.

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Alaska Territory.
Arizona Territory.
Arkansas.
Asia.
Australia.
California.
Canada.
Centre of U. S. Pop.
Colorado.
Connecticut.
Dakota Territory.
Delaware.
District of Columbia.
Europe.
Europe under the Romans.
Europe under Carlovingians.
Europe under Napoleon I.
Europe, Languages of.
Florida.
France.
Georgia.
German Empire.

Name.

Great Britain and Ireland.
Greece.
Idaho Territory.
Illinois.
Indiana.
Indian Territory.
Iowa.
Kansas.
Kentucky.
Louisiana.
Maine.
Maryland.
Massachusetts.
Michigan.
Minnesota.
Mississippi.
Missouri.
Montana Territory.
Mts. and Rivers of the World.
National Emblems.
Nebraska.
Nevada.
New Hampshire.
New Jersey.
New Mexico Territory.

Name.

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North America.
North Carolina.
Ohio.
Oregon.
Pennsylvania.
Rhode Island.
Russia.
South America.
South Carolina.
Stellar Type Spectra.
Switzerland.
Tennessee.
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To the
memory of the late
HORACE GREELEY,
the great philanthropist and public educator—whom only to know was to love—this **UNIVERSAL CYCLOPÆDIA**, which he planned and assisted in editing in part, is reverently dedicated by his devoted friend and household companion,
THE PUBLISHER.

PUBLISHERS' ANNOUNCEMENT.

(REVISED EDITION.)

WITH profound gratitude to the American people for the unprecedented favor heretofore extended to them—a favor which has manifested itself in the purchase of more than a million copies of their publications—the Publishers now take pleasure in laying before the same generous public the thoroughly revised and very elaborate work herewith presented, entitled JOHNSON'S UNIVERSAL CYCLOPÆDIA. In doing this they respectfully solicit the continuance of the liberal patronage which has been thus far bestowed on them, and which they have endeavored to deserve by faithfully laboring to meet the intellectual wants of an enlightened and cultivated people. They do not claim perfection for this work, though it has been revised without regard to labor or expense. Still, whatever imperfections the critical eye may discover in it, no one who gives it a candid examination can fail to concede that it now possesses, in many important particulars, such a superiority over any other encyclopædia yet published as must make it invaluable, if not indispensable, to the scholar, the man of business, and the general reader.

To explain the principles which have governed the revision of this work belongs properly to the province of the Editors. The Publishers may, nevertheless, be permitted to observe, that in bringing together the vast amount of material here accumulated, recourse has been had to every accessible source of authentic information. The most recent publications, not only in English, but in all the leading languages of the continent of Europe (particularly the German, French, and Italian), have been constantly consulted. And in order to guard against the possibility of being betrayed into error by relying too implicitly on printed authorities, all articles compiled from such sources have been subjected to the scrutiny of accomplished critics in the departments of knowledge to which they severally belong. A very important feature in the plan of revision, which has been systematically pursued throughout, has been to place all the most important subjects in the hands of living authorities of distinguished eminence, to be originally treated expressly for this work. Each of the articles thus specially prepared is attested by the signature of its author; and, immediately following the "Organization of the Editorial Staff," a list of the many eminent writers who have been thus engaged is given in full.

The original suggestion of this work is due to the late Hon. HORACE GREELEY, LL.D., for more than ten years the intimate friend of the undersigned, and for the last two years or more of his life a member of Mr. Johnson's family. It has been dedicated to his memory, therefore, not only in testimony to the warm personal regard which, during this long period, he won to himself by his many kindly traits of character; but also in just recognition of his early participation in the preparation of the work itself, and of the fact that it may, without impropriety, be said to owe to him its existence. As an indefatigable laborer and prolific writer for the daily press (to say nothing of the more permanent monuments of literary industry which he created in the course of a long and "busy life"), dealing constantly with topics of immediate and stirring interest in the political, industrial, and social world, where the whole force of an argument or trustworthiness of a conclusion must depend constantly on the correctness of the assumed premises, Mr. Greeley had long felt the need of a comprehensive book of general reference better adapted to his needs, and to the needs of all active workers like himself, than any then in existence. His experience taught him that the existing encyclopædias, all of which have their merits, fail to meet the wants of the class of busy and practical men to which he belonged, for several reasons. In the first place, they are generally too voluminous: occupying a whole shelf in a library, instead of a corner of a writing-table, they cannot be consulted without disarrangement, loss of time, and serious inconvenience. Secondly, since many of their articles have much the form of treatises, the important facts in them of which the busy man is in need are spread over a large surface, and can only be found by a search involving vexatious delay. And thirdly, in respect to accuracy of statement and freshness of information, these works are very unequal. Even in the new editions of the most approved encyclopædias—editions professedly rewritten throughout—errors of long standing continue in many instances to be perpetuated, and statistical and scientific statements which belong to a period long passed by are often presented.

The busy man's cyclopædia, according to Mr. Greeley, should be something different in every one of the particulars here specified. It should be, first of all, a *table-book:* that with him was a *sine qua non.* It should, furthermore, be pre-eminently a book of facts, and to a very limited extent, if at all, a volume of discussions or of critical opinions. Finally, it should be severely and uniformly accurate; and should be brought up, in every article, to the actual state of knowledge at the date of publication. With Mr. Greeley, to perceive a mode in which the world might be benefited was to feel an irrepressible desire to secure the benefit. In many earnest conversations, two years or more before the end of his useful life, he urged upon the undersigned himself to undertake the publication of a work of such a character as is here briefly outlined; promising to contribute personally a large share of the literary labor which the preparation of the work would require. The magnitude of the pecuniary responsibility involved in so vast an enterprise prevented an immediate acquiescence in this proposal; and it was only after it had been repeatedly presented that the undersigned finally yielded to these pressing solicitations, and consented to assume the heavy burden. Some of the words used by the zealous originator and early advocate of the scheme, in the conversations above referred to, are still remembered; and now that he has passed away for ever, they may perhaps be read with interest, as illustrating his peculiarities of expression in earnest social intercourse with his daily associates. The decision of the undersigned to comply in this matter with the wishes of his distinguished friend was reached during a drive with Mr. Greeley in the Central Park of New York City in December, 1870; and in the course of that memorable drive, Mr. Greeley said, emphatically, "I want just three books constantly at my elbow when I am writing: *Johnson's Family Atlas of the World, Webster's Dictionary,* and an *Encyclopædia,* which should have every general article abridged as much as possible, or, as they say in Vermont, 'boiled down.'" In another explanation of his views as to the kind of condensation to be given to the work, he said, "I don't care upon whose shoulders Humboldt's cloak may have fallen, or if he had one, even; but I simply want to know when and where he was born, what he did, and when he died. The rest would be good for nothing except to lumber up the book. The lives and labors of men are the best kind of history, and the history that is needed; but lengthy dissertations upon them in a book of reference would be misplaced."

The preparation of the work having been resolved on, and Mr. Greeley having promised it from the beginning the aid of his counsel and pen, it might naturally have been anticipated that he would cheerfully assume, or perhaps claim as due to him of right, the position of its Editor-in-Chief. This, however, would have been impracticable with him, considering the numerous and absorbing duties already pressing upon him; which did not prevent him, however, from allowing his name to be placed as that of an associate on the editorial staff. He gave to the matter probably as much thought as if he had been in the chief direction, but he had not time to attend in person to the practical execution of the working plans. As soon as the proper literary assistance could be secured, repeated consultations took place between the Editors and the Publishers in the private room of Mr. Greeley at the residence of Mr. Johnson; and in these conferences he unfolded his views in so lucid and masterly a manner as strongly to impress all who heard him with admiration of his comprehensive grasp of the subject, and to convince them of his own wonderful fitness to contribute personally to the successful execution of the scheme.

Before the business arrangements for prosecuting the work had been actually completed, it occurred to the undersigned that there might be some advantage in transferring the responsibility of the publication to some other well-known publishing house in this city or elsewhere; reserving only to themselves the task of managing the sale. Messrs. Charles Scribner & Co. of New York, and afterwards Messrs. James R. Osgood & Co. of Boston, were applied to, but without success; for while, on other accounts, they were not indisposed to regard the proposition favorably, they hesitated to stake upon a single enterprise so large an amount of capital as seemed likely to be required to carry out this work with the thoroughness contemplated. This caused, however, only a temporary delay. After having put their hands to the plough, the undersigned had at no time the idea of looking back; and when it became evident that, if the work was to be carried through, the entire responsibility must rest upon themselves alone, they came to the deliberate conclusion that their shoulders were broad enough to bear it. In point of fact, however, the original cost of the publication proved greater than was anticipated, the work, including revision, having cost $325,000. The design from the beginning having been to make a good book, no other consideration has been at any time allowed to interfere for a moment with it. The circle of eminent contributors has been constantly extending; and it is believed that no similar work has ever been produced in this country, or elsewhere, in which the literary labor of preparation has been more liberally compensated.

The active labor of revising the work was vigorously begun early in the spring of 1883, under the direction of the same Editors-in-Chief and an Editorial Staff of Associate Editors, composed, in part, of those who originally acted in this capacity and of several other prominent scholars, who were induced by the publishers to assume a share of the editorial revision, aided by an able and thoroughly competent corps of special contributors.

As the work of revision advanced, and its magnitude began to be more fully appreciated by those interested in its preparation, the principle of the division of labor which had guided its execution from the beginning was brought more distinctly out, and made more efficacious, by enlarging the Editorial Staff, as before mentioned, and incorporating into it men not only thoroughly competent to direct the several departments of which they assumed the charge, but known to be so by the public. Time, also, was given to these gentlemen to revise thoroughly the whole work and to propose additions or emendations with the most perfect freedom; and all the suggestions of improvements made by them were unhesitatingly adopted, without regard to expense. This has to some degree retarded the appearance of the revised work, which it had been designed to lay before the public some time in 1884; but the Publishers have the satisfaction of believing that the delay thus occasioned has been vastly more than compensated for in having secured for the work the careful scrutiny and approval of the body of able and distinguished men whose names appear on the title-page as Editors and Associate Editors. It is not without a feeling of natural pride that the Publishers call public attention to the galaxy of talent there exhibited, each departmental Editor having been engaged in consequence of the honorable eminence already achieved by him in some one of the many paths of letters or science. No name has been included in the list merely to give an adventitious lustre to the book. All are the names of active workers, and they are placed there to give the public a secure guaranty of the trustworthiness of the varied information which these volumes embrace.

The *county colored reference-maps* which comprise the *Atlas* part of the work—a new feature in a cyclopædia in the way they are used—were drawn by *Mr. T. W. Baker*, and engraved by *Mr. C. X. Craig* upon copper plates in our office; and therefore, without fear of contradiction, we declare them to be peerless in *accuracy*, *beauty*, and *freshness*. The type is *new*, and the illustrations were not borrowed or bought, nor are they old casts put in simply to fill space, please the eye, and sell the work, but are mainly new and from original drawings, and are inserted where the pencil of the artist is necessary to supplement the pen of the writer.

There are many new and valuable features connected with this Cyclopædia which cannot be as well understood from a short written description as by a careful examination of the work itself, and hence an attempt to set them forth here will not be made. The Publishers, in addition to their own daily supervision in every business line of the work, have spared no expense to secure its thorough execution in every respect; and they feel confident, knowing the work as they do from its beginning, that it will meet the requirements of that great and ever-growing body of the American people for whose use it is especially designed. In conclusion, we would call special attention to the Appendices in each volume and to the fine engravings of the Editors, gratefully thank the public for their very liberal patronage in the past, and respectfully ask for its continuance in the future.

Faithfully,

A. J. JOHNSON & CO.

11 Great Jones Street, New York, 1886.

Note.—We take this opportunity to notify our patrons that Biennial Supplements to Johnson's Universal Cyclopædia will be issued (as usual) every two years, at *cost*, to actual subscribers whose names and addresses are upon our books; and we therefore request that our subscribers notify us of any actual or intended change of residence, in order that we may keep our record-books accurately posted.

PREFACE.

(REVISED EDITION.)

When a new book of general reference is presented for the first time to the public, it becomes its originators to state the reasons which have induced them to undertake the labor of its preparation, and to explain the principles which have guided them in the performance of their task. There are many encyclopædias already in existence, from the merits of which the present Editors are by no means disposed to detract. They, like most men whose lives are given to study, have made much use of works of this description, and have learned by experience to appreciate their value. But the same experience has taught them that there are certain particulars in which all the works of this class with which they are acquainted are more or less unsatisfactory.

In explanation of what is here meant, it must be premised that no cyclopædia, however it may be named, can be, in the strictest sense, universal, and that therefore every such work must sometimes fail to respond to the demands of the inquirer. The misfortune is, that the particulars as to which these works are thus occasionally disappointing are too often precisely those on which information is most frequently needed in the ordinary affairs of life. In statistics, for example, they deal much in aggregates and little in details. In geography they are full upon countries, and provinces, and capitals, and populous cities; but whatever lies beyond this they leave to the gazetteers. And while, as to the men whose names have come down to us from other times, the information they furnish leaves little to desire, in regard to those who have made themselves conspicuous among the living generation, they are either silent, or their notices are imperfect and few.

But, in the second place, the information which these works contain is often scattered through too large a space: facts of detail, of which the need is immediate and pressing, are so submerged beneath the multitude of words that the hurried inquirer finds his time and his patience alike too limited to permit him to study them out. The works of this class which have cost their editors the largest labor and their publishers the largest outlay —such, for instance, as the "Encyclopædia Metropolitana" and the "Encyclopædia Britannica"—have, as a necessary consequence of their ambitious design, and in virtue of the very pains expended in carrying this faithfully out, sacrificed to a great degree their every-day usefulness. For quiet perusal, with abundance of leisure, they are invaluable; but they are libraries rather than books of reference. They are in no proper sense dictionaries, but groups of systematic treatises loosely linked together; and though their general titles are arranged in alphabetic order, they can only be conveniently consulted for the purposes of occasional reference by the aid of an independent index.

But, thirdly, these elaborate and costly works have not only the character of a library, they have almost the bulk of a library. They fill many volumes, and occupy so large an amount of space as to unfit them altogether for table use. A condition indispensable to the usefulness of a book of reference is, nevertheless, that it shall be always near the inquirer's hand—on the table of the student, on the desk of the merchant, on the bench of the artisan;—a condition which deprives every voluminous cyclopædia, however great in other respects may be its merits, of its principal practical value for the every-day uses of practical men.

Another fault of most works of this class is, that the information they give cannot always be trusted. In this respect they are very unequal. An article, for example, in the "Encyclopædia Britannica," which bears the signature of Thomas Young, or Henry Brougham, or Sir John Herschel, will of course command universal confidence; but besides such as these, there are in the same work many articles of unknown authorship, derived probably, in most instances, from previous similar publications, and originally affected by unsuspected errors which they continue to perpetuate.

Finally, it is too often the case that books of general reference are behind the actual state of knowledge at the date of their publication. In the progress of the sciences, in the growth and decline of industries, in the incessant social and political mutations which time brings with it, any occasional résumé of the aspects of human affairs must largely lose in value in proportion as the point of time for which it is true recedes into the past. Every inquirer, therefore, who has sought from books of reference information as to matters of living interest, must have been often disappointed to find that, while they tell him so very much, they fail to tell him precisely what he wants to know.

Entering thus upon their task with a lively recollection of the particulars in which they have found the books of general reference at their command to fail them at their need, the Editors of this one have faithfully labored, not wholly they trust without success, to avoid the faults here signalized. To this end, considering in the outset that no work, however comprehensive its scope, can be absolutely exhaustive of all human knowledge, they have aimed to give the largest space to matters concerning which the need of exact information is most generally and most frequently felt; keeping in view, at the same time, the wants of the student in his closet, and those of the practical man in the daily affairs of life.

They have, secondly, treated all large subjects *analytically*, exhibiting each elementary topic under its own head in alphabetic order. Titles are thus multiplied and separate articles abridged. The work becomes its own index, and is made to combine the character of a dictionary with that of a cyclopædia. Upon topics of principal importance or of immediate and living interest, nevertheless, it has not been considered incompatible with this plan to introduce systematic essays; but these when admitted are practically indexed, by including their subordinate titles in the alphabetic arrangement, with cross-references to the principal articles. The accuracy of the information conveyed in these more elaborate essays is in all cases attested by the signatures of their writers, who will be recognized in general as the highest authorities on the subjects thus treated. In the list of these valued contributors, elsewhere given, will be noticed the names of very many gentlemen of distinguished eminence in letters and science in the United States and in Europe.

In the articles of the class by far most numerous, however, the principle has been adhered to of compressing the largest number of facts or truths into the smallest possible compass. These articles are therefore very brief, but pithy in proportion to their brevity. Comments, discussions, speculations—even, as a rule, criticisms upon the *chefs d'œuvre* of art or letters—have been avoided. These have no fit place in a book of reference, of which the proper object is to give facts of positive knowledge, and not the opinions of men about such facts. This was the principle laid down by the eminent man with whom, as the Publishers have elsewhere stated in a narrative of deep interest, the project of this work originated. "Give me the facts—I will find you the words," seems always to have been the unuttered motto of HORACE GREELEY. And the only book of reference which Mr. Greeley required was a book of facts. The character of the present work will be found to have been largely controlled by this fundamental principle of its projector. Had he lived to rejoice with us in its revision, it might have been more largely so; but the present Editors have remembered that to most men facts are sometimes made more useful, and principles more intelligible, by concise illustrations of their significancy.

Still, the condensation given to the articles in general has made it possible to introduce an amount of information in detail, principally scientific, geographical, biographical, and statistical, quite beyond what will be found in any other cyclopædia.

1. As to Geography. So far as the United States are concerned, this work is a complete gazetteer. Every county and county town in every State or Territory will be found in its proper place in the article upon the State or Territory in which it is located, with the population given according to the census of 1870, 1880, or 1885, in order that the reader may note the increase or decrease between the given dates. The cities and larger

towns, as well as the States themselves, have been made the subjects of elaborate articles by accomplished experts, whose names, attached to the articles, will be a sufficient guaranty of the fidelity with which they have been prepared.

Nor has foreign geography been a subject of less careful or less conscientious attention, although it has not been followed into so minute detail as that of our own country. Compact notices are given of all towns numbering more than five thousand inhabitants; in which are exhibited all the important statistical facts relating to them, whether industrial, educational, social, religious, or in any manner otherwise interesting. Every important country has been treated, by specially competent writers, in a variety of aspects, including its physical geography; its political divisions; its growth or decline in population; its geology, natural history, and mineral resources; its agriculture and manufactures, and their characteristic products; its commerce and commercial marine; its inland navigation and railway communications; its political institutions; its systems of civil and criminal jurisprudence; its postal and telegraphic service; its provision for the maintenance of religion, the support of education, the cultivation of art, and the encouragement of science; its methods of organized benevolence; its literature, ephemeral and permanent; its military and naval strength; and finally, in brief outline sketch, the history of its past, as a key to its actual condition. Provinces and large towns have been treated in accordance with the same plan, in so far as it is applicable to them. The foreign countries and their principal towns are described in many cases by eminent foreign writers, members of the geographical and statistical societies of European capitals, or gentlemen of distinguished reputation whose studies have been specially devoted to these subjects.

2. As to Biography. In this department, the present work may fairly claim a certain merit, not only for what it has added of matter wholly new, but also for what it has omitted. Many names handed down from the distant past, which have long encumbered the dictionaries of biography without sensibly enhancing their value, will be looked for in the present publication in vain. They are names of men who were no doubt useful in their day, but who have been long since nearly swallowed up in that practical oblivion which awaits the great majority of mankind, however prominent among the men of their own generation. The space thus gained has been more usefully filled, by introducing in large number the biographies of living men, whose names are constantly encountered in journals or heard on people's lips, but of whom little is generally known beyond those facts of their history which have secured for them honorable distinction, or simple notoriety. The materials for these biographical notices have been gathered by writers perfectly well acquainted with their subjects; and the statements they embrace may be accepted as entirely authentic. It may probably be remarked that some of the names here given are not those of men entitled to permanent pedestals in a national Walhalla. To this entirely just observation the reply may be, that the object of these volumes is not to dispense laurels, nor to distinguish, among the candidates for immortality, those who are most deserving. Their single object is to furnish to the people such information as the people need—information, moreover, of a kind which the people have heretofore had no ready means of obtaining. But though among the names which appear in these volumes for the first time there are doubtless some which may have for the world, and even for the American portion of it, only a temporary interest, and which will therefore, sooner or later, drop from the places here assigned them, there are none, it is believed, concerning which the men of the present generation are not likely more or less frequently to desire information. They are names of men who have been, or who are now, conspicuous in public affairs, or prominent as religious teachers and leaders, or influential as writers or journalists, or distinguished as members of the Bar or Bench, or widely known as philanthropists, scholars, educators, engineers, naturalists, physicists, chemists, or devotees of abstract or applied science. It is of course not to be expected that a first attempt to gather the biographies of noted living men shall have included all who are fairly entitled to notice, or shall fail to have included some whose claims to such distinction are doubtful. The Editors can only promise that omissions and errors of this nature shall be corrected from time to time as new editions are issued.

3. As to Law. It is at once the duty and the interest of every member of an organized political society to acquaint himself with his rights as a citizen, and with the obligations

under which he lies to his fellow-citizens and to the government under which he lives. Keeping this proposition in view, the Editors have felt that it would add very greatly to the practical value of a book which is likely to be a hand-book and a table-book in the dwellings of the people, if there were here presented, more fully than they are elsewhere to be found except in works strictly professional, all the leading principles of municipal law, with clear explanations of the various modes of proceeding in law and in equity, and with descriptions of the most important legal forms and written instruments. This has been done with a thoroughness which will be understood, when it is stated that the present volume alone contains more than two hundred important articles belonging to this class.

Nor has what is called public law, or the law which is supposed to regulate the intercourse of nations, received less careful attention. The present Cyclopædia is believed to be the first of its class, published in this country, which has embraced in its plan a provision for the full and systematic unfolding of the principles of international law. The treatment of this weighty subject belongs in regular order to the fourth volume, and the article has been carefully prepared and is from the hand of a recognized master of the science. Questions of international obligation and international courtesy have been in our time of so frequent occurrence, that an authoritative exposition of the principles according to which they should be settled cannot fail to possess a high value for every citizen.

4. As to Pathology and Medicine. The Editors of this work are by no means inclined to favor the maxim that every man should be his own physician. But they are satisfied that a little of that kind of pathological knowledge which may enable a man to identify a disease, and a little of that acquaintance with therapeutics which may qualify him to judge what it is best to do for the patient before the professional practitioner can arrive, may often be the means of alleviating suffering, and perhaps of saving life. It is certainly better to use remedies with some knowledge of them, than to attempt their use, as is often done, with no knowledge of them at all. A book of reference, therefore, which is destined to lie on the table in many dwellings remote from towns or villages, where hours must often intervene before, in a case of emergency, medical aid can be obtained, will be largely increased in its usefulness if, in its preparation, there shall have been introduced into it such simple descriptions of the symptoms of the most frequently occurring diseases, and such suggestions as to the means to be earliest resorted to in order to palliate their violence, as can be understood and employed by any person of ordinary intelligence. In the preparation of the present work this object has been constantly kept in view. The diseases of children have received special attention; and it is confidently believed that this feature of the work will add much to its acceptability among the people.

5. As to Physics, Chemistry, Natural History, and the sciences generally, exact and applied. The design of the present Cyclopædia having been to make a work pre-eminently practical, it may be fairly claimed as a merit that it has given a larger proportion of its space to the sciences of nature, and their numerous applications, than is usual in works of its class. The fact is here simply noted, without descending to particulars or enlarging upon the importance of this feature. The most cursory inspection of the pages of the work will show the extent of its prevalence.

The foregoing points embrace the principal peculiarities which distinguish the present Cyclopædia from those which have gone before. Some few still remain which deserve a moment's attention.

First among these may be mentioned the careful attention which has been given to subjects distinctively American. In all the encyclopædias published abroad—and hundreds of copies of these are annually sold in the United States—these subjects are very imperfectly exhibited, or are left unnoticed altogether; nor has this defect been adequately repaired in any similar publication in our own country. In the preparation of the present work, no time or labor has been spared to secure a satisfactory presentation of whatever relates to the political or social history of the American people and the eminent men by whom this history has been adorned; to the form and principles of our government; to our laws and usages; our systems of education and educational institutions; our religious organizations; our public charities; our methods of agriculture; our artificial channels of transportation; the statistics of our population, commerce, manufactures, and mining; the characteristic features of our physical geography, with their accompanying varieties of climate, soil, and productions; the languages, habits, and habitations of the aboriginal occupants of the continent; the scattered traces yet remaining of extinct races which preceded these; and numerous topics of a kindred nature which are likely to interest especially the American reader. The present work will furnish ample evidence of the steadiness with which this object has been kept in view.

Something may be claimed, in the next place, for the sincerity with which it has been endeavored to keep this work entirely free from every kind of bias. In books of general reference there must unavoidably be embraced many subjects on which opinions differ; and—a thing of much greater consequence—on which feelings are even more widely at variance than opinions. To this class belong grave questions of public policy, momentous events in the history of the still living generation, and the doctrines which distinctively divide the differing schools of religious thought. In regard to all these, the Editors have steadily endeavored that the views of every party, section and denomination should be presented fairly, and with entire respect for the views of others. To the end that this desirable result might be more surely attained, they have associated with themselves a number of distinguished gentlemen, who will be recognized as fairly representing the different portions of our country geographically, and its principal religious denominations. Security has thus been provided that every class of opinions shall be expounded by its friends; while, by the simple expedient of never admitting any paragraph or sentence which, to any member of the editorial staff, seemed, either in statement or in spirit, objectionable, the work has been kept, it is hoped, free from liability to any just imputation of prejudice or partiality. A similar impartiality has thus likewise been secured for it in the collection of the numerous biographical notices which it contains of conspicuous members, still living, of different religious denominations; the associate editors representing such denominations having undertaken, each within his own, to gather such notices, and all of them having largely contributed in this department with their own hands.

The means, thirdly, which have been employed to ascertain with exactness the statistics of towns, villages, public works and public institutions, and to gather facts of local history and personal interest, have been probably without example in the conduct of any similar enterprise. Communications have been opened with some hundreds of local correspondents scattered throughout all the States and Territories of the United States, involving the interchange of letters to the number of many thousands, besides the transmission of a still larger number of forms for the registration of the information gathered. The necessary manuscript correspondence has been too voluminous to be maintained in any other way than by dictation to phonographic clerks or other rapid writers. In the management of this very laborious branch of the business, the Editors have to acknowledge their obligations to the energetic Publishers, by whom the principal burden of it has been borne, and who have thus left them a larger freedom to maintain the necessary correspondence, also very heavy, with the special writers occupied with topics of greater importance and wider scope.

For the preparation of articles compiled from printed authorities, an able staff of editorial assistants and other writers has been employed in the office, whose time is given exclusively to this work. A comprehensive library has been provided expressly for their use, embracing every cyclopædia, general or special, and every dictionary or compendium of art, science, law, medicine, theology, biblical literature, mythology, history, archæology, technology, geography, natural history, biography, etc. etc., known to have been published in this country, in England, or on the continent of Europe, within the last twenty years. To these have been added the proceedings of geographical and statistical societies, periodical journals devoted to these sciences, the reports and public documents published under the authority of governments, relating to population, commerce, agriculture, manufactures, coinage, currency, etc., and in general all publications entitled to be regarded as authentic sources of information as to important matters of fact. All the articles prepared by the writers in the office have passed under the critical scrutiny of three or four, at least, of the editorial staff, before being finally given to the press. With these ample provisions to secure accuracy and to guard against errors of ignorance or inadvertency, it is to be hoped that the faults of this work will consist rather in its unavoidable omissions than in any seriously mistaken statements.

As additional evidence of the thoroughness with which the work of this Cyclopædia has been, at least in intention, conducted, it may be further remarked, that the number of specially qualified writers engaged in it is unprecedentedly great. No argument is necessary to secure assent to the proposition, that an article upon any important subject prepared by one who, through the study and investigation of a lifetime, has made the subject his own, must be at once more clear in its method and more instructive in its details, than any that can be compiled by an ordinary writer, even with the best printed authorities before him. The rule has been, therefore, to place such subjects in such hands; and this has been followed out so persistently that, in not a few instances, after articles in themselves quite unexceptionable had been already prepared by the office-writers, and had even been set up in type, they have been subsequently cancelled and set aside in favor of new articles by living authorities upon the same subjects, whose co-operation had been later secured. In regard to changes of this nature, in many instances involving delay and no slight expense, the Editors feel bound to acknowledge—and they do here publicly acknowledge—the unfailing cheerfulness with which the Publishers have received all their suggestions, and the prompt liberality with which they have carried them into effect.

After saying so much of the pains taken with the literary labor of the Cyclopædia, it may seem like descending to matters comparatively trivial to speak of the work as a pronouncing dictionary. This, however, is a feature in it which will strongly recommend it to most readers; for nothing is more embarrassing, either in public speaking or in ordinary conversation, than the uncertainty which is often felt as to the proper mode of accenting an unfamiliar word. In this book the place of the accent is marked in the title of every article, and thus the essential guide is given to its just pronunciation.

One important observation remains to be made in conclusion. No cyclopædia, however correctly it may represent the state of the world's knowledge or of its material condition at the date of its publication, can continue to do so for a long period of years. Works of this kind, nevertheless, have often been reprinted from the same plates unaltered, for a quarter of a century or more; long before the end of which period, in regard to all matters to which time brings change, they cease to be authorities altogether. With the present work it is proposed to pursue a different plan. Editions will be printed from time to time, as the demand may require; but no edition will be published without such corrections in the plates as the progress of time may render necessary. The book will therefore always, so far as vigilance can accomplish that result, be kept up in its record of facts to the date of its delivery to purchasers; and its latest issues will stand on a level, in point of authority, with its earliest. It follows that whatever errors may be found to have escaped notice in the present issue, will be corrected as soon as discovered; and the Editors will feel themselves under obligations to any who will call their attention to such as they may chance to observe.

By means of this system of continual emendation, by supplying omissions, by adding immediately on their announcement new facts which the progress of discovery may bring to light, and by entirely rewriting, from time to time, such articles as are capable of being improved by reconstruction, the Editors trust that the work may not only preserve its original value, but that it may even, with lapse of time, grow more and more useful to the public for whose benefit it has been designed, and to whose judgment it is now submitted.

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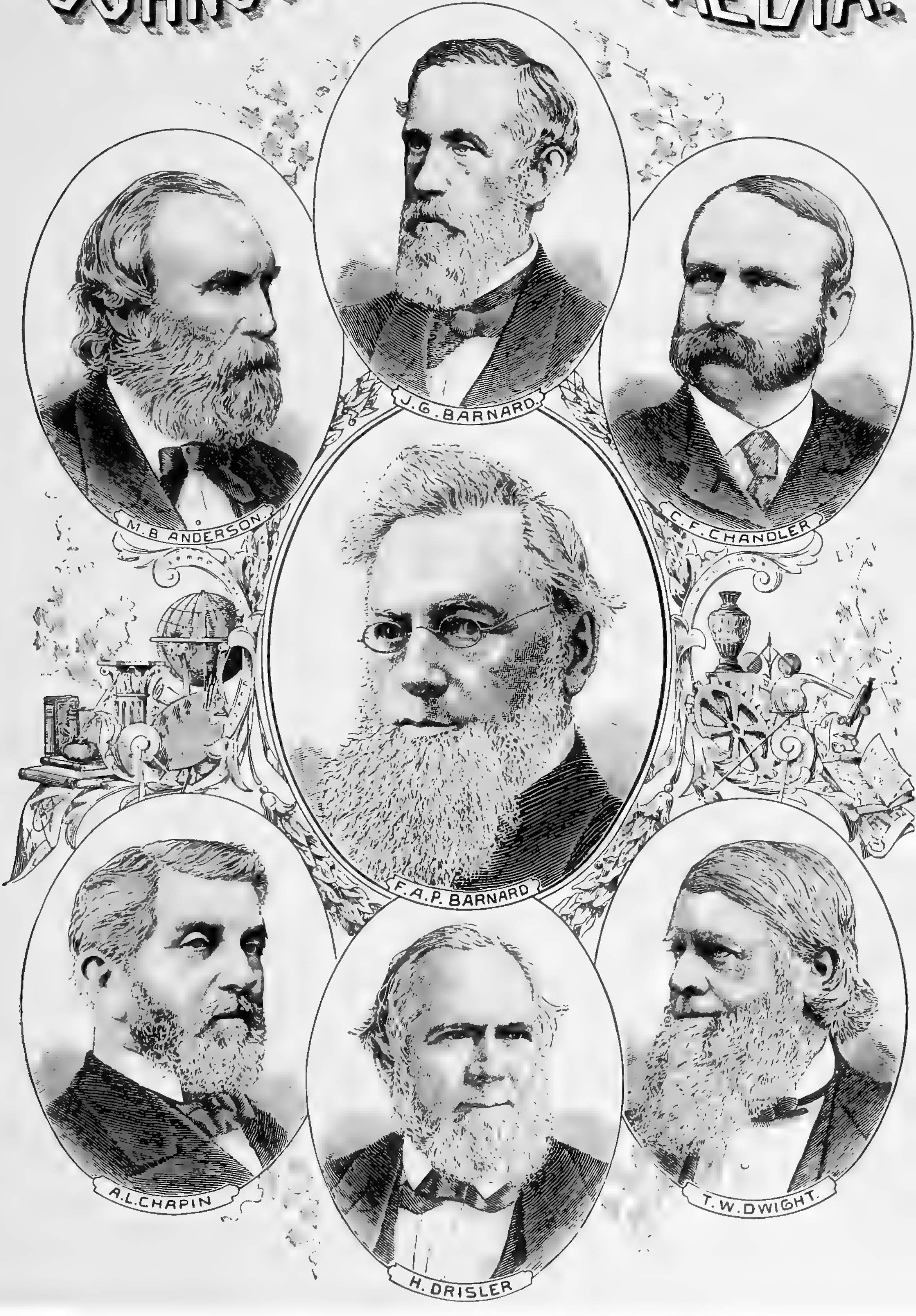

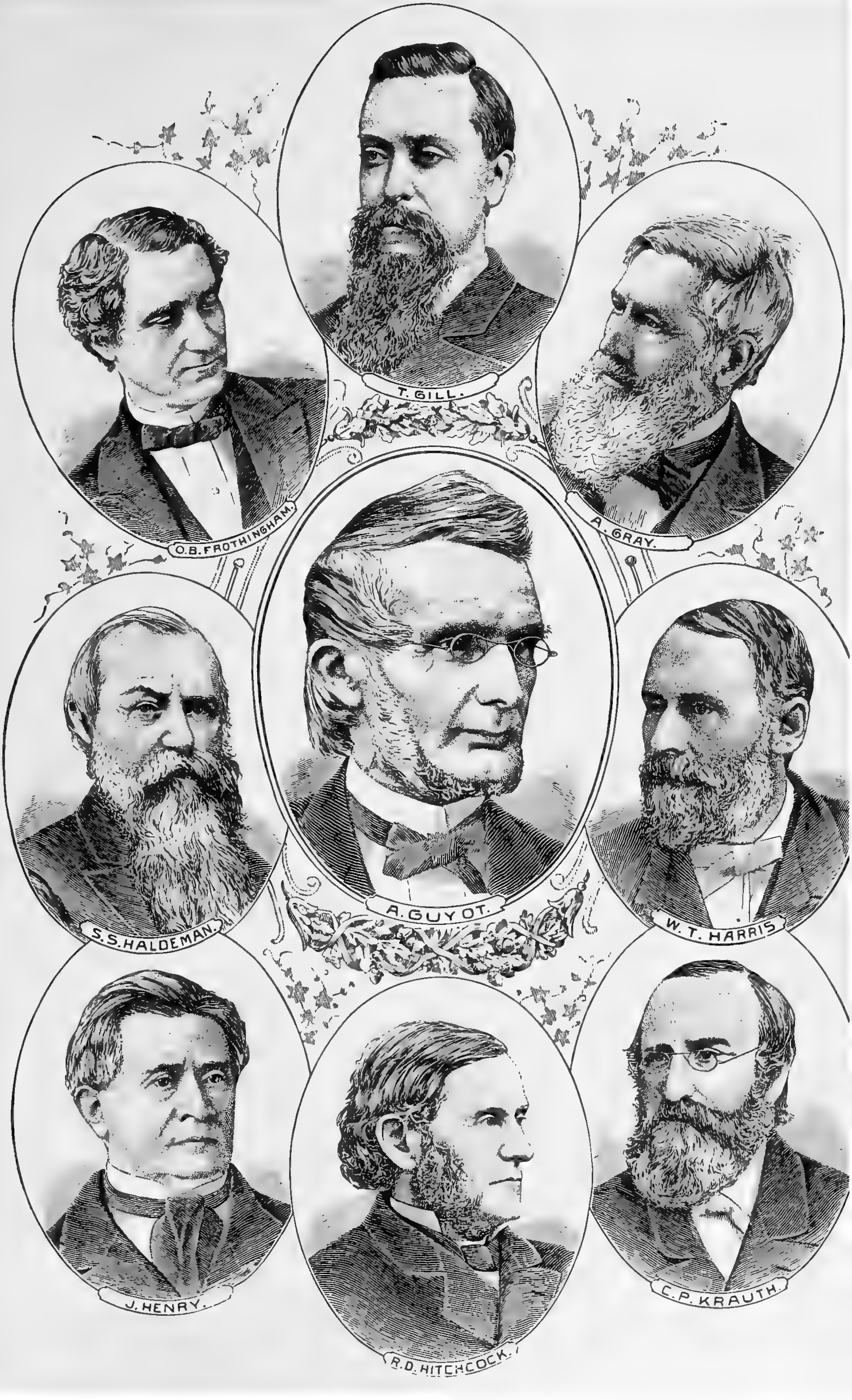
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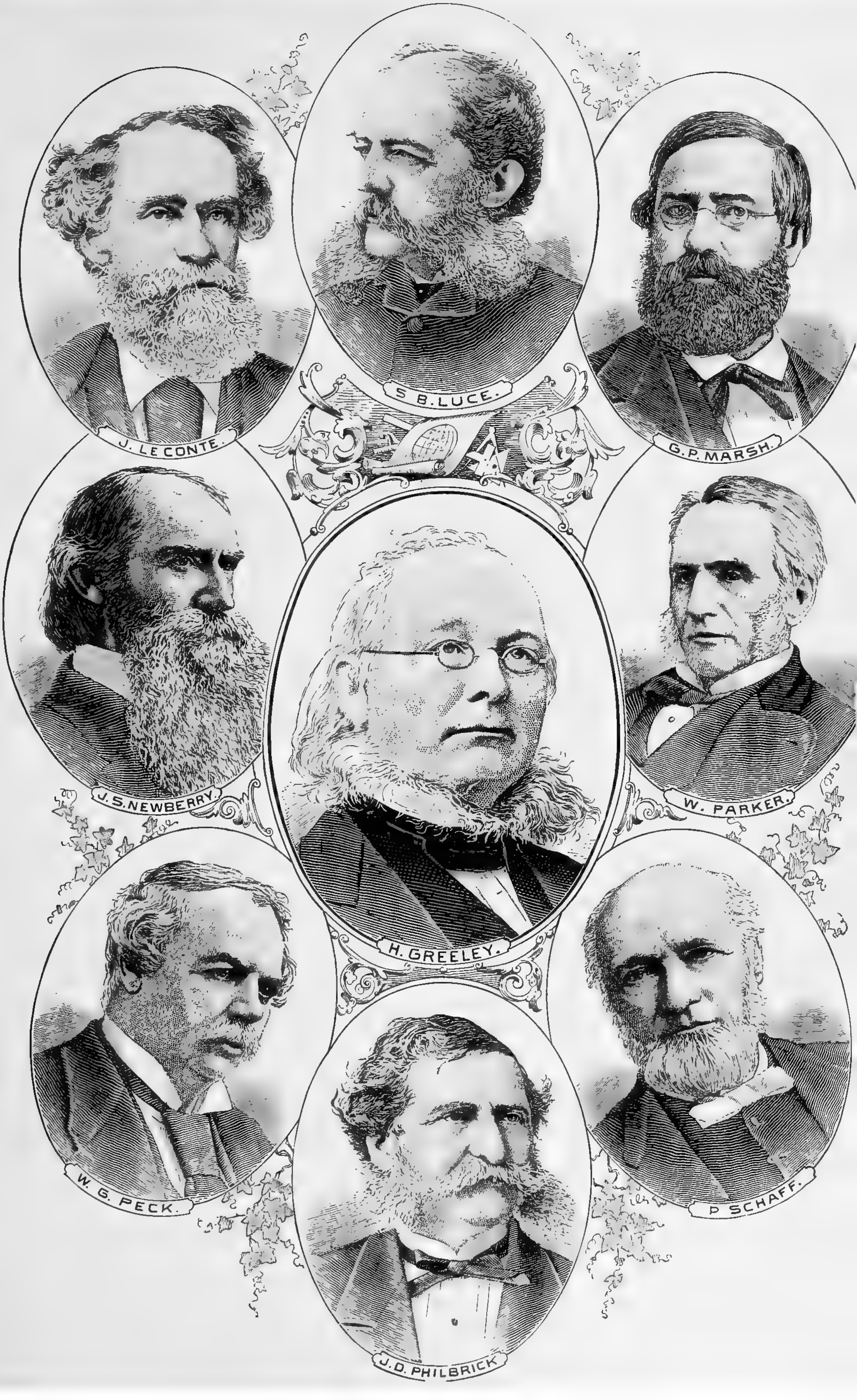
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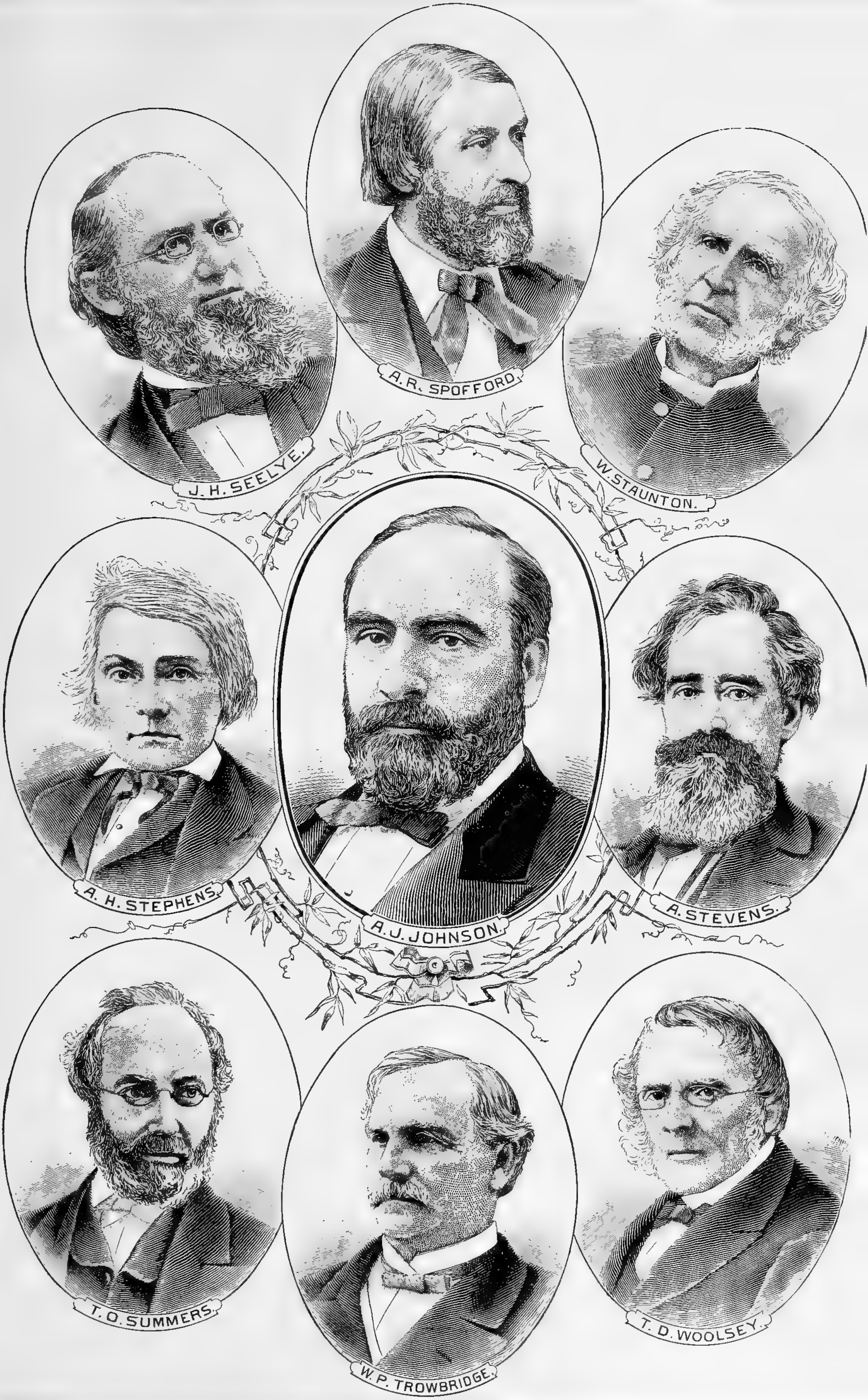
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⁂ The following statement shows the subjects to which the different members of the Editorial Staff have severally given their more particular attention, not only in themselves preparing articles relating to those subjects, but also in securing contributions from others, and in carefully scrutinizing all such contributions with a view both to ensure accuracy and to exclude anything which might seem objectionable.

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* The names of the following gentlemen—J. G. Barnard, Horace Greeley, Arnold Guyot, S. S. Haldeman, Joseph Henry, C. P. Krauth, George P. Marsh, Willard Parker, Alexander H. Stephens, Thomas O. Summers—have been, with justice, retained upon the *Editorial Staff*, as their latest labors were given to this work.

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Tidball, John C., U. S. A.,
Col. U. S. Artillery, Bvt. Maj.-Gen. U. S. A.

Tillman, Samuel D., LL.D., New York,
Late Prof. of Mechanical Philosophy and Technol., Am. Inst.

Trumbull, Rev. Henry Clay, S. T. D., Phila., Pa.,
Editor of the Sunday-School Times.

Tyler, William S., S. T. D., Amherst, Mass.,
Williston Prof. of the Greek Lan. and Lit. in Amherst College.

Walker, Francis Amasa, LL.D., Boston, Mass.,
President of Massachusetts Institute of Technology.

Walsh, Patrick, Augusta, Ga.,
President of Chronicle and Constitutionalist.

Warren, William F., D. D., LL.D.,
President of Boston University, Mass.

Watson, James C., Ph. D., LL.D., M. N. A. S.,
Late Professor of Astronomy, University of Michigan, and Director of the Observatory at Ann Arbor.

Whedon, Daniel D., S. T. D., LL.D.,
Late Editor of the Methodist Quarterly Review.

Wilder, Alexander, M. D., New York,
President of Board of Trustees, Eclectic Medical College.

Wingate, Charles F., New York, Sanitary Engineer.

Winter, William, Esq., New York, New York Tribune.

Woolsey, Theodore D., S. T. D., LL.D.,
Ex-President of Yale College, Conn.

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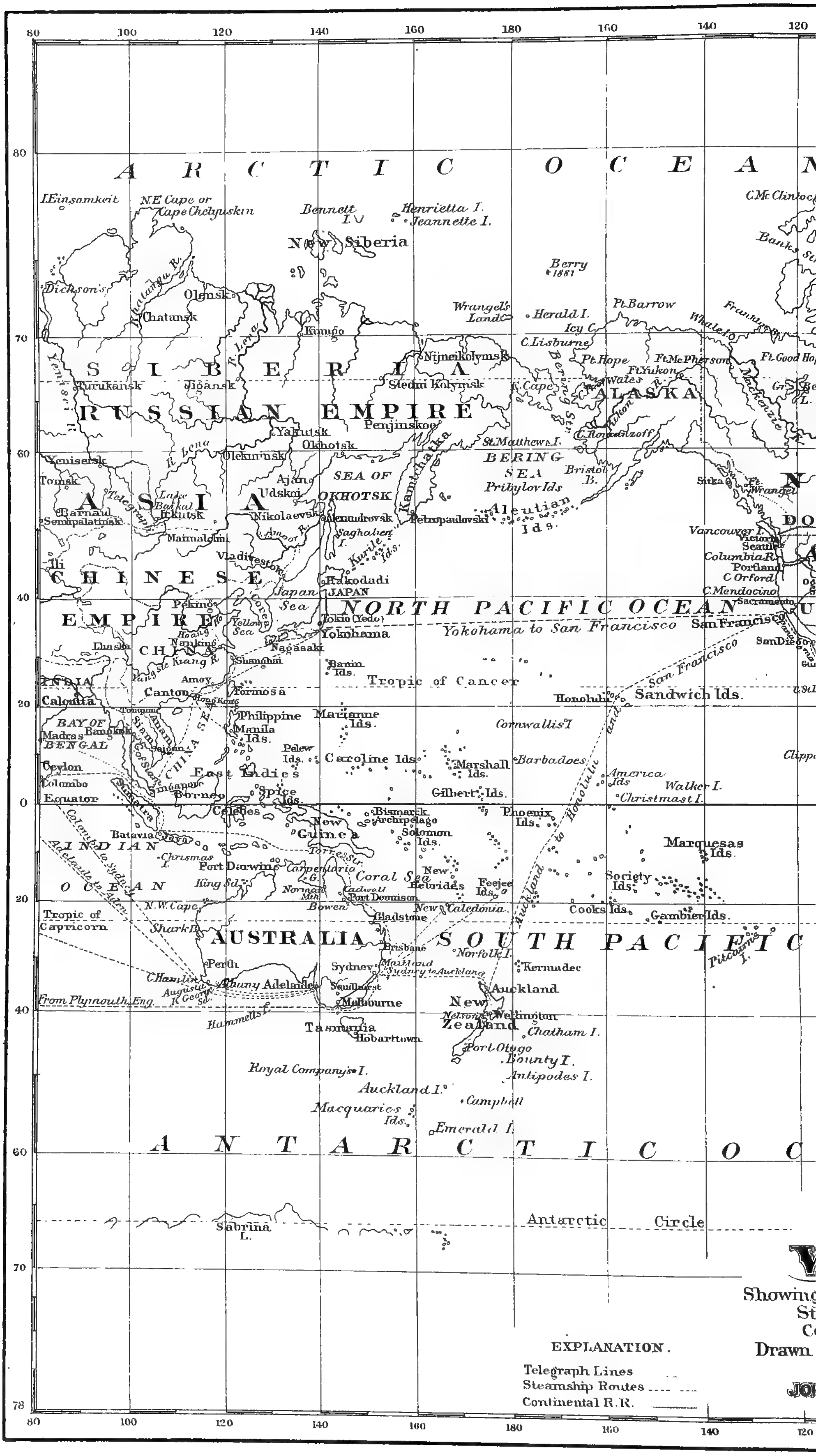
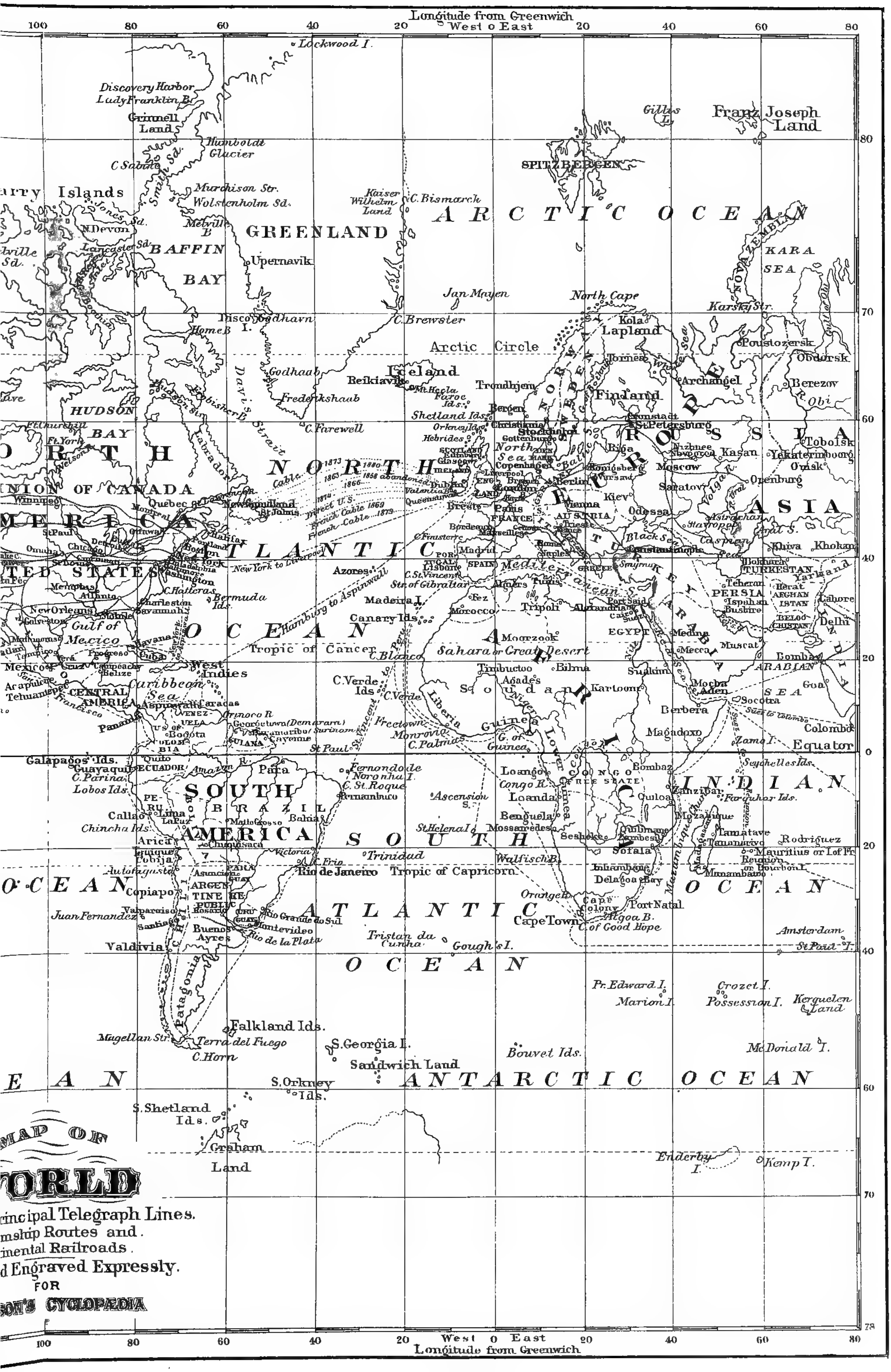


EXPLANATION.

Telegraph Lines
Steamship Routes
Continental R.R.



MAP OF

ORLD

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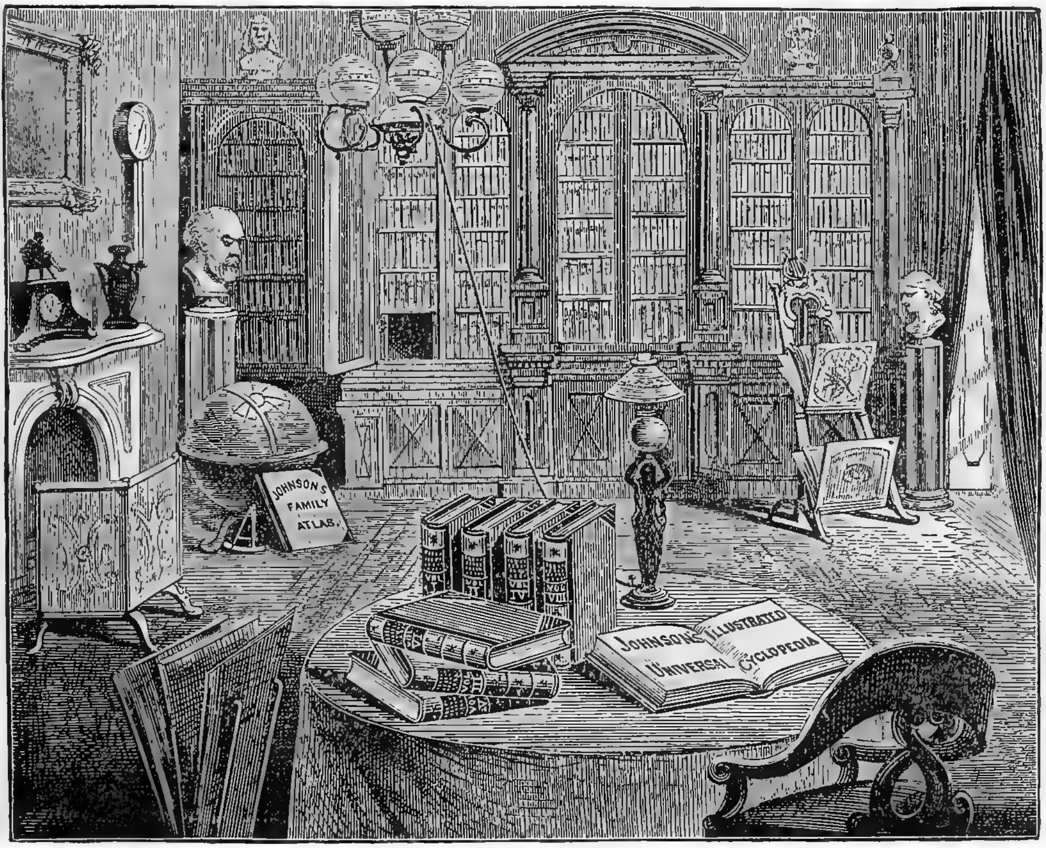
FOR
SON'S CYCLOPÆDIA

JOHNSON'S
NEW ILLUSTRATED
UNIVERSAL CYCLOPÆDIA.



A.

A, the first letter of all known phonetic alphabets, except the Abyssinian (or Ethiopian), in which it forms the thirteenth, and the Runic, in which it is the tenth. The cause of its being placed at the head of all the principal European and Asiatic alphabets is not certainly known, but is probably to be found in the fact that the original sound of the letter (similar to that of our *a* in *far*) is the most easily formed of all the vowels, requiring for its utterance scarcely any effort, and the slightest possible change in the position of the vocal organs, except simply opening the mouth; it is accordingly the first sound that children usually utter. *A* with a stroke above it (*á*), in the ancient Greek, denoted the first numeral, but a̩ with the stroke beneath stood for 1000. *A* in Latin stands for 500, and with a stroke over (*Ā*) for ten times that number (or 5000). *A* is also used to mark a note in MUSIC (which see). *A* is frequently used as an abbreviation. (See ABBREVIATIONS.) In logic, *A* is the sign employed to denote a universal affirmative proposition. *A*1 (or "A No. 1") is often applied in mercantile affairs to denote any article of the very highest class. In registering vessels, *A* designates the character of the hull of the vessel, while the figure 1 marks the efficient state of her anchors, cables, stores, etc. In Latin, *A* stands for several proper names, especially for the prænomen *Aulus*.

A, Ab, or **Abs,** a Latin particle signifying "from," "off," "away," and forming the prefix of a multitude of English words, as *abduct*, to "lead or take away;" *abstract*, to "draw away or from;" *avert*, to "turn away."

Aa, the name of several rivers or streams in Germany, Switzerland, Holland, Russia, and France. It is supposed to signify "water," and to be etymologically related to the Latin *aqua*. The Icelandic word for "river" is **á**. In Swedish this primitive form becomes **å**, and in Danish **aa,** and these syllables become very often the termination of names of rivers in the three countries mentioned. **Aach,** or **Ach,** another form of the same, constitutes a part of several geographical names, as *Aachen* (the German of Aix-la-Chapelle), *Biberach*, etc.

Aachen. See Aix-la-Chapelle.

Aagesen (Svend), (*Sueno Agonis*), wrote, at the command of Archbishop Absalon of Lund, at the close of the twelfth and in the beginning of the thirteenth century, a history of Denmark down to 1187, edited by S. J. Stephanius, Soröe, 1642, under the title, "Suenonis Agonis filii Opuscula."

Aal'borg (*i. e.* "Eel Castle" or "city"), a seaport of Denmark, in Jutland, on the south shore of the Lymfiord, through which vessels pass into the Cattegat, and 63 miles N. W. of Aarhuus. The number of vessels arriving here annually amounts to about 600. Pop. in 1880, 14,152.

Aa'len, a town of Würtemberg, on the Kocher, 48 miles by rail E. N. E. of Stuttgart. Pop. in 1880, 6491.

Aa'li Pash'a (Mehemed Emin), a Turkish statesman, was born in 1815 at Constantinople, was appointed minister of foreign affairs Aug. 15, 1845, which position he filled three times within the period from 1846 to 1853. In Dec., 1845, he became chancellor of the divan, in 1846 pasha, and in 1852 for the first time grand vizier, which position he afterwards held several times. In 1855 he represented Turkey at the conferences of Vienna and Paris, and signed the treaty of Paris of Mar. 30, 1856. In May, 1864, he presided at the conference of European powers for settling the Rumanian question. In 1867, while the sultan undertook a tour over the Continent, Aali Pasha was appointed regent of the empire. In the same year he went to Candia to settle the difficulties there amicably. Died Sept. 6, 1871.

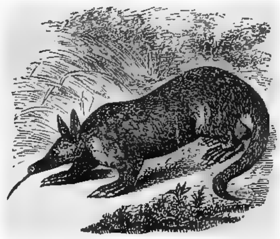
Aall (Jakob). See Appendix.

Aalten, a town of the Netherlands, province of Guelderland, on the Aar, 29 miles E. of Arnhem. Pop. in 1880, 6591.

Aar, a river of Switzerland, rising in the Grimsel and Schreckhorn Mountains in the canton of Berne, forms the remarkable fall of Handeck, traverses the lakes of Brienz and Thun, and enters the Rhine opposite Waldshut. Length, 175 miles. It is navigable from Thun to its mouth. Aar is also the name of several rivers of Germany.

Aa'rau, a town of Switzerland, capital of Aargau, on the river Aar, 63 miles by railway W. of Zürich. It has manufactures of silk and cotton stuffs, mathematical instruments, etc. In 1798 it was the capital of the Helvetic republic. (See Switzerland.) Pop. in 1880, 5944.

Aard-Vark, *i. e.* "earth-pig" (*Orycter'opus Capen'sis*), an animal of the class Mammalia, order Edentata, abounds in Cape Colony. It is a plantigrade, is about five feet long, including the tail, burrows in the ground if pursued, and quickly enters so far that it is beyond the reach of the pursuer. It feeds on ants, seeking its prey by night; it readily breaks down the walls of the ant-hills, catching the insects with its long prehensile and slimy tongue. Its flesh is often used as food.


Aard-Vark.

Aard-Wolf, *i. e.* "earth-wolf" (*Prot'eles crista'tus*), a carnivorous digitigrade quadruped of the class Mammalia, is a native of Caffraria. It is about equal in size to a fox, and resembles a hyæna in structure and other respects, having the fore legs longer than the hind legs. It is called earth-wolf because it digs burrows or holes in the ground, in which it passes the day. It is considered by some as a connecting link between the hyæna and the dog.

Aar'gau [Fr. *Aargovie*], a canton in the N. part of Switzerland, is bounded on the N. by Germany, on the E. by Zurich, on the S. by Lucerne, and on the W. by Basel and Solothurn. Area, 543 square miles. The chief rivers are the Aar and the Limmat. It consists chiefly of fertile and well-cultivated hills. Its minerals are unimportant, but it has remarkable palæontological remains in its rocks. Fruit of all kinds is produced in large quantities, and many cattle are raised here. It has important cotton-factories. There are mineral springs at Baden and Schinznach. In 1880 the population was 198,645, of whom 108,029 were Protestants, 88,893 Roman Catholics, 489 belonged to other Christian churches, and 1234 were Jews. It formed a part of the canton of Bern until 1798, but was erected into a separate canton after the Helvetic republic was proclaimed, and was organized in 1803. The constitution is dated from 1841, and was revised in 1852 and in 1862. Capital, Aarau. (See Müller, "Der Aargau.")

Aar'huus, a seaport of Denmark, on the E. coast of Jutland, on the Cattegat, 37 miles S. E. of Viborg. It has a cathedral, a museum, a library, and various manufactories. Pop. in 1880, 24,831.

Aar'on [Heb. אהרון], the first high priest of the Israelites, was a descendant of Levi, probably in the eighth or ninth generation. He was three years older than his brother Moses (Ex. vii. 7), and apparently (Ex. ii. 4) some years younger than their sister Miriam. An impulsive and eloquent man, he was appointed spokesman to Moses, whom he assisted in the deliverance of the Israelites from the bondage in Egypt. He died on Mount Hor, which is still called the "Mountain of Aaron," and was succeeded in the priesthood by his son Eleazar.

Aaron (Samuel), a Baptist minister and educator, born in 1800 at New Britain, Pa., was ordained in 1829, and held pastorates at New Britain and Norristown, Pa., and at Burlington and Mount Holly, N. J. He also gained great reputation as a teacher in various schools, especially at Treemount Seminary, near Norristown, and the Mount Holly Institute. He was the author of various text-books. Died April 11, 1865.

Aar'sens, or **Aarssens, van** (Franciscus), born at The Hague in 1572, was the son of the Dutch statesman Cornelis van Aarsens (1543–1624). The younger Van Aarsens was sent to the court of France as resident in 1598, and as ambassador in 1609 and in 1627; to Venice from 1609 to 1615, and again in 1619; to England in 1626 and in 1640, when he negotiated the marriage between the prince of Orange (William II. of Nassau) and the princess Mary, daughter of Charles I. of England. Died in 1641.

Aa'sen (Ivar Andreas), a Norwegian writer, born Aug. 5, 1813, at Orsteen, was at first a school-teacher, but subsequently devoted himself wholly to the study of the Norwegian dialects. He was supported in this study by the Drontheim Association of Sciences, which furnished him the means of visiting all parts of the country. He wrote "Det Norske folkesprogs grammatik" (1848), "Ordbog over det Norske folkesprog" (1852; new and much improved ed. 1873), and "Norske ordsprog" (1856).

Aas'vær is the name of a group of small islands under the Arctic polar circle, about 10 miles from the Norwegian coast, which until recently were entirely unnoticed. The owner leased them for a small price to two poor fishermen. At present they are one of the most important fishing-places in Europe. About Dec. 10, when the herrings arrive, over 10,000 fishermen come here, and in two or three weeks catch about 200,000 kegs of herrings. From Jan. 1 to Dec. 1 the islands are almost deserted, being inhabited by only a few families.

Ab, the eleventh month of the Jewish civil year, and the fifth of the ecclesiastical year.

Abab'de, a village of Middle Egypt, on the east bank of the Nile, 8 miles S. of Beni Hassan. Near it are the ruins of the ancient Antinoë (or Antinoöpolis), a city built by the emperor Hadrian (or Adrian) in honor of his favorite Antinoüs.

Ababdeh, a negro tribe of nomads in Upper Egypt and Nubia, are chiefly employed as guides through the deserts.

Ab'aca, or **Manila Hemp,** is the fibre of the leaf-stalk of a species of plantain (*Mu'sa troglodyta'rum*, otherwise called *Mu'sa tex'tilis*), growing abundantly in the Philippine Islands, from which many thousand tons are annually exported. Of the fibres of this tree a cordage is made which has the property of floating on water; sea-water does not rot it, and it therefore requires no tarring. A portion of the fibre which is fine and white is manufactured into a kind of linen. It is an excellent material for paper.

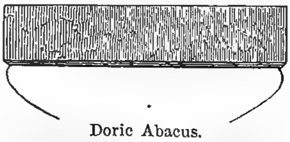
Aback', in sea-language, denotes the position of the sails when laid flat against the mast, either by the force of the wind or to avoid some imminent danger.

Ab'aco, or **Great Abaco,** the largest of the Bahama Islands, is 80 miles long, its N. E. point being in lat. 26° 18' N., lon. 76° 57' W. Area, about 96 square miles. Carleton is the chief town.—Little Abaco lies W. of the northern part of Abaco.

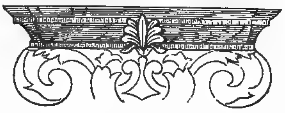
Ab'acot, an antique cap of state, worn formerly by the kings of England. It was made in the shape of a double crown.

Ab'acus [Gr. ἄβαξ, gen. ἄβακος], a calculating instrument used in mercantile transactions by the ancient Greeks and Romans. It is still used by the Chinese, and to a certain extent in our own schools to illustrate addition and subtraction. As thus used, it usually consists of several parallel wires stretched from side to side of a rectangular frame, each wire carrying ten sliding beads, or counters. The wires represent successive *orders* of units, and the counters stand for *units* of the several orders. *Ab'acus*

Pythagor'icus was anciently a name for the multiplication table. The word has an architectural meaning, and signifies the level tablet placed between the entablature and the capital of a column. The old Ionic as well as the Tuscan abacus is similar to the Doric (as here represented), but the new Ionic resembles the Corinthian.



Doric Abacus.



Corinthian Abacus.

Abâd, an affix of Persian origin, signifying "abode," and occurring in the names of many cities in the East; as *Hyderâbâd,* the "abode or city of Hyder."

Abâd' is also the name of several kings who reigned in Moorish Spain. Abâd I. was the first Moslem king of Seville. He began to reign in 1023, and died in 1042. Abâd III., the last of this dynasty, died in 1095.

Abad'don, a Hebrew name applied to the angel of the bottomless pit; the same as the Asmodeus of Tobit iii. 8, and the Apollyon of Rev. ix. 11.

Abaissé, or **Abaissed** (*i. e.* "lowered"), a term in heraldry applied to any armorial figure when it is depressed or placed below the centre of the shield.

Abalo'ne, a name, derived from the Spanish, given in California to species of *Haliotis*, especially *H. Cracherodii*.

Ab'ana, the name of one of the rivers of Damascus mentioned in the Bible (2 Kings v. 12). Its identification with the modern Barada is now generally accepted. (See PORTER'S "Five Years in Damascus," 1855.)

Abancay', a town of Peru, in the department of Cuzco, is situated on the river Abancay, 74 miles W. S. W. of Cuzco. It has large sugar-refineries. Pop. estimated at about 5000.

Abancourt, d' (CHARLES FREROT), a distinguished French engineer, born in Paris, resided many years in Turkey in the employ of the French government. Several of the maps of Eastern Europe prepared by him have a high reputation. Died at Munich in 1801.

Abancourt, d' (CHARLES XAVIER JOSEPH FRANQUEVILLE), a minister of Louis XVI. of France, was born at Douai in 1758. He was a nephew of the celebrated Calonne. He was massacred at Versailles Sept. 9, 1792.

Aban'donment [from the Fr. *abandonner*], in law, is used in several senses, depending upon the subject to which it is applied:

1. *In Insurance.*—In this branch of the law it is applied to recovery by the insured in case of loss. Loss is either total or partial. In certain cases of partial loss the insured may, at his election, transfer the entire property to the insurers, and claim a total loss. The insurers would thus become the owners of the property in its impaired condition. This act is abandonment, and the "total loss" thus occasioned is termed constructive. It is applicable particularly to marine insurance. The subject is governed by rules differing somewhat in England and in America. The general principle is, that a serious injury must have happened by a marine peril to the ship or cargo (the value must have usually been diminished more than one-half), or the purposes of the voyage as to the ship must have been substantially defeated, as in the case of an embargo for an indefinite time. The act of abandonment must be exercised not upon mere conjecture, but upon credible information, and without delay. No particular form is necessary.

2. *As to Personal Property.*—An owner may cast away or otherwise relinquish personal property, so as to cause his ownership to cease. This may readily occur in the case of property at sea. The intent is a principal subject of inquiry. Property in this condition is otherwise called "derelict."

3. *Real Estate.*—Abandonment in this branch of the law applies to incorporeal rights, such as easements. There can be no abandonment of the ownership of the land itself. This must be parted with by some recognized mode of conveyance, such as a deed, or the principle of estoppel must be invoked or the rules of the statute of limitations.

4. In the legal relation of husband and wife the word abandonment is frequently employed as an equivalent to desertion. It is in some instances defined by statute.

Aba'no, d' (PIETRO). See APPENDIX.

Abar'ca (JOAQUIN), a Spanish bishop and leader of the absolutist party, born in 1780, was, on account of his zealous advocacy of the principles of absolutism, made a bishop by Ferdinand VII. Subsequently he became prime minister of Don Carlos, but after a time fell into disfavor for being too moderate. He was banished, and died in 1844.

Aba'rim (meaning "regions beyond"), a mountain-range of Moab, on the E. side of Jordan, opposite Jericho, mentioned in Num. xxvii. 12 and elsewhere. Pisgah is either the same as Abarim or a part of it. This line of mountains rises to the height of nearly 3000 feet above the Mediterranean, and more that 4000 feet above the Dead Sea. As seen from Jericho or the Mount of Olives, the summit of the range is apparently almost level. But recent explorers report considerable inequalities of surface. The highest of the peaks, still called Mount Neba or Nebbeh, is thought to be the Nebo from which Moses viewed the Land of Promise (Deut. xxxiv. 1–4).

Abascal' (JOSÉ FERNANDO), a Spanish commander, born at Oviedo in 1743. He entered the army in 1762, served against the French and the English, became intendant of New Galicia, and in 1804 was appointed viceroy of Peru. He was an able and popular ruler, and accomplished much for the people of Peru. In 1812 he was made a marquis. He was recalled in 1816. Died at Madrid June 30, 1821.

Abatement [from the Fr. *abattre,* to "strike away"] is a legal term applied in various branches of the law.

1. *Title to Real Estate.*—Here it refers to the wrongful entry of a stranger upon land after an ancestor's death, and before the entry of an heir or devisee, and thus keeping him out of possession. The wrong-doer is termed an abator.

2. *Nuisances.*—In this case it means the act of destroying or removing a nuisance, which may take place without legal process. No unnecessary damage must occur, and the act must be done without a breach of the peace.

3. In respect to legacies and creditors' claims the word means a proportionate reduction of them where there are not sufficient assets to make full payment.

4. In actions the word has two significations: (1.) In respect to pleadings. A defendant may assert by a "plea in abatement" that the plaintiff's action ought to cease by reason of some informality or irregularity. It is called a *dilatory* plea, because it does not meet the case upon the merits. Such pleas are not favored in modern law, and there is a tendency to confine them by statute within narrow limits. If the cause is abated on such grounds, a new action may be brought. (2.) In respect to the termination of a litigation by the occurrence of some event during its progress, such as the death or disability of a party. In a court of law the regular effect of the death of a party was to cause the action to abate altogether. In a suit in equity proceedings were suspended, and might be revived by established methods. Similar rules were applied to disabilities, such as the marriage of a female party to an action. The effect of this doctrine is largely modified in codes of procedure in this country, and in England by the "Common-Law Procedure" act. Under these statutory regulations an action may, after the death of a party, be continued by or against his representatives, on motion to the court in which the action is pending. The application is subject to regulations to prevent unnecessary delay. There are certain actions in which there can be no revival. An instance is that of a cause of action for a personal wrong (tort). This is said to "die with the person." In other words, it cannot be prosecuted by or against the executors or administrators of a party sustaining or inflicting the wrong. T. W. DWIGHT.

Abatement, in heraldry, denotes symbols of disgrace introduced into a coat-of-arms; these are scarcely mentioned by any heraldic writers except the English. A *delf tenné* is the sign of a revoked challenge; a *point-à-point* denotes a coward; a *gusset sinister* denotes drunkenness.

Abattis, or **Abatis** [Fr.], in fortification, a bulwark or obstruction formed by trees felled and placed side by side, so that their tops are directed towards the enemy. Sometimes the ends of the branches are cut off and sharpened.

Abattoir, a public establishment in which cattle, sheep, etc. are killed with such sanitary arrangements as will guard the population of a city against the nuisances of private slaughter-houses. This improvement originated in Paris in 1807, and has been adopted in New York and other large cities.

A Battuta [It.], a term in music signifying in strict or measured time.

Aba-Ujvar, a county of Hungary, is bounded by the counties of Zips, Saros, Zemplin, Torna, and Borsod. Area, 1109 square miles. The country consists entirely of picturesque mountains. The soil, which is very fertile, yields wine in abundance. Gold, silver, iron, and copper are found here. Pop. in 1880, 162,756. Chief town, Kaschau.

Abauzit (FIRMIN), a celebrated French Protestant philosopher and mathematician, was born at Uzès, Languedoc, Nov. 11, 1679, was educated at Geneva, travelled in England and Holland, and wrote several works on theology, antiquities, etc. He was a friend and correspondent of Sir Isaac Newton, who esteemed him highly, and he was profoundly versed in many branches of learning and science. Died in Geneva Mar. 20, 1767.

Abbadie (Jacques), D. D., a French Protestant divine, born in Béarn in 1658. He removed to England in 1688, preached in London, and became dean of Killaloe in Ireland. His chief work is a "Treatise on the Truth of the Christian Religion" (in French, 2 vols., 1684), which was received with favor by both Protestants and Roman Catholics. Died in London Nov. 7, 1727.

Abbadie, d' (Antoine and Arnould Michel), two brothers and French travellers, born in Dublin in 1810 and 1815, who explored Abyssinia and Upper Egypt between 1838 and 1848, travelled up the White Nile, and even visited Darfoor. Their more important works are "Nouvelles du haut fleuve Blanc," "Note sur la route du Darfour," "Sur les nègres Yambo," "Géodésie d'Éthiopie," etc. (1860–63), and "Douze ans dans la Haute-Éthiopie" (2 vols., 1868). Their collection of Ethiopic and Amharic manuscripts, numbering 234, was until recently the largest collection in Europe.

Abbandonamen'te [It.], in music, signifies "with self-abandonment," despondingly.

Abbas', or, more fully, **Abbâs-Ibn-Abd-il-Moot'-talib,** a paternal uncle of Mohammed, and the ancestor of the dynasty of Abbassides, was born at Mecca about 566 A. D. He fought against Mohammed at the battle of Bedr, but was afterwards converted, and rendered important services to that prophet.

Abbâs I., or **Shâh Abbâs,** surnamed the Great, a king of Persia, born in 1557, was a son of Mohammed Mirza. He began to reign about 1584, and distinguished himself by his ability and energy. In 1605 he defeated the Turks in a great battle, and recovered the Persian provinces which they had occupied. Died in 1628.

Abbâs-Mîr'za, a son of Fatah Ali Shah, king of Persia, was born in 1783. He commanded the Persian army which was defeated by the Russians in 1811. He was a prince of superior talents, and promoted the introduction of European culture and military tactics into Persia. He died before his father, in 1833.

Abbâs Pasha, viceroy of Egypt (the third of the present dynasty), a grandson of Mehemet Ali, was born at Yedda, in Arabia, in 1813. He succeeded his uncle, Ibrahim Pasha, Nov. 9–10, 1848, and died in July, 1854. He was succeeded by his uncle, Saïd Pasha.

Abbassides (pronounced ab-bas'sidz; sing. **Abasside,** ab-bas'sid), or **Abbasides** [Lat. *Abbasidæ;* called by the Arabs Beni Abbâs, *i. e.* "sons or descendants of Abbâs"], the name of a celebrated dynasty of caliphs who reigned at Damascus, and afterwards at Bagdad, from 762 to 1258 A. D. They traced their genealogy to Abbâs, the uncle of Mohammed. To this dynasty belonged the caliphs Harun-al-Rashid and Al-Mamun.

Abbatu'cci (Carlo, or Charles), a Corsican general, born in 1771. He served in the French army under the republic, and was killed at Huningue in 1796.

Abbatucci (Charles), a son of Jean Charles, born in 1816, became under Napoleon III. counsellor of state, and was in June, 1872, elected to the National Assembly as the candidate of the Bonapartist party.

Abbatucci (Giacomo Pietro, or Jacques Pierre), a Corsican, born in 1726, became a general of division in the French service. Died in 1812.

Abbatucci (Jacques Pierre Charles), a French lawyer, a nephew of Carlo, noticed above, was born in Corsica in 1791. He became in 1848 a partisan of Louis Napoleon, who appointed him minister of justice in 1852. Died in 1857.

Abbatucci (Séverin), son of Jean Charles, was in 1871 elected member of the National Assembly, and in August resigned his seat in order to give to Rouher, the leader of the Bonapartist party, an opportunity to be elected.

Abbé, ă'bā', a French term formerly applied to ecclesiastics and students of theology who were supported by the revenue of monasteries. They often devoted themselves to literature or were tutors in wealthy families. Before the Revolution the king could nominate 225 *abbés commendataires,* whose offices were sinecures. (See Abbot.)

Abbe (Cleveland), M. A. See Appendix.

Abbeoku'ta, or **Abbekuta** (*i. e.* "under the rock"), a large town of Western Africa, and capital of the kingdom of Egba, in Yorruba, is built on granite hills around a rock 250 feet high, and is situated on the left bank of the Ogoon River, 120 miles N. W. of Benin. The negro bishop Crowther has established a newspaper here in the Egba language; the number of Christians is estimated at 2000. The city was founded in 1825, has rapidly increased, and has become an important missionary station. Pop. estimated at 130,000.

Ab'bess [Lat. *abbatis'sa*], the superior of a convent of women, corresponding in rank and authority to an abbot, except that she cannot exercise the functions of the priesthood.

Abbeville, ăb'vèl', a fortified city of France, situated on the river Somme, in the department of Somme, on the Northern Railway, 36 miles by rail N. W. of Amiens. It contains a fine cathedral and manufactories of woollen cloths, etc. Abbeville has in late years been made famous by the discovery of many interesting relics of pre-historic man in the valley of the Somme at that place. Pop. in 1881, 19,283.

Abbeville Treaties. The treaty between Henry III. of England and Louis IX. of France, May 20, 1259, though settled in Paris, has, from the meeting of the two kings at Abbeville, been named after that city. Henry III. gave up all claim to Normandy, Anjou, Touraine, Maine, and Poitou. He received 300 small pounds of Tour, being guaranteed possession of some other provinces of France, which he was to hold as fiefs; Henry III. was to sit with the peers of France as duke of Guienne, and he soon dropped the titles of duke of Normandy and count of Anjou. Wolsey arrived here in July, 1527, sent by Henry VIII. to conclude a treaty with Francis I. The negotiations were finished Aug. 18, 1527.

Abbeville, the capital of Henry co., Ala. (see map of Alabama, ref. 7–F, for location of county), has an academy. Pop. of township in 1870, 1267; in 1880, 2258.

Abbeville, capital of Wilcox co., Ga. (see map of Georgia, ref. 6–H, for location of county). Pop. in 1880, 61.

Abbeville, capital of Vermilion parish, La. (see map of Louisiana, ref. 10–D, for location of county.) Pop. in 1870, 545; in 1880, 255.

Abbeville C.-H., on R. R., capital of Abbeville co., S. C. (see map of South Carolina, ref. 5–C, for location of county), is 97 miles W. by N. of Columbia. It has some manufactures, a male and female academy, and various public buildings. Pop. in 1880, 1543.

Abbey. See Appendix.

Abbey (Richard), a Methodist clergyman and author, born in Genesee co., N. Y., Nov. 16, 1805, removed to Illinois in 1816, and to Natchez, Miss. in 1825. In 1844 he entered the ministry in the Methodist Church, and was afterward a member of the Mississippi Conference of the Methodist Episcopal Church South. He has been an extensive newspaper and review writer. His first book, "Letters to Bishop Green on Apostolic Succession," was published in 1853, and was soon followed by the "End of the Apostolic Succession," a written debate with Yerger and Smedes on High-Church doctrines. His "Ecclesiastical Constitution" was published in 1856, "Creed of All Men," against deism, appeared in 1855, "Church and Ministry" in 1859, and "Diuturnity" in 1866. In 1868 he published anonymously "Ecce Ecclesia," and in 1872 "The City of God and the Church-Makers." He has also published "Baptismal Demonstrations," "Divine Assessment," "Strictures on Church Government," "The Divine Call to the Ministry," etc.

Abbia'ti (Philippo), a skilful Italian painter, born at Milan in 1640; died in 1715.

Abbitib'bie, or **Abbitib'be,** a lake, river, and trading-station in British North America, near James's Bay, into which the river flows.

Abbon the Crooked (in Latin, *Ab'bo Cer'nuus*), a French monk of St.-Germain-des-Prés, described the siege of Paris by the Northmen (885–887) in an epic poem which has been translated into French by Guizot. Died in 923.

Abbon of Fleury [in Latin, *Ab'bo Floriacen'sis*], an eminent French monk, born near Orleans in 945, was one of the most learned men of his age. He became abbot of Fleury. Died in 1004.

Ab'bot [Lat. *ab'bas;* Fr. *abbé;* from the Hebrew *abba,* "father"], the superior of a convent or monastery, and an ecclesiastic of high rank in the Roman Catholic Church. Abbots were ranked as prelates of the Church next to the bishops, and had the right to vote or speak in the general councils. In England there were formerly a number of *mitred abbots,* who sat and voted in the House of Lords.

Abbot of Misrule, or **Abbot of Fools,** called in Scotland the "Abbot of Unreason," a title given in the Middle Ages to the master of revels, and especially to the person appointed to preside over Christmas festivities.

Abbot (Abiel), D.D., born at Andover, Mass., Aug. 17, 1770, graduated at Harvard in 1792, was a Congregational minister in Haverhill, Mass. (1795–1803), and in Beverly, Mass., until 1827, when he sailed for Cuba. Died of yellow fever at Staten Island, N. Y., June 7, 1828. His "Letters from Cuba" (1829), and a volume of his sermons (1831), with a memoir, have been published.

Abbot (Abiel), D.D., born at Wilton, N. H., Dec. 14, 1765, graduated at Harvard in 1787. He studied theology, was tutor at Harvard (1794–95), minister of the Congregational church at Coventry, Conn. (1795–1811), and of the Unitarian church, Peterborough, N. H. (1827–48). He published a "History of Andover," Mass. (1829), etc. Died Jan. 31, 1859.

Abbot (Benjamin), LL.D., an eminent teacher, was born at Andover, Mass., Sept. 17, 1762, and graduated at Harvard College in 1788. He was principal of Phillips Academy at Exeter, N. H., for fifty years (till 1838). Among his pupils were Daniel Webster, Alexander H. Everett, Edward Everett, Lewis Cass, Jared Sparks, and George Bancroft. Of fine character and courtly manners, he had great power over his pupils. He died Oct. 25, 1849.

Abbot (Charles), Lord Colchester, born Oct. 14, 1757, Speaker of the British House of Commons (1802–17), was made peer in 1817, and died May 8, 1829.

Abbot (Ezra), D.D., LL.D., born in Jackson, Me., Apr. 29, 1819, graduated at Bowdoin Coll. 1840, became in 1856 assistant librarian in Harvard College, in 1872 professor of New Testament criticism and interpretation in the Cambridge Divinity School; published "Literature of the Doctrine of a Future Life" (1864–71). He also served as assistant and editor of such works as Norton's "Gospels," Hackett's revision of Smith's "Bible Dictionary," Noyes' "New Testament," and Hudson's "Concordance." Wrote "The Authorship of the Fourth Gospel" (1880); was member of the Bible Revision Committee. D. Mar. 21, 1884.

Abbot (Francis Ellingwood), born at Boston, Mass., Nov. 6, 1836, graduated at Harvard, and was (1870–73) editor of the "Index," a journal devoted to the interests of Free Religion. He also published articles on the "Philosophy of Space and Time," "The Conditioned and the Unconditioned," "Philosophical Biology," etc.

Abbot (George), D. D., born in Surrey Oct. 29, 1562, was educated at Oxford. He became bishop of London in 1610, and archbishop of Canterbury in Jan., 1611. He was noted for his liberal principles, and was a rival or opponent of Laud. Died Aug. 4, 1633.

Abbot (Gorham Dummer), LL.D., a younger brother of Jacob Abbott, was born Sept. 3, 1808, graduated at Bowdoin College in 1826, and took a part of the theological course at Andover in the class which graduated in 1831. He was pastor for three years at New Rochelle, N. Y., and for thirteen years principal of the Spingler Institute in New York City. He has published "The Family at Home," "Nathan Dickerman," "Mexico and the U. S." (1869), and other works. Died July 31, 1874.

Abbot (Henry L.), an American officer, born Aug. 13, 1831, at Beverly, Mass., graduated at West Point 1854, lieutenant-colonel of engineers Mar. 31, 1880, served as assistant on Pacific R. R. surveys 1854–57, and was associated with Gen. Humphreys on the hydrographic survey of the delta of the Mississippi, 1857–61, the results being set forth in an elaborate report, "Physics and Hydraulics of the Mississippi River." In the civil war served in the Manassas campaign, 1861; engaged at Blackburn's Ford and Bull Run (wounded and brevet captain); in the construction of the defences of Washington, 1861–62; in the Virginia Peninsula, 1862; engaged at Yorktown (brevet major) and the Seven Days' operations before Richmond; as chief topographical engineer of Banks's expedition to the Gulf of Mexico, 1862–63; as colonel of the First Connecticut Artillery Volunteers, in command of siege artillery before Petersburg, 1864–65 (brevet lieutenant-colonel U. S. A., and brevet brigadier-general U. S. V.); engaged in various actions; as chief of artillery of expedition to Fort Fisher, 1865; and in command of a brigade in the defences of Washington, 1863–65. Brevet colonel and brigadier-general U. S. A. Mar. 13, 1865, and brevet major-general U. S. V. Since the war he has been superintending defences and in command of engineer battalion and torpedo school of practice at Willet's Point, N. Y., member of engineer boards, and observer on solar eclipse expedition to Sicily, 1870–71. He is a member of American Academy of Sciences and other associations. G. W. Cullum.

Abbot (Joel), Dr. See Appendix.

Abbot (Joseph Hale). See Appendix.

Abbot (Robert), D.D., a learned English bishop, a brother of Archbishop George Abbot, was born in 1560. He became a popular preacher, and in 1615 bishop of Salisbury. Died Mar. 2, 1617. He left several theological, controversial, and political works, once highly valued for their learning.

Abbot (Samuel), a wealthy merchant of Boston, born at Andover, Mass., was one of the founders of the theological seminary at Andover, towards the building of which he gave $20,000 during his lifetime and $100,000 at his death. He also contributed large sums for various other charitable purposes. Died April 30, 1812, aged eighty.

Abbot (Walter), U. S. N., born in 1843 in the State of Massachusetts, graduated at the Naval Academy in 1861, became an ensign in 1862, a lieutenant in 1864, a lieutenant-commander in 1866, served on board the steam frigate Mississippi at the passage of Forts St. Philip and Jackson and the capture of New Orleans in 1862, and on board the iron-clad New Ironsides from 1863 to 1865 in her numerous engagements with the forts off Charleston, and in the fight with Fort Fisher at Wilmington, N. C. Died at Funchal, Madeira, in the winter of 1873. Foxhall A. Parker.

Ab'botsford, the seat of Sir Walter Scott, is situated on the right bank of the Tweed, about three miles from Melrose Abbey. It is surrounded by beautiful scenery. This estate was purchased in 1811 by Sir Walter, who expended a large sum of money in the erection of a picturesque and irregular pile of buildings. After his death it was occupied by his granddaughter, the wife of James Hope Scott, until her death in 1858, when it was converted into a Roman Catholic female school. (See Scott, Sir Walter.)

Ab'bott (Austin). See Appendix.

Abbott (Benjamin), a noted Methodist preacher, was born in Pennsylvania in 1732. He travelled and preached extensively in his native State, in New Jersey, Delaware, and Maryland, and was one of the chief founders of his denomination in those States. His native eloquence was extraordinary. His autobiographical records, embodied in Firth's "Life of Abbott," are among the most remarkable of the early writings of Methodism. Died in 1796.

Abbott (Benjamin Vaughan). See Appendix.

Abbott (Charles), Lord Tenterden, an eminent English judge, born at Canterbury in 1762. He published in 1802 a "Treatise on the Law of Merchant Ships and Seamen," which is a standard work; became a judge in the court of common pleas in 1816, and lord chief-justice of the king's bench in 1818. In 1827 he was raised to the peerage as Lord Tenterden. Died in 1832.

Abbott (Charles Conrad), M. D. See Appendix.

Abbott (Edward). See Appendix.

Abbott (Emma A.). See Appendix.

Abbott (Jacob), a prolific and popular writer, was born at Hallowell, Me., Nov. 14, 1803, graduated at Bowdoin College in 1820, studied theology at Andover, Mass., from 1822 to 1824, was tutor in Amherst College from 1824–25, and professor of mathematics in the same institution from 1825 to 1829, was principal of the Mount Vernon School (for young ladies) in Boston from 1829 to 1834, when he was ordained and took charge of the Eliot church in Roxbury (till 1836). For several years he made his home in New York City, though frequently absent in foreign countries. His reputation as an author was established by the "Young Christian Series." But he is best known as the author of "The Rollo Books" (28 vols.), "The Franconia Stories" (10 vols.), "Harper's Story-Books" (36 vols.), and other juvenile works. D. at Farmington, Me., Oct. 31, 1879.

Abbott (John C.), b. in Concord, N. H., July 15, 1825; became a lawyer and journalist; commanded a regiment during the civil war, and was brevetted brigadier-general. He removed to North Carolina in 1865, and was U. S. Senator from North Carolina, 1865–71. D. Oct. 9, 1881.

Abbott (Rev. John Stevens Cabot), brother of Jacob, was born at Brunswick, Me., Sept. 18, 1805, graduated at Bowdoin College in 1825, at Andover Theological Seminary in 1829, and was settled as minister in Worcester, Roxbury, Nantucket, and New Haven. Among his works are "The Mother at Home," "History of Napoleon Bonaparte," "History of the Civil War," his American histories, and his "History of Napoleon III." D. at Fair Haven, Conn., June 17, 1877.

Abbott (Lyman), D. D., third son of Rev. Jacob Abbott, was born in Roxbury, Mass., Dec. 18, 1835, graduated at New York University in 1853, practised law for a time in New York City, studied theology with his uncle Rev. John S. C. Abbott, was settled in the ministry at Terre Haute, Ind., from 1860 to 1865, was connected with the Freedmen's Commission from 1865 to 1868, then accepted the pastorate of the New England Congregational church in New York City, which he resigned in 1869, and is now engaged in literary pursuits. For some years he edited for the American Tract Society its "Illustrated Christian Weekly," the only *illustrated* religious weekly paper in the country. Besides other literary work, he has published "Jesus of Nazareth, His Life and Teachings" (1869), "Old Testament Shadows of New Testament Truths" (1870), "Morning and Evening Exercises, selected from the Writings of Henry Ward Beecher" (1871), "Laicus, or the Experiences of a Layman in a Country Parish" (1872), a "Popular Religious Dictionary," and several commentaries on books of the N. T. He is now editor of the New York "Christian Union."

Abbott (Robert O.), M. D., brevet colonel and surgeon U. S. A., born in 1824, entered the army as assistant surgeon in 1849. In 1862 he became medical director of the Fifth Corps, and in the summer of that year medical director of the department of Washington—a difficult position, the duties of which he performed with great honor and administrative ability and rare professional skill. Died, in consequence of overwork, June 10, 1867.

Abbrevia′tio Placito′rum ("abbreviation of pleadings"), in legal history, an abstract of ancient pleadings made prior to the Year Books. (See Year Books.)

Abbreviations [Lat. *abbreviationes*, from *abbre′vio*, *abbrevia′tum*, to "shorten" (from *bre′vis*, "short")], customary contractions of words and phrases used in writing, in order to save time and space. They are formed by the omission of some letters or words, or by the substitution of arbitrary signs. In mediæval manuscripts abbreviations are so numerous that special study and training are required to decipher them. For denoting moneys, weights, and measures, characters which are not properly abbreviations are used as such; for instance, ° ′ ″ for "degrees, minutes, and seconds;" $ for "dollar;" £, "pound" (money), etc.

The following are the more important abbreviations in common use:

āā, *ana*, "of each."
A. A. A. G., Acting Assistant Adjutant-General.
A. A. G., Assistant Adjutant-General.
A. B., *Artium Baccalaureus*, Bachelor of Arts.
A. B. C. F. M., American Board of Commissioners for Foreign Missions.
Abp., Archbishop.
A. C., *Ante Christum*, before Christ; also Arch-Chancellor.
Acct., account.
A. D., *Anno Domini*, "in the year of our Lord."
Ad. or Adv., adverb.
Adj., adjective.
Admr., administrator.
Admx., administratrix.
Æt. or ætat., *ætatis*, of age.
A. G., Adjutant-General.
A. H., *Anno Hegiræ*, "in the year of the Hegira" (flight of Mohammed).
Ala., Alabama.
A. M., *Anno Mundi*, "in the year of the world."
A. M., *Ante Meridiem*, "before noon."
A. M., *Artium Magister*, Master of Arts.
Anon., anonymous.
Ans., answer.
Apr., April.
A. Q. M., Assistant Quartermaster.
A. R. A., Associate of the Royal Academy (London).
Ari., Arizona.
Ark., Arkansas.
A. U. C., *Ab Urbe Condita*, "from the Founding of the City" (*i. e.* Rome).
Aug., August.
A. V., Authorized Version.
A. Y. M., Ancient York Masonry.
B.A. or A. B., Bachelor of Arts.
Bart. or Bt., Baronet.
Bbl., barrel.
B. C., before Christ.
B.C.L., Bachelor of Civil Law.
B. D., Bachelor of Divinity.
B. L., Bachelor of Laws, *legum baccalaureus*.
Bp., Bishop.
Brig.-Gen., Brigadier-General.
Bro., brother.
Bush., bushel.
B. V., Blessed Virgin, Lat. [*Beata Virgo*.
C., *centum*, a "hundred;" also "centigrade."
C., Consul; also chapter.
Ca., *circa*, about.
Cal., California.
Cal. or Kal., Kalends.
Cantab., *Cantabrigiensis*, "of Cambridge."
Cantuar., of Canterbury.
Cap., *capitulum*, "chapter."
Capt., Captain.
C. B., Companion of the Bath; also Cape Breton.
C. C., Caius College.
c. c., cubic centimetre.
C. C. P., Court of Common Pleas.
C. E., Civil Engineer.
Cent., *centum*, "hundred."
Cf., *confer*, compare.
C. G. H., Cape of Good Hope.
Chap. or ch., chapter.
Chron., Chronicles.
C. J., Chief-Justice.
C. M., common metre.
Co., company; also county.
C. O. D., cash on delivery.
Col., Colonel; also Colorado.
Coll., college.
Com., Commodore, Commissioner.
con., *contra*, "against."
Cor., Corinthians.
Cor. Sec., Corresponding Secretary.
Cos., cosine.
Coss., *Consules* or *Consulibus*, "consuls" (of Rome).
Cr., creditor.
Crim. Con., criminal connection or conversation.
C. S. A., Confederate States of America.
Ct. or Conn., Connecticut.
Cwt., a hundredweight.
Cyc., cyclopædia.
d., penny, pence, *denarius*.
D., five hundred; also Denarius.
D. A. G., Deputy Adjutant-General.
Dak., Dakota.
Dan., Daniel, Danish.
D. C., District of Columbia; also *da capo*, "from the beginning."
D. C. L., Doctor of Civil Law.
D. D., Doctor of Divinity.
D. D. S., Doctor of Dental Surgery.
Dea., deacon.
Dec., December.
Deg., degree.
Del., Delaware; also *delineavit*, "he designed" (on engravings).
Dept., department.
Deut., Deuteronomy.
D. F., *Fidei defensor*, "Defender of the faith."
Dft., defendant.
D. G., *Dei gratiâ*, "by the grace (or favor) of God."
Dist., district.
Do., ditto, "the same."
Doz., dozen.
Dr., Doctor; also debtor.
D. T., Dakota Territory.
D. V., *Deo volente*, "God willing."
Dwt., pennyweight.
E., east.
Ebor., *Eboracum*, York.
Eccl., Ecclesiastes.
Ecclus., Ecclesiasticus.
E. D., Eastern District (of Brooklyn, N. Y.).
Ed., editor, edition.
Edin., Edinburgh.
E. E., Errors excepted.
e. g., *exempli gratiâ*, "for example."
E. I., East Indies.
E. I. C., East India Company.
E. M., Mining Engineer.
Encyc., encyclopædia.
E. N. E., east north-east.
Eng., English, Engineers.
Eph., Ephes., Ephesians.
E. S. E., east south-east.
Esth., Esther.
Esq., Esquire.
et al., *et alii*, "and others."
etc., *et cætera*, "and the rest;" *i. e.* other such things; and so forth.
Et seq., *et sequens*, "and the following."
Exr., executor.
Exod., Ex., Exodus.
Exon., *Exonia*, Exeter.
Exx., executrix.
Ez., Ezra.
Ezek., Ezekiel.
F. or *f.*, franc, florin, farthing, foot.
F. and A. M., Free and Accepted Masons.
F. or Fahr., Fahrenheit.
F. A. S., Fellow of the Antiquarian Society; Fellow of the Society of Arts.
F. A. S. E., Fellow of the Antiquarian Society of Edinburgh.
F. B. S., Fellow of the Botanical Society.
F. D., *Fidei defensor*, "Defender of the faith."
Feb., February.
F. F. V., first families of Virginia.
F. G. S., Fellow of the Geological Society.
Fla., Florida.
F. L. S., Fellow of the Linnæan Society.
F. R. A. S., Fellow of the Royal Astronomical (or Asiatic) Society.
F. R. C. P., Fellow of the Royal College of Physicians.
F. R. C. S., Fellow of the Royal College of Surgeons.
Fri., Friday.
F. R. G. S., Fellow of the Royal Geographical Society.
F. R. S., Fellow of the Royal Society.
F. R. S. E., Fellow of the Royal Society of Edinburgh.
F. S. A., Fellow of the Society of Antiquaries.
F. S. S., Fellow of the Statistical Society.
F. Z. S., Fellow of the Zoological Society.
Ga., Georgia.
Gal., Galatians.
gal., gallons.
G. B., Great Britain.
G. C. B., Grand Cross of the Bath.
G. M., Grand Master.
Gen., General, Genesis.
Ger., German.
Gov., Governor.
Gr., Greek.
G. T., Good Templars; Grand Tiler.
Gtt., *guttæ*, "drops."
Hab., Habakkuk.
Hag., Haggai.
H. B. C., Hudson's Bay Company.
H. B. M., His or Her Britannic Majesty.
Hdkf., Handkerchief.
h. e., *hoc est*, "this is."
Heb., Hebrews.
hhd., hogshead.
Hist., history.
H. I. H., His or Her Imperial Highness.
H. M. S., His or Her Majesty's Ship.
Hon., Honorable.
Hos., Hosea.
H. R., House of Representatives.
H. R. H., His or Her Royal Highness.
H. S. S., *Historiæ Societatis Socius*, Fellow of the Historical Society.
I., Is., Isl., island.
Ia., Iowa.
Ibid. or Ib., *ibidem*, "in the same place."
Id., *idem*, "the same."
Id., Idaho.
i. e., *id est*, "that is."
I. H. S., *Iesus Hominum Salvator*, "Jesus Saviour of men."
Ill., Illinois.
incog., *incognito*, "unknown."
Ind., Indiana.
Ind. Ter., Indian Territory.
In lim., *in limine*, "at the outset."
In loc., *in loco*, "in the place."
I. N. R. I., *Jesus Nazarenus Rex Judæorum*, "Jesus of Nazareth, King of the Jews."
Inst., institute.
inst., *instante mense*, "in the present month."
Int., interest.
I. O. O. F., Independent Order of Odd Fellows.
I. O. S. M., Independent Order of the Sons of Malta.
Isa., Isaiah.
It., Italian.
J. A., Judge Advocate.
Jam., Jamaica.
Jan., January.

Jas., James.
J. C., Jurisconsult.
J. C. D., *Juris Civilis Doctor*, Doctor of Civil Law.
J. D., *Juris Doctor*, Doctor of Law.
Jer., Jeremiah.
Jno., John.
Jona., Jonathan.
J. P., Justice of the Peace.
Jr. or Jun., Junior.
Jud., Judith.
J. U. D., *Juris utriusque Doctor*, Doctor of both Canon and Civil Law.
Judg., Judges.
J. V. D., *Juris utriusque Doctor*, Doctor of Civil and Canon Law.
K., King.
Kal. or Cal., Calends.
Kan., Kansas.
K. B., Knight of the Bath.
K. C., King's Counsel.
K. C. B., Knight Commander of the Bath.
K. G. C. B., Knight Grand Cross of the Bath.
K. G., Knight of the Garter.
K. P., Knight of St. Patrick.
K. T., Knight of the Thistle.
Kt., Knight.
Ky., Kentucky.
La., Louisiana.
Lam., Lamentations.
Lat., latitude.
Lat., Latin.
L. D., Lady Day.
Lev., Leviticus.
L. H. D., *Literarum Humaniorum Doctor*, Doctor of Literature—conferred only by the Regents of the University of the State of N. Y.
L. I., Long Island.
Lib., *liber*, book.
Lib., lb., l., *libra*, a "pound."
Lieut., Lieutenant.
LL.B., Bachelor of Laws.
LL.D., *Legum Doctor*, "Doctor of Laws."
L. S., *Locus Sigilli*, "Place of the seal."
Lon., longitude.
L. R. C. P., Licentiate of the Royal College of Physicians.
L. R. C. S., Licentiate of the Royal College of Surgeons.
L. S. D., *Libri, Solidi, Denarii*, "pounds, shillings, [and] pence."
M., Monsieur, *mille* (a "thousand"), a mile; noon.
M̅., 10,000.
M. A., Master of Arts.
Macc., Maccabees.
Mad. or Mme., Madame.
Mag., magazine.
Maj.-Gen., Major-General.
Mal., Malachi.
Mar., March.
Masc., masculine.
Mass., Massachusetts.
Matt., Matthew.
M. B., Bachelor of Medicine.
M. C., Member of Congress.
Md., Maryland.
M. D., *Medicinæ Doctor*, "Doctor of Medicine."
Me., Maine.
M. E., Methodist Episcopal.
M. E. S., Methodist Episcopal South.
M. H. S., Massachusetts Historical Society.
Messrs. or MM., Messieurs, "gentlemen."
Mic., Micah.
Mich., Michigan.
Minn., Minnesota.
Miss., Mississippi.
Mlle., Mademoiselle.
Mme., Madame.
M. N. A. S., Member of the National Academy of Sciences.
Mo., Missouri.
Mon., Montana.
M. P., Member of Parliament.
M. R. A. S., Member Royal Academy of Sciences.
M. R. C. S., Member of the Royal College of Surgeons.
M. R. I. A., Member of the Royal Irish Academy.
MS., manuscript; pl. MSS.
Mt., mount.
Mus. D., Doctor of Music.
N., north, or noon.
N. A., North America.
N. A. S., National Acad. of Sci.
N. B., *Nota Bene*, "mark well;" also North Britain and New Brunswick.
N. C., North Carolina.
N. E., north-east, New England.
Neb., Nebraska.
Neh., Nehemiah.
Nem. Con., *Nemine contradicente*, or Nem. Diss., *Nemine dissidente*, "no one contradicting or opposing."
Nev., Nevada.
N. F., Newfoundland.
N. G., New Granada.
N. H., New Hampshire.
N. J., New Jersey.
N. M., New Mexico.
N. N. E., north north-east.
N. N. W., north north-west.
No., *Numero*, "Number."
N. O., New Orleans.
Nov., November.
N. P., Notary Public; also New Providence Island.
N.S., Nova Scotia, New Style.
N. T., New Testament.
Num., Numbers.
N. W., north-west.
N. W. T., North-west Terr.
N. Y., New York.
N. Z., New Zealand.
O., Ohio.
Ob., *obiit*, "died."
Obad., Obadiah.
Obdt., obedient.
Obs., obsolete.
Oct., October.
Ol., *oleum*, oil.
Ol. or Olym., Olympiad.
Or., Oregon.
O. S., Old Style.
O. T., Old Testament.
Oxon., *Oxoniensis*, "Oxonian" or "of Oxford."
Oz., ounce.
P., *Père*, "father."
Pa., Pennsylvania.
Parl., Parliament.
P. C., Privy Councillor.
P. E. I., Prince Edward Island.
P. E., Protestant Episcopal.
Per Ann., Pr. An., *Per Annum*, "by the year."
Per Cent., *Per Centum*, "by the hundred."
Pet., Peter.
Ph. D., *Philosophiæ Doctor*, "Doctor of Philosophy."
Phil., Philippians, Philip.
Phila., Philadelphia.
Philem., Philemon.
Philom., *Philomathes*, "a lover of learning."
Philomath., "a lover of learning."
Pinxt. or pxt., *pinxit*, "he painted."
Pk., peck.
pl., plu., or plur., plural.
plff., plaintiff.
plupf., pluperfect.
P. M., *Post Meridiem*, "after noon."
P. M., Postmaster.
P. O., Post-office.
P. of H., Pat. of Husbandry.
Pop., population.
Port., Portuguese.
PP., *Patres*, "fathers."
pp., pages.
P. P. C., *pour prendre congé*, "to take leave."
P. R., Porto Rico.
Pres., President.
Priv., privative.
Prof., Professor.
Pro tem., *Pro tempore*, "for the time."
Prob., problem.
Prov., Proverbs.
Prox., *Proximo* or *Proximo mense*, "in the next month."
Ps., Psalm.
P. S., postscript, privy seal.
Pub. Doc., public document.
Pxt., *pinxit*, painted it.
q., farthing (*quadrans*).
Q., Queen, question, Quintus.
Q. C., Queen's Counsel.
Q. d., *Quasi dicat*, "As if he should say."
Q. E. D., *Quod Erat Demonstrandum*, "which was to be demonstrated."
Q. E. F., *Quod Erat Faciendum*, "which was to be done."
Q. M., Quartermaster.
Q.P., "as much as you please."
Qr., quarter, farthing.
Q. S., *Quantum Sufficit*, "a sufficient quantity."
Qu., query.
Q. V. or *q. v.*, *quod vide*, "which see," or *quantum vis*, "as much as you please."
R. (*Rex*), "King," or *Regina*, "Queen."
R. A., Royal Academician, or Royal Artillery.
R. C., Roman Catholic.
R. E., Royal Engineers.
Rec. Sec., Recording Secretary.
Ref. Ch., Reformed Church.
Reg. Prof., Regius Professor.
Rev., reverend, Revelation.
R. I., Rhode Island.
R. M., Royal Marines.
R. M. S., Royal Mail Steamer.
R. N., Royal Navy.
Ro. or Robt., Robert.
Rom., Romans.
R. R., Railroad.
R. Rs., Railroads.
R. S. D., Royal Society of Dublin.
R. S. E., Royal Society of Edinburgh.
R. S. V. P., *répondez, s'il vous plait*, "Reply, if you please."
Rt. Hon., Right Honorable.
Rt. Rev., Right Reverend.
S., south, saint, or shilling.
S. A., South America.
Sam., Samuel.
Sans., Sanskrit.
S. C., South Carolina.
Sc. or Ss., *scilicet*, "to wit;" also *sculpsit*, "he engraved it" (on engravings).
S. E., south-east.
Sec., Secretary.
Sept., September.
sin., sine.
S. J., Society of Jesus.
S. J. C., Supreme Judical Court.
S. M., *Sa Majesté*, His or Her Majesty.
Sp. or Span., Spanish.
S. P. Q. R., *Senatus Populusque Romanus*, "the Roman senate and people."
Sq. or Seq., *sequens*, the following; Sqq., *sequentes*, the same in plural.
Sq. ft., square foot.
Sq. in., square inch.
Sq. m., square mile.
SS., saints; also "esses," a collar worn by knights and others in heraldry.
Ss. or Sc., *scilicet*, "to wit," "namely."
Ss., *semis*, "half."
S. S., Sunday School.
S. S. E., south south-east.
S. S. W., south south-west.
St., saint and street.
S. T. D., *Sacrosanctæ Theologiæ Doctor*, Doctor of Theology.
S. of T., Sons of Temperance.
S. T. P., *Sacrosanctæ Theologiæ Professor*, Professor of Theology.
S. W., south-west.
Syr., Syriac.
T. E., Topographical Engineers.
Tenn., Tennessee.
Tex., Texas.
Text. Rec., *Textus Receptus*.
Thess., Thessalonians.
Tit., Titus.
U. G. R. R., Underground Railroad.
Ult., *Ultimo*, *ultimo mense*, "in the last month."
U. P., United Presbyterian.
U. S., United States.
U. S. A., United States Army.
U. S. A., United States of America.
U. S. N., United States Navy.
U. S. P., United States Pharmacopœia.
U. S. S., United States ship or steamer.
U. T., Utah Territory.
V. or vs., *versus*, against.
Va., Virginia.
V. D. M., *Verbi Dei Minister*, "preacher of the word of God."
Ven., Venerable.
V.-G., Vicar-General.
Viz., *Videlicet*, "namely."
V.-P., Vice-President.
vs., *versus*, "against."
Vt., Vermont.
W., west.
Wash., Washington.
W. I., West Indies.
Wis., Wisconsin.
W. N. W., west north-west.
W. S. W., west south-west.
W. T., Washington Territory.
W. Va., West Virginia.
Wy., Wyoming Territory.
X, Χριστός, Christ.
Xmas., Christmas; Xtian, Christian, etc.
Yr., year, your.
Zech., Zechariah.
Zeph., Zephaniah.
&, and.
&c., *et cætera*, or and so forth.

Y^e, Y^t, The, That. (This use of Y originated in the Anglo-Saxon character þ, which was equivalent to the modern *th*. In manuscripts this character degenerates into a form like a black letter *y* (𝔶), which was retained after its origin and real sound had been lost sight of.)

Abbrevia′tor, a notary of the papal court and of the church councils, whose business is to prepare briefs and perform various important services as secretary. The number of these notaries was formerly about seventy-two.

Abbt (Thomas), an eminent German author, born at Ulm in 1738. He became professor of mathematics at Rinteln in 1761, and contributed to the improvement of the German language. His chief works are "Vom Verdienste" ("On Merit," 1765) and "Vom Tod fürs Vaterland" ("On Dying for [one's] Fatherland," 1761). Died in 1766.

Abd, an Arabic word which signifies "servant" or slave, and forms the prefix of many Oriental names, as Abd-Allah, "servant of Allah." Abd-er-Rahman, "servant of the Merciful" (*i. e.* of God).

Abd-el-Hamid (Du Couret), a French traveller, born in 1812, set out in 1834 for the East, visited Egypt, travelled up the Nile, through Abyssinia, to the shores of the Red Sea, and returned along the Red Sea to Cairo. In consequence of the Eastern habits contracted on his travels, he embraced Mohammedanism, and assumed the name of Abd-el-Hamid. After having been imprisoned in Persia for political reasons, he was released through the intervention of France, and returned to his native country in 1847. In 1848 he was despatched by the government to Timbuctoo. He published the result of this exploration in "Mémoire à Napoléon III." (1855); he also published "Médine et la Mekke" (3 vols., 1855).

Abd-el-Kâ′der (*i. e.* the "servant of the Powerful," in other words, the "servant of God"), a distinguished Arab chieftain, born near Mascara, in Algeria, in 1807. His father, Mehi-ed-Deen, was a maraboot, or religious noble, of no little influence. Algeria having been invaded by the French in 1830, Abd-el-Kâder was chosen emir (prince) by the Arabs of that country. He defeated the French at Macta in 1835. A treaty of peace was concluded in 1837. In 1839 hostilities were again renewed, and in the war which followed, against a power so much superior to his own, Abd-el-Kâder displayed extraordinary energy, combined with a marvellous fertility of resources, but he was at length, in 1847, obliged to yield to overwhelming odds: he laid down his arms on condition that he should be sent to Alexandria or St. John d'Acre. But, in direct violation of the terms of capitulation, he was taken to France, where he was detained as a prisoner until 1852. In 1860, when the Christians of Syria were threatened with massacre by the fanatical Mohammedans of that country, Abd-el-Kâder, with extraordinary diligence and at the risk of his own life, protected many thousands of those defenceless people so long as the danger lasted. In 1864 he paid a visit to Egypt, where he was well received by the viceroy, and received from M. de Lesseps a piece of land. He also joined the order of Freemasons. In 1865 he visited Constantinople, where he was received with great honors. In 1867 he attended the Universal Exhibition of Paris. Abd-el-Kâder has written in the Arabic language a work which he sent to the French Academy, and which was translated into French by Dugat, under the title "Rappel à l'Intelligent, avis à l'Indifferent" (1858). Abd-el-Kâder contributed important notes and commentaries to Daumas' "Les Chevaux du Sahara." (See "Life," by Churchill, London, 1867.) D. at Damascus May 26, 1883.

Abd-el-Latif′, an Arabian historian and physician, born at Bagdad in 1162. He wrote a valuable work on the history, antiquities, and geography of Egypt, of which De Sacy published a French version. Died about 1230.

Abd-el-Wahâb′, the founder of the sect of Wahabites or Wahâbees, was born in Nejed, Arabia, in 1691. He recognized the Koran, and endeavored to reform the Mohammedan religion, which he affirmed had become corrupted. Died in 1787. (See Wahâbees.)

Abde′ra [Gr. Ἄβδηρα], an ancient city of Thrace, noted as the birthplace of the philosopher Democritus. The stupidity and ignorance of the people of Abdera was proverbial.

Abd-er-Rahman III., surnamed An-Nâsir-Lidinillah, or Al-Nasser-lidînillah, a celebrated caliph, was born about 888 A. D. He began to reign at Córdova in 912. . He was distinguished as a patron of learning and the arts. During his long reign the Moslem empire in Spain was raised to the highest pitch. Died in 961.

Abdication, or the resignation of his throne by a king, was in former times of very rare occurrence, and generally occasioned by mental exhaustion, not to say derangement, as in the cases of Diocletian, Charles V., and Christina of Sweden. But in our century it has become a common affair, frequently resorted to for political ends. Charles IV. of Spain abdicated in 1808; Gustavus Adolphus IV. of Sweden in 1809; Louis I. of Holland in 1810; Napoleon I. 1814 and 1815; Victor Emmanuel I. of Sardinia in 1821; Charles X. of France in 1830; Louis Philippe of France, Louis I. of Bavaria, and Ferdinand I. of Austria in 1848; Charles Albert of Sardinia in 1849; and Amadeus of Spain in 1873.

Abdo′men [Lat. *abdo′men* (gen. *abdom′inis*), from *abdo, abdere,* to "hide"], that portion of the trunk of the human body which lies below the diaphragm. It contains the liver, pancreas, spleen, and kidneys, as well as the stomach, the small intestines, and the colon. The abdomen is lined by a serous membrane, the peritoneum, which is folded over the viscera, allowing them a certain freedom of motion, but retaining them in their proper relations to each other by means of the mesenteric fold. The external wall of the abdomen is divided by writers into thirteen "regions," by means of four imaginary transverse lines and five vertical ones. The first transverse line crosses the point of the ensiform cartilage; the second is on the lowest ribs; the third goes through the anterior superior spinous process of the ilium; the fourth is on the upper margin of the pubic bone. The first and fifth vertical lines run through the shoulder-joint, from the insertion of Poupart's ligament into the pubes; the second and fourth lines ascend from a point on the crest of either ilium vertically towards the posterior border of the axilla; the third line passes along the spinous processes of the vertebræ. Of the thirteen regions, five are anterior, four are lateral, and four are posterior. From above downward, the anterior are the epigastric, umbilical, hypogastric, and right and left inguinal regions. The lateral regions are the right and left hypochondriac and the right and left iliac. The posterior regions are the inferior dorsal and lumbar regions of either side.

Abdomen, in entomology, the hindmost of the three regions into which the body of an insect is divided. It is composed, typically, of eleven rings or segments, more or less distinct from each other, but the number is often only ten. It contains a portion of the intestines and the sexual organs. In the perfect insect its segments have attached to them no legs or wings. In many insects its last segments bear appendages of various uses and forms, as pincers, stings, ovipositors, etc. In some insects the abdomen is not well differentiated from the thorax.

Abdomina′les [the plu. of the Latin adjective *abdomina′lis,* "belonging to the abdomen"], or **Abdominal Fishes,** in the Linnæan classification, an order including all osseous fishes of which the ventral fins are beneath the abdomen and behind the pectoral fins. In the system of Cuvier the name is given to an order of more limited extent, a subdivision of the Malacopterygii or soft-rayed fishes, having the ventral fins, if present, beneath the abdomen and not attached to the bones of the shoulder. It includes the Cyprinidæ (carp, etc.), Esocidæ (pike, etc.), Siluridæ, Salmonidæ (trout, salmon, etc.), Clupeidæ (herring, etc.), Cyprinodontidæ, etc. The order is not recognized by all naturalists.

Abduc′tion [from the Lat. *ab,* "away," and *duco, ductum,* to "lead"], in law, the forcible or fraudulent carrying away of a person. It is usually confined to females removed with a view to their marriage or seduction. It is allied to the word *kidnapping,* which would include the case of males. Abduction is an offence severely punished by statute law, both in England and in this country.

Abd-ul-Aziz′ [written in French *Abdoul-Aziz,* and in German *Abd-ul-Asis*], a son of Mahmood II., was born Feb. 9, 1830; succeeded his brother, Abd-ul-Medjid, as sultan of Turkey, June 25, 1861. He reduced the imperial civil list from seventy-five million piasters to twelve million, abolished, among other barbarous practices, that of assassinating the sons of the princesses, favored the introduction of Western manners and customs, and did much to destroy the old and cherished traditions of the Turks. Deposed May 29, 1876, and is supposed to have been assassinated June 4, 1876. (See Turkey.)

Abd-ul-Hamid II., padishah or sultan of the Turkish empire, thirty-fifth of the dynasty of Othman, born in Constantinople Sept. 5, 1842; he is the second son and fourth child of Abd-ul-Medjid (which see); he was adopted by his father's second wife, who was childless. He was brought up with his brother Murad in the harem, and received but little education. In 1867 his uncle, Abd-ul Aziz, then sultan, took him with him to Paris to the Exposition of that year, and what he saw there developed in him a love of study, which greatly improved his mind. On the deposition of Abd-ul-Aziz (May 29, 1876), Murad, eldest son of Abd-ul-Medjid, succeeded, but proving incompetent from insanity, he was deposed Aug. 31, and Abd-ul-Hamid was invested with the sword of Othman Sept. 7, 1876, as Abd-ul-Hamid II. He is said to belong to the "Old Turkish" party, and has thus far carried on the government with considerable ability.

Abd-ul-Mejid′ [written in French *Abdoul-Medjid,* and in German *Abd-ul-Medschid*], sultan of Turkey, the eldest son of Mahmood II., was born in 1823. He succeeded his father July 1, 1839, when his capital was menaced by the victorious army of Mehemet Ali, viceroy of Egypt. This danger was averted by the intervention of England and other great powers in July, 1840. He favored religious liberty and the reforms which his father had initiated, but his good-will was partially frustrated by the resistance of his fanatical subjects. He died June 25, 1861, and was succeeded by his brother, Abd-ul-Aziz. (See Turkey.)

Abeceda'rians, a sect founded in the sixteenth century by a person named Storck, who professed that learning was not necessary, not even the knowledge of the alphabet (A B C, hence their name), for the proper understanding of the Scriptures; and some went so far as to maintain that it was not desirable to know how to read.

A'Beck'et (Gilbert Abbot), a humorous English writer and lawyer, born in London about 1810. He contributed to the London "Times" and "Punch." Among his works is "The Comic Blackstone" (1844–46). Died in 1856.

A'Becket (Thomas). See Becket.

Abeel' (David), D. D., an American missionary, born at New Brunswick, N. J., June 12, 1804. He published "A Journal of a Residence in China, 1829–33," "A Missionary Convention in Jerusalem, 1838," and "The Claims of the World to the Gospel." Died at Albany Sept. 4, 1846.

A'begg (Julius Friedrich Heinrich). See Appendix.

A'bel, the second son of Adam and Eve, was killed by his brother Cain. He is regarded as a type of faith and as the first martyr. (See Genesis iv. and Hebrews xi. 4.)

A'bel (Clarke), an English surgeon and naturalist, b. in 1780. He was naturalist to Lord Amherst's embassy to China, 1816, and published "Narrative of a Journey in the Interior of China." Died at Cawnpore, India, Nov. 24, 1826.

Abel (Niels Henrik), an eminent mathematician, born at Findö, in Norway, in 1802. He gained distinction by his discoveries in the theory of elliptic functions, and was highly eulogized by Legendre. Died in 1829.

Abelard [Lat. *Abælardus*], or **Abailard** (Pierre), a celebrated French philosopher and dialectician, born near Nantes, in Bretagne, in 1079. He studied dialectics under the Nominalist Roscellinus and the Realist William de Champeaux, and afterwards theology under Anselm of Laon. He taught in various places, largely in Paris, drawing around him great numbers of pupils from different parts of Europe. He sought to avoid the extremes of Nominalism and Realism, though his doctrine is not far removed from strict Nominalism. He had marvellous subtlety; he was able to foil the first masters of his age in logic; and was as audacious in propounding his notions as he was ingenious in defending them. But he lacked moral courage; he loved truth less than he thirsted for fame; his vanity and selfishness had no bounds; and his treatment of one of his pupils, the beautiful and accomplished Eloise, whom he first seduced, afterwards married, and then deserted, leaves upon his memory an indelible stain. He was one of the most prominent founders of Scholasticism, and exerted a larger influence upon the intellectual activity of his time than any other man. He died in 1142. The most complete work on Abelard is Charles de Rémusat's "Abélard," Paris, 1845. (See also Cousin's "Introduction to the Works of Abelard;" Berington's "History of Abelard and Heloise," and Wight's "Abelard and Eloise," N. Y., 1853.) J. H. Seelye.

A'belites, or **Abe'lians,** a sect of Christians who lived in Northern Africa in the fourth century. They enjoined marriage without carnal intercourse, in order not to propagate original sin, claiming in support of their practice the example of the patriarch Abel. They adopted children, who were brought up to the same kind of marriage. They were extinct before the time of Augustine.

Aben, Ebn, or **Ibn,** a prefix to many Arabic proper names, denoting "son of."

Abenaquis. See Abnakis.

Aben'cerrage, the name of a noble Moorish family of Granada, in Spain. The implacable feud between this family and the Zegris formed the subject of several Spanish and French dramas.

A'bendberg, a mountain of the Bernese Alps, in the Swiss canton of Berne, rises abruptly from the S. shore of Lake Thun, and has an altitude of about 5000 feet above the sea. On its southern slope was an asylum for cretins, founded about 1842, but since abandoned.

A'ben Ez'ra, b. at Toledo about 1088; d. at Calanorra in 1167; wrote commentaries on the Pentateuch and Isaiah which denote a great progress in the department of biblical exegesis.

A'bensberg, a small town of Bavaria, 18 miles S. W. of Ratisbon, has a castle and a mineral spring. Here Napoleon defeated the Austrians April 20, 1809.

A'ber, a Cymric term signifying "meeting-place of waters," occurs as a prefix to names of places in Great Britain—*e. g.* Aberdeen. It is probably etymologically related to the Persian *ab*, "water." The corresponding Gaelic term is *Inver*—*e. g.* Inverness.

Aberbrothwick. See Arbroath.

Ab'ercorn, dukes of, marquesses of Abercorn (in the Irish peerage, 1790), Viscounts Hamilton (in the peerage of Great Britain, 1786), earls of Abercorn (1606), barons of Paisley (1587), of Abercorn (1603), of Hamilton, Mountcastle, and Kilpatrick (in the peerage of Scotland, 1606), Viscounts Strabane (1701), Barons Strabane (1616), Mountcastle (in the Irish peerage, 1701), marquesses of Hamilton (in the Irish peerage, 1868), and dukes of Chatelhérault (in France, 1548), one of the most prominent noble families of Great Britain.

Abercorn (James **Hamilton**), first duke of, born Jan. 21, 1811, succeeded his grandfather as marquis of Hamilton in 1818, and became lord lieutenant of Ireland in 1866, which position he held until 1868, when he was created duke of Abercorn, and when the Derby ministry returned to power he was restored in 1874 lord lieutenant of Ireland; held the office till 1876. D. Oct. 31, 1885.

Ab'ercrombie (James), a British general, born in 1706, who in 1758 took command of near 50,000 men in New York, in order to recover the forts which the French had taken. On the 8th of July he attacked Ticonderoga, but was repulsed by the French with great loss, and was soon removed from the command. Died April 28, 1781.

Abercrombie (James), D. D., an eloquent Episcopalian clergyman and scholar, born Jan. 26, 1758, preached in Philadelphia, where he died June 26, 1841.

Abercrombie (John), M. D., an eminent Scottish physician, born at Aberdeen in 1780. He graduated as M. D. in 1803, practised in Edinburgh, and attained the reputation of being the first consulting physician in Scotland. He published "Inquiries concerning the Intellectual Powers of Man" (1830), and "The Philosophy of the Moral Feelings" (1833), which were highly esteemed. Died in 1844.

Abercrombie (John J.), an American officer, born in 1798 in Tennessee, graduated at West Point in 1822, colonel Seventh Infantry Feb. 25, 1861, and Aug. 31, 1861, brigadier-general U. S. volunteers. He served chiefly on the Western frontier (1822–61); as adjutant First Infantry (1825–33); in the Black Hawk war in 1832; in the Florida war, 1837–40; engaged at Okee-cho-bee (brevet major); in the war with Mexico, 1846–48; engaged at Monterey (wounded and brevet lieutenant-colonel), Vera Cruz, Cerro Gordo, and aide-de-camp to Major-General Patterson, 1846–47; as superintendent of recruiting service, 1853–55. In the civil war served in the Shenandoah campaign, 1861–62; engaged at Falling Waters; in the Virginia Peninsula, 1862; engaged at Fair Oaks (wounded) and Malvern Hill, and till 1864 in command of troops before Washington, D. C. Brevetted brigadier-general U. S. A. for long and faithful services, and retired from active service June 12, 1865. D. Jan. 3, 1877. George W. Cullum.

Ab'ercromby (James), Baron Dunfermline, born in 1776, was a son of General Sir Ralph Abercromby. He was chosen Speaker of the House of Commons by the Whigs in 1835, and resigned in 1839, when he passed into the House of Lords. Died in 1858.

Abercromby (Sir Ralph), a distinguished British general, born in Clackmannanshire Oct., 1734, entered the army in 1758. After the peace of 1783 he passed ten years at home in retirement. He distinguished himself in the disastrous campaigns in Holland in 1794 and 1795. In 1795 he took command of an expedition sent to the West Indies, where he captured several islands from the French. He was the second in command of the army which the duke of York led to Holland in 1799, and was appointed in 1800 commander-in-chief of the expedition to Egypt, which was then occupied by the French under Bonaparte. The British army, which landed early in Mar., 1801, was attacked by Menou, near Alexandria, on the 21st of that month. In this action the French were defeated, but Sir Ralph was mortally wounded, and died on the 28th of Mar., 1801. He was distinguished for superior talents, bravery, and humanity.

Ab'erdeen', or **Aberdeen'shire,** a county of Scotland, is bounded on the N. and E. by the North Sea, on the S. by Kincardine, Forfar, and Perth, and on the W. by Inverness and Banff. It has an area of 1970 square miles. The Grampian range of mountains extends along the southern boundary of this county, which contains several high peaks. Among these are Ben-Macdhui, 4390 feet, and Cairngorm, 4060 feet high. It is drained by the Dee and the Don. The principal rocks are granite and mica-slate. More cattle are raised in Aberdeen than in any other county in Scotland. Pop. in 1851, 212,032; in 1871, 244,607; in 1881, 267,990.

Aberdeen, a city and seaport of Scotland, and the capital of the county of Aberdeen, is on the North Sea, at the mouth of the river Dee, 93 miles N. N. E. of Edinburgh. It is a handsome city, with spacious streets and granite houses, and is celebrated as a seat of learning. Among the principal public buildings are the town-house, several churches, and Marischal (pronounced mar'shal) College, founded in 1593. Aberdeen has a good harbor and an extensive trade, the chief articles of export being fine cotton and woollen fabrics, granite, grain, cattle, and fish. Here are flourishing manufactories of cotton and woollen goods, combs, machinery, etc. Old Aberdeen, which is about 1 mile N. of the new city, is the seat of King's College and University, founded in 1494, united with Marischal College in 1860 as the University of Aberdeen. The Free Church Divinity College was built in 1850. Pop. in 1881, 105,189.

Aberdeen, capital of Monroe co., Miss. (see map of Mississippi, ref. 5–H, for location of county), is on R. R. and the W. side of the Tombigbee River. It buys and ships about 16,000 bales of cotton yearly, and has a fine court-house, one of the best river bridges in the South, a female college, and a great trade. It contains several steam-mills and a steam cotton-compress. Pop. in 1870, 2022; in 1880, 2339.

Aberdeen, Dak. See APPENDIX.

Aberdeen, Huntington township, Brown co., O. (see map of Ohio, ref. 8-D, for location of county), on Ohio River opposite Maysville, Ky. Pop. in 1870, 871; in 1880, 885.

Aberdeen (GEORGE HAMILTON **Gordon**), FOURTH EARL OF, a British statesman, born in Edinburgh Jan. 24, 1784, graduated at Cambridge in 1804. He began his public life as a Tory, was sent as ambassador to Vienna in 1813, and was raised to the British peerage as Viscount Gordon in 1814. In 1828 he became secretary of state for foreign affairs in the cabinet of the duke of Wellington, with whom he resigned in Nov., 1830. He was reappointed to that office by Sir Robert Peel in 1841, gradually abandoned the high Tory principles, and favored a pacific foreign policy. In 1846 he resigned office with Sir Robert Peel, after whose death (1850) he was regarded as the chief of the Peelite party. He became, in Jan., 1853, prime minister in a cabinet formed by a coalition of parties. In 1854 England was involved in a war against Russia, to which measure Lord Aberdeen gave a reluctant support. Either from this cause, or because the war was conducted with ill success, the ministers became very unpopular. Lord Aberdeen resigned in Feb., 1855, and was succeeded by Lord Palmerston. Died Dec. 14, 1860.

Aberdeen (GEORGE JOHN JAMES), FIFTH EARL OF, oldest son of the preceding, born Sept. 28, 1816, was for a number of years, as Lord Haddo, a member of the House of Commons, where he voted with the Liberals; succeeded his father in the peerage in 1860. Died Mar. 22, 1864.

Aberdeen, EARLS, Viscounts Formantine, Barons Haddo, Methlie, Tarves, and Kellie (in the Scottish peerage since 1682), Viscounts Gordon (in the peerage of the United Kingdom since 1814), and baronets (in the Scottish peerage since 1642), one of the most prominent noble families of Great Britain, an offshoot of the ancient Scotch family of the Gordons.—Sir John Gordon of Haddo was in 1642 created baronet by Charles I. for services rendered to that monarch in the battle of Turriff.—Sir George Gordon of Haddo was lord high chancellor of Scotland when in 1682 he was created an earl. He was an uncompromising opponent of William of Orange. Died in 1720.

Abergavenny, commonly pronounced ab-er-gā'ne, a market-town of England, in Monmouthshire, on the Usk, which is here joined by the Gavenny, and crossed by a fine bridge, 13 miles W. of Monmouth. Pop. in 1881, 7886.

Abergavenny, EARLS OF, and Viscounts Nevill (in the peerage of Great Britain, 1784), barons of Avergavenny since the time of Henry III., a prominent noble family in the peerage of Great Britain.—WILLIAM NEVILL, FIFTH EARL OF, was born Sept. 16, 1826, and succeeded his father in 1868. His oldest son and heir is REGINALD WILLIAM BRANSBY, Viscount Nevill, born Mar. 4, 1853.

Ab'ernethy (JOHN), a dissenting minister, born at Coleraine, in Ireland, in 1680. He was for many years pastor of a Presbyterian church at Antrim, and incurred the censure of the synod by his independent spirit. About 1730 he removed to Dublin, where he preached to an independent congregation. Died in 1740.

Abernethy (JOHN), an eminent English surgeon, born about 1765, was a grandson of the preceding, and a pupil of John Hunter. He was chosen assistant surgeon of St. Bartholomew's Hospital, London, in 1786, and eventually chief surgeon of the same. As a lecturer on anatomy and surgery he gained immense popularity. He published in 1809 an important work, "On the Constitutional Origin and Treatment of Local Diseases," the doctrines of which have greatly contributed to improve the science of surgery. Many anecdotes are related of his eccentric manners and of his witty or petulant speeches to his patients. Died in 1831.

Aberra'tion [Lat. *aberra'tio*, from *ab*, "from," and *er'ro, erra'tum*, to "wander"], a term variously employed: in optics it denotes the unequal deviation of rays of light when refracted by a lens or reflected from a concave mirror. There are two kinds of optical aberration—viz., Chromatic (from the Greek χρῶμα, "color") Aberration, or Aberration of Refrangibility, and Spherical Aberration, or Aberration of Sphericity. In astronomy also there is the Aberration of the Celestial Bodies, sometimes (but less correctly) termed the Aberration of Light.

1. *Chromatic Aberration, or Aberration of Refrangibility.*—A convex lens may be regarded as a number of prisms having their bases in contact. Hence, when a sheaf of rays of white light passes through it, the rays undergo not only refraction, but also decomposition; and since the variously colored rays into which white light is divided by a prism possess different refrangibilities, it follows that when light is converged by a convex lens it is refracted to different foci. The violet rays, being the most refrangible, form a focus nearest to the lens; while the red rays, being the least refrangible, form a focus farthest from the lens. Thus, in place of one focus, there are, in reality, an almost infinite number—viz., one for each of the differently refracted rays (the rays even of the same general color being not all refracted equally), and in the order of violet, indigo, blue, green, yellow, orange, red. Hence the rays do not meet at the same focus of the lens; and this deviation of the foci is called the *chromatic aberration* of a lens.

2. *Spherical Aberration, or Aberration of Sphericity.*—Lenses and mirrors are usually ground with spherical surfaces, and so long as the aperture does not exceed eight or ten degrees, the rays of homogeneous light refracted or reflected by different parts of them meet very nearly at the same focus of the lens or mirror. But as the aperture of a spherical mirror increases, the rays reflected from the edges cross each other at a point on the axis nearer to the mirror than those which are reflected from portions of the mirror near its centre. Thus, the rays are deviated from the true focus of the mirror. Again, with regard to spherical lenses of large aperture, the rays which pass through the lens near its circumference are refracted to a point nearer to the lens than those which pass through its central portion. In the case of mirrors this deviation of light from the focus is called *spherical aberration by reflection*, while in the case of lenses it is called *spherical aberration by refraction*. It may be remedied by giving lenses and mirrors parabolic surfaces—a plan which is almost invariably followed in the construction of specula for astronomical purposes.

3. *Aberration of the Celestial Bodies*, often (but less correctly) termed the *Aberration of Light*, in astronomy, an apparent displacement of a celestial object, due to the progressive motion of light. This aberration is caused—1, by the motion of the earth in its orbit; and 2, by the motion of the observed celestial objects. It was discovered by Bradley in 1727. This astronomer reasoned that if the earth's motion bears only an appreciable relation to the velocity of light, we ought to expect that the rays from a star would seem to come from a point nearer than is actually the case to that point in the heavens towards which the earth's course is directed. The phenomenon he had observed corresponded exactly with this explanation. The change of place due to the velocity of light, estimated from the eclipses of Jupiter's satellites, corresponded (within the limits of observational error) with the observed changes in the apparent positions of the fixed stars. It follows, from a consideration of the earth's path, that each star appears to describe a small ellipse about its true place. This fact is of great importance in its direct bearing on observational astronomy, but it is perhaps no less important on account of the evidence it supplies as to the motion of the earth.

The correction of the observed position of a celestial object for aberration gives the true position for the moment when the light which makes it visible left it; but this is not the true position for the moment of observation, except on supposition that the observed object is at rest. If the body itself is in motion, then, in addition to the correction of position for aberration, there must be a correction for the amount of proper motion which has taken place in the interval since the light which makes it visible left it. In order to make this correction we must know the rate of proper motion and the distance of the body. If the absolute proper motion of the body is given in miles, or length-measure, and not the apparent in angular measure, and is parallel to the motion of the earth, then the whole correction may be treated as aberration, by taking the sum or the difference of the velocities per second of the two bodies, according as they are in the opposite or in the same direction, and comparing this with the velocity of light. If the velocities of the two bodies are in the same direction and equal, their difference is zero, and the correction is *nil*. Hence, a body moving in the same direction as the earth, and with the same velocity, is unaffected in apparent position by aberration. The same will be true of a body not moving in the same direction as the earth, provided that when its velocity is decomposed into rectangular components, one of which is parallel to the earth's motion, this latter component velocity is equal to the earth's velocity and in the same direction.

It follows from the foregoing that the bodies of a group or system, as observed the one from the other, are unaffected by aberration in consequence of any common motion in which all participate alike, but that they suffer displacement from this cause only in consequence of their relative motions. The moon partakes of the annual motion of the earth round the sun, but suffers no aberration on that account; and so the sun, though it may have a proper motion in space, is unaffected by this cause in its apparent position, as viewed from the earth or from any other member of the solar system, since this motion is one in which all the bodies of the system equally participate.

F. A. P. Barnard.

A'bert (John J.), a graduate of the U. S. Military Academy, class of 1811, born in Maryland, 1785. Immediately resigning, he became a lawyer in the District of Columbia; and in the war with Great Britain, 1812–15, served as private in the militia at the battle of Bladensburg, Aug., 1814. Appointed brevet major of U. S. Topographical Engineers, Nov. 22, 1814, he was placed in charge of the bureau, Mar. 19, 1829, and on the organization of an independent *corps* of that title was made, with rank of colonel, its chief, July 7, 1838. Retired from active service Sept. 9, 1861. Died at Washington, D. C., Jan. 27, 1863. As an officer, and as chief of Topographical Engineers, Colonel Abert exercised an important agency in the development of the earlier national works of civil engineering in the U. S.—*e. g.* the canal around the Falls of the Ohio at Louisville; the Chesapeake and Ohio Canal; the Potomac aqueduct, etc. His exhaustive report on water-supply, in connection with the Chesapeake and Ohio Canal (1838), is a standard of reference. He was a member of the Geographical Society of France and other learned societies.

Ab'eryst'with, a market-town, seaport, and fashionable watering-place of Wales, at the mouth of the Ystwith, 34 miles N. E. of Cardigan. Pop. in 1881, 7088.

Abe's Spring, capital of Calhoun co., Fla. (see map of Florida, ref. 2–C, for location of county). Pop. of precinct in 1880, 607.

Abey'ance [Norman Fr. *abbaiaunce*, "expectation;" literally, "gaping" or waiting with open mouth], a legal term signifying "in expectation or suspense." It is used to indicate the condition of property where there is no person in whom its ownership is vested. In the law of real estate it is generally applied to a fee, which is said to be in *abeyance* when there is no particular owner of the inheritance. It has been laid down that a fee can be in abeyance only while there is a freehold estate (or life interest) in the land vested in some person. It is denied by writers of high authority that a fee can be in abeyance. The tendency of modern law certainly is to discountenance this theory, and to reduce the cases of abeyance to the narrowest possible limits. The term has been applied in some instances to personal property, as in case of captures at sea in time of war, as to the title after capture and before condemnation in the prize court.

Ab'gar, or **Ab'garus** [Gr. Ἁβγαρος], written also **Abagarus, Agbarus,** and **Augarus,** a name common to several kings of Edessa, in Mesopotamia. The fourteenth of these kings, Abgar Uchomo, is said to have been in correspondence with Christ. The genuineness of this correspondence has found defenders even in the nineteenth century.

Abgil'lus (John), son of the king of the Frisii, became a Christian, and accompanied Charlemagne in several of his expeditions. He received the title of Prester, or Priest, on account of the excessive severity of his life. He is not to be confounded with the Mongolian Prester John of the eleventh century.

A'bib (after the Babylonian captivity called **Nisan**), the first month of the Hebrew sacred year, and the seventh of the civil year.

Abich (Wilhelm Hermann). See Appendix.

Abida-Jebel, a volcanic mountain of Abyssinia, in Mudaito; lat. 10° 9′ N., lon. 41° E.

A'bies [Lat. *abies*, a "fir tree"], the name of a genus of coniferous trees which have leaves growing singly on the stem, as the fir and the spruce. The *Abies excelsa* produces the valuable timber called "white deal," also Burgundy pitch and frankincense; the *Abies balsamea* yields the balm of Gilead, or Canadian balsam. The famous cedar of Lebanon, which affords excellent timber, is called *Abies cedrus* by some botanists. Several species of *Abies* are highly prized as evergreen ornamental trees—viz. *Abies excelsa* (the Norway fir), *Abies alba* (white spruce), *Abies nobilis* (noble silver fir), *Abies pectinata* (European silver fir), and *Abies balsamea* (balsam fir). The *Abies balsamea, Abies Canadensis* (hemlock spruce), *Abies alba, Abies Fraseri*, and *Abies nigra* are natives of the Eastern U. S., while the most magnificent species of the genus, *Abies Douglasii, Abies Menziesii, Abies nobilis, Abies grandis*, and *Abies amabilis*, grow on the western coast of North America. The ancient genus is now divided into four—*Abies* for the firs, *Picea* for the spruces, such as the Norway and our black and white spruces (these two names have been used differently, but this is the ancient and recent scientific use), *Tsuga* for hemlock spruces; *Pseudotsuga* for Douglas spruce.

Ab'ila, capital of the tetrarchy of Abilene, identified, some fifty years ago, with Sûk, on the right bank of the Barada, near the point where it breaks through the Antilibanus range of mountains towards the plain of Damascus. It was on the great road between Heliopolis and Damascus, 32 miles from the former city and 18 miles from the latter. There was another Abila E. of the Jordan, a few miles S. of the Yarmuk (or Hieromax), the northern boundary of Gilead.

Abile'ne, an ancient tetrarchy, whose capital was Abila (which see). It is impossible to fix its limits. St. Luke (iii. 1) speaks of it as the tetrarchy of Lysanias, who was apparently a son of the Lysanias mentioned by Josephus. (See Krafft's "Topographie Jerusalems," 1847.)

A'bilene, capital of Dickinson co., Kan. (see map of Kansas, ref. 5–G, for location of county), on R. R. and the Kansas River, 95 miles W. of Topeka, is a great point for shipping cattle eastward by rail. Pop. in 1880, 2360.

Abilene, Tex. See Appendix.

Abim'elech ("the royal father"). I. A king of Gerar, a city of the Philistines, in the time of Abraham (Gen. xx. 1, *sq.*). II. Another king of Gerar in Isaac's time (Gen. xxvi.), perhaps a son of the foregoing. III. A son of Gideon (Judges ix.), was for three years (B. C. 1322–1319) a self-constituted king over a great part of Israel.

Ab'ingdon, a market-town of England, in Berkshire, on the Ock where it joins the Isis, 51 miles W. N. W. of London. It contains a fine memorial of Prince Albert, erected in 1860 and surmounted by his statue. It has a free grammar school. Pop. in 1881, 7019.

Abingdon, city and R. R. centre of Knox co., Ill. (see map of Illinois, ref. 4–C, for location of county), 85 miles N. E. of Quincy. It is surrounded by a rich agricultural district and is the seat of Hedding College, controlled by the Methodist Episcopal Church, and of Abingdon College, sustained by the Christian denomination. It has a plough-factory, steam-mills, and public parks. Pop. in 1870, 948; in 1880, 1511.

Abingdon, the capital of Washington co., Va. (see map of Virginia, ref. 7–B, for location of county), in a township of its own name, on R. R., 315 miles W. S. W. of Richmond. It has three female colleges of high grade, an extensive iron-foundry, and is the birthplace of several distinguished men. The county was organized in 1776, and is the first spot of earth named in honor of the Father of his Country. Emory and Henry College is in this county, and a large male academy, both flourishing institutions. The Maury Literary Society of Abingdon has a valuable library. Immense deposits of salt and gypsum are found here, and a large part of the salt used in the Southern States during the war was obtained from salt-wells bored in this vicinity. Pop. in 1870, 715; in 1880, 1064.

Abingdon, Earls of, Baron Norreys (1572, in the English peerage), a noble family of Great Britain. The first earl was created in 1682.—Montagu Bertie, the sixth earl, was born June 19, 1808, and succeeded his father in 1854. He is lord lieutenant of Berkshire.

Ab'inger (Sir James **Scarlett**), Lord, born in Jamaica, 1769, was educated at Cambridge and the Middle Temple, and was called to the bar in 1791. He became one of the most accomplished barristers of his time. In 1818 he entered Parliament as a Whig, but afterwards became a decided Tory. In 1827, and again in 1829, he was attorney-general. He was raised to the peerage in 1834, and was appointed chief baron of the exchequer. He died April 7, 1844.

Ab'ington, a township of Plymouth co., Mass. (see map of Massachusetts, ref. 4–J, for location of county), on R. R., 18 miles S. by E. of Boston, and has manufactures of boots, shoes, and tacks. Pop. in 1870, 9308; in 1880, 3697; in 1885, 3699. In 1874 part of its territory was set off to Rockland township, and in 1875 part to South Abington township.

Abiogen'esis [from *a* priv., *βίων*, "life," and *γένεσις*, "generation"], a name proposed as a substitute for *spontaneous* or *equivocal generation*—*i.e.* the doctrine that certain animals or plants have spontaneously originated, and without birth from previous living beings. Although credited by some naturalists, it has no scientific basis as generally presented.

Abipones, a tribe of Indians living in the Gran Chaco, in the Argentine Confederation. They lived formerly W. of the Paraná, between lat. 28° and 30° S., between Santa Fé and Santiago del Estero, but at present have removed towards Corrientes. The Abipones are of high stature, good swimmers, and tattoo themselves. Long lances and arrows with iron points are their weapons. In 1783 their number was estimated at 5000, but they have been reduced to 100 at the present day. They are related to the Tobas.

Abka'sia, or **Aba'sia,** a narrow territory in Western Asia, belonging to Russia, lies between the Caucasus Mountains and the Black Sea, which bounds it on the S. W. Area, estimated at 3486 square miles. Pop. about 80,000. The inhabitants, under the emperor Justinian, became Christians, but subsequently embraced Mohammedanism.

Ablu'tion [Lat. *ablutio*, from *ab*, "from," and *lu'o*, *lu'tum*, to "wash"], a religious ceremony of the Roman Catholic Church, signifies the washing of the sacramental cup and of the hands of the priest.

Abna'ki, or **Abenaqui,** frequently called **Tarrantenes** or **Taranseens,** a name given to the former tribes of Algonquin Indians of Maine and vicinity. They were once formidable enemies of the Indians of Southern New England and of the colonists, siding with the French against the English, but the latter overcame them and expatriated the greater part. Their remnants are Catholics, their ancestors having been converted by the labor of Sébastien Rale (1658–1724) and others. Rale compiled a dictionary of their language (published in 1833). Their history has been written by Maurault (1866) and by Vetromile (1866).

Ab'ner (the "enlightener"), the uncle of Saul, the first king of Israel. Abner became commander-in-chief of Saul's army, and for some time after the death of the king he was the chief support of Ishbosheth, his successor; but subsequently went over to the side of David, then king of Judah. With David he found such favor that the jealousy of Joab was aroused, and Abner was slain by him B. C. 1046.

Åbo [Sw. pronunciation, ō'boo], a Russian city and seaport, on the Aurajoki near its entrance into the Gulf of Bothnia; lat. 60° 26′ 58″ N., lon. 22° 17′ E. It was built by Eric IX. of Sweden in 1157, was subsequently taken by the Russians, and in 1809 was, with the whole of Finland, ceded to Russia. It was the capital of Finland until 1819, and is now the see of a Lutheran archbishop. It has a cathedral, a town-hall, and a custom-house. The University of Åbo, having been destroyed by fire in 1827, was rebuilt at Helsingfors. Pop. in 1880, 22,967.

Åbo-Björneborg, a government of Finland, is bounded by the governments of Wasa and Tawastehus, and by the Gulfs of Finland and of Bothnia. Area, 9895 square miles. The chief occupation of the inhabitants is commerce and shipbuilding. The government has also some factories. Pop. in 1879, 340,602. Chief town, Åbo.

Åbo, Peace of, concluded August 17, 1743, between Sweden and Russia, put an end to the war begun by Sweden at the instigation of France in 1741. During this contest, and through the misconduct of the Swedish generals, the Russians gained entire possession of Finland. The greater part of this territory they offered to restore on condition that Sweden should elect the prince of Holstein-Gottorp successor to the throne. This condition the Swedes complied with, and the treaty of peace was accordingly signed at Åbo.

Abolition of Slavery. Ancient servitude of the constrained, involuntary kind appears to have risen, flourished, decayed, and passed away without provoking any organized moral or religious opposition. That, so far at least as Europe was affected, was irrespective of race or color; for, though the Egyptians and Arabs bought and held negro slaves, they were not known in Europe till introduced into Spain by the Moorish invasion and conquest. After the slavery of negroes had been firmly planted in, and quite generally diffused over, the New World, slaves began to be taken to Europe by their American masters, and legal opinions for a time affirmed the validity of their bondage in countries where no law forbade it; but this was arrested, so far at least as Great Britain was concerned, by the famous decision of Lord Mansfield, who, in the case of the negro Somerset, brought to England from the West Indies by his master, held that slavery can only exist by virtue of positive law, and that, there being no such law in England, the master, though a Briton, forfeited all right in and power over him by taking him to that country.

The first systematic agitation for the overthrow of slavery began with certain American Quakers—John Woolman and Anthony Benezet of Philadelphia being conspicuous among them—about the middle of the last century. Benezet published in 1762 a book in exposure and denunciation of the slave-trade. His friend William Dillwyn removed to England some time afterwards, and there enlisted Granville Sharpe and others in the cause. The agitation soon after arising in this country against the Stamp Act and other arbitrary measures of the British government, incited many Americans to consider questions of natural right, and thus to condemn and oppose slavery. Hence, Thomas Jefferson, himself a slaveholder, yet opposed to slavery, had no difficulty in inducing a majority (sixteen to seven) of the Congress which met next after the acknowledgment of our independence to vote to exclude slavery (in March, 1784) absolutely and for ever from all the Union not included in any State. The proposition did not then prevail, since the votes of a majority (seven) of all the States were required to enact it, and the absence of a delegate from New Jersey reduced the States voting yea to *six*, against three voting nay—North Carolina being divided. The proposition, restricted to an inhibition of slavery in the territories already ceded by the States to the Confederation, was renewed in 1787, when it was unanimously passed, and it was reiterated with like unanimity by the first Congress which assembled under the Federal Constitution, when it received the approval of President Washington.

Meantime, the convention which formed that Constitution had authorized Congress to prohibit the importation of slaves after twenty years; and this was done—Congress having forbidden, in 1794, our people to engage in carrying slaves to other lands, absolutely outlawing all participation in the slave-trade by our people, and all importation of slaves into this country, by an act passed March 2, 1807—twenty-three days *before* the British Parliament, after a struggle which had lasted nearly a quarter of a century, did likewise.

A British society for the suppression of the slave-trade was organized by Dillwyn, Granville Sharpe, and Thomas Clarkson in 1787, to whom William Wilberforce, already in Parliament, soon lent his powerful aid. William Pitt, then prime minister, admitted the justice of their cause, and gave them a cold and hesitating support; Charles James Fox, his great rival, was its hearty supporter; so was Edmund Burke. Yet bill after bill for the suppression was defeated either directly or by postponement until after Pitt's death and Fox's accession to the premiership, when (in June, 1806) a resolve pledging the House to the measure passed the Commons by 100 yeas to 41 nays, and a bill founded thereon was next winter carried through both Houses, and received the royal assent Mar. 25, 1807.

Great Britain was slowly followed in this step by Sweden, Denmark, Holland, France, and several of the South American republics. Spain and Portugal reluctantly promised to do likewise, but were tardy in fulfilling their compact, even though they had accepted money or favor from Great Britain as a consideration therefor. The slave-trade was first declared a felony by act of Parliament in 1811, while acts passed in 1824 and 1837 made it piracy, punishable by transportation for life.

So soon as the slave-trade had been placed under the ban of the law, its British adversaries reorganized for a war upon slavery itself, against which they had hitherto put forth no combined or systematic efforts. Mr. Wilberforce presented their petition to the House of Commons in 1823, when it was defeated; Mr. Brougham took the lead in their behalf in 1830; and the struggle for parliamentary reform which followed the death of George IV. and the accession of William IV. brought a large adhesion of strength to their cause; so that in May, 1833, Mr. Stanley (the late earl of Derby) introduced, as secretary for the colonies, resolves which proposed the total (though gradual) emancipation of the slaves held in the British colonies, and a payment to their owners of £20,000,000. These resolves passed both Houses, and were followed by a bill of like tenor, which likewise passed and received the royal assent Aug. 2, 1833. It took effect Aug. 1, 1834, but an apprenticeship system was engrafted upon the measure, whereby the slavery of some was virtually prolonged for four, and that of others for six years. Experience proved this apprenticeship tainted with all the vices of slavery, relieved by scarcely any of its advantages; so the last traces of slavery were, by common consent, effaced from British soil Aug. 1, 1838.

The more northern of our States are justly entitled to the credit of having first in modern times discerned and proclaimed the wrong and mischief of slaveholding. Abolition received in Great Britain powerful and, for a time, commanding influence in Church and State; but the slaveholders were distant colonists, not directly represented in Parliament, and their defeat would not disturb the existing social order in the mother-country. Not so in the original New England States, New York, New Jersey, and Pennsylvania. Rhode Island, then eminently commercial, was long the focus of an extensive slave-trade, wherein some of her first families were involved; and slaves were held as firmly, though not so numerously, in New York and Pennsylvania as in Virginia and the Carolinas before the Revolution. Soon after the Declaration of Independence, Massachusetts adopted a bill of rights, which her highest court soon decided was incompatible with slavery, which was thereby outlawed. In Pennsylvania an abolition society, whereof Dr. Franklin was a member, was organized in 1780, and did not cease its earnest efforts until it had seen that State made a home for freemen only. In New York a similar organization was effected somewhat later, and the State was brought to decree the emancipation of her slaves by the constitution of 1821, though, with regard to some who were then minors, the liberation did not take effect till about 1830. In New Jersey the work was still more gradual, but hardly a handful were held in a nominal bondage after that date. Slavery had ceased to be a power north of Delaware and Maryland as early as 1820, save through the political, commercial, and social ligaments which bound the North and the South closely together, and made the wishes and supposed interests of the latter potent throughout the former.

As in England the early efforts of the abolitionists were directed against the African slave-trade exclusively, and a general crusade against slavery disclaimed, so in this country the anti-slavery spirit was long contented with resisting the extension of slavery into regions previously unscourged by it. There were, indeed, unconditional abolitionists, of whom Benjamin Lundy, William Lloyd Garrison, Alvan Stewart, Nathaniel P. Rogers, Lewis Tappan, and Elijah P. Lovejoy may be deemed representative pioneers; but their school was limited in numbers, and had little immediate influence on legislation or government, since an overwhelming majority of those earnestly opposed to slavery held that the spirit, if not the letter, of the Federal Constitution forbade all interference by Congress with the internal polity of a State, and restricted to moral influence the efforts of the citizens of one State to subvert or modify the institutions of another State. But when, in 1818, the Territory of Missouri framed a constitution and applied for admission into the Union as a State—said constitution recognizing and upholding slavery—the representatives of the free States very generally resisted such admission until she should provide at least for gradual emancipation. The Senate opposed any such restrictions, but a compromise was ultimately effected whereby Missouri was admitted as a slave State on condition that slavery should never exist in any territory of the U. S. north of the parallel of 36° 30′ N. latitude. The House consented to this by barely three majority (90 to 87), nearly all the nays being cast by Northern opponents of slavery. (See Missouri Compromise.) On the admission of the republic of Texas into the Union in 1845 the Missouri Compromise line of division was agreed upon and extended through all the public domain then acquired. In 1846, pending the war with Mexico, Mr. David Wilmot of Pennsylvania introduced into the House a proposition to prohibit for ever slavery from all new territory that might be acquired from Mexico, at the termination of that war. This proposition became celebrated as the Wilmot Proviso, and gave rise to continued and heated discussions in the House and the Senate until 1850, when another compromise, as it was called, was made in which Henry Clay was the pacificator. The agitation was renewed again in 1854, when a bill was introduced into the Senate by the Hon. Stephen A. Douglas for the organization of State governments in the Territories of Kansas and Nebraska, and providing for the repeal of the so-called Missouri Compromise act of 1820. The bill was adopted by the Senate by a large majority, but in the House it encountered very strong opposition, passing finally by a vote of 113 to 100. The question whether slavery should exist within the States to be formed under this act was thus referred to the people of the Territories themselves, and was left to be decided by what, in the popular parlance of that day, was called "squatter sovereignty." As the Territories were thinly peopled, there consequently arose a rapid migration towards them, especially towards Kansas, from both North and South, each section aiming to secure a predominance in the popular vote and in the constitutional convention. Occasional collisions between these rival colonists naturally occurred, attended in some instances with serious violence; and the struggle for power was protracted through several years. Both parties prepared and presented constitutions to Congress embodying their respective views. The election of Mr. Lincoln as President in 1860 finally decided the controversy, and Kansas was admitted as a free State in 1861. The same event occasioned the withdrawal from their seats in Congress of the Senators and members of the House from seven of the Southern States, and gave the advocates of slavery restriction by Federal legislation a majority in the Senate for the first time since the government was organized. The House was still more decidedly anti-slavery. As the war went on, defeats, even more than victories, diffused and intensified among Unionists the hatred of slavery; so that when Mr. Lincoln (Sept. 22, 1862) proclaimed that if the revolted States should still continue in rebellion he would, on the 1st of January ensuing, declare free all who were held as slaves within those States, public sentiment was ripe for sustaining that policy. Secession being still rampant, the President issued his second proclamation on the day appointed; after which no Federal commander was at liberty to remand slaves who had fled from their masters to find protection within the Union lines. From that date the war for the Union became, what in essence it had necessarily been from the outset, a struggle for freedom to all, and European rulers, who had smiled upon the Confederacy in the earlier stages of the contest, were repelled from taking its part openly when it was seen that its fate involved that of American slavery.

The Thirty-seventh Congress initiated the work of direct, outright emancipation by an act proposed by Senator Wilson of Massachusetts, abolishing slavery in the Federal District, and paying the owners an average compensation of $300 for each slave liberated. This bill passed the Senate, April 3, 1862, by 29 yeas to 14 nays, and the House, April 10, by 92 yeas to 39 nays. This was followed by an attempt to proffer a like compensation to the so-called Border States if they would consent to emancipation; but it was strenuously opposed by their representatives and by the entire Democratic party, and ultimately failed in the House for lack of a two-third vote to take it up out of its order on the last day of the session. A bill prohibiting absolutely all slaveholding in any Federal territory became a law, by the President's approval, June 19, 1862. A bill decreeing the freedom of all slaves of persistent rebels found in any place occupied or commanded by the forces of the Union, forbidding their rendition to their masters, and providing that negroes might be enlisted to fight for the Union, after undergoing sundry transmutations ultimately passed the House by 82 yeas to 42 nays, and the Senate by 27 yeas to 12 nays, and became a law, by the President's approval, July 17, 1862.

A constitutional amendment (the thirteenth), abolishing and prohibiting evermore the enslavement of human beings, was proposed in the Senate by Mr. Henderson of Missouri at the former session, when it passed that branch, April 8, 1864, by 38 yeas to 6 nays—six Senators not voting. Being sent to the House, it failed to command the requisite two-thirds—yeas, 85; nays, 66; when Mr. Ashley of Ohio kept it alive by changing his vote to nay and then moving a reconsideration. When that Congress reassembled, Dec. 6, 1864, for its final session, Mr. Lincoln had been triumphantly re-elected and the civil war was plainly near its end. The President, in his annual message, recommended a reconsideration and passage of the amendment aforesaid; and this was accomplished, Jan. 31, 1865, by 119 yeas to 57 nays—12 chosen as Democrats or Conservatives voting with all the Republicans in the affirmative—every Republican present and voting; eight Democrats absent. By the ratification of three-fourths of the States, and by the utter collapse of the civil war, this amendment became a part of the supreme law of the land, and its authority has never been contested. By its force slavery was banished from the U. S., as it had already been from every portion of this continent except Brazil and the Spanish islands of Cuba and Porto Rico. In Brazil an act was passed in Sept., 1871, freeing all the slaves belonging to the government, and securing freedom to all those born after the date of the enactment. (There has not yet been published any complete history of the abolition of slavery; the best work on the abolition of the slave-trade is Clarkson's "History of the Abolition of the Slave-Trade," 2 vols., 1808.)

Horace Greeley.

Aboli′′tionists, a name applied to those persons—more particularly in the U. S.—who were distinguished for their zeal against the institution of slavery. (See ANTI-SLAVERY SOCIETY, by HON. HORACE GREELEY, LL.D.)

Abo′mey, an African town, capital of the kingdom of Dahomey; lat. 7° 30′ N., lon. 1° 40′ E. It contains several royal palaces. Pop. estimated at from 50,000 to 60,000.

Abo′ny, a town of Hungary, in the county of Csongrad, 47 miles S. E. of Prague. Pop. in 1880, 11,186.

Aborig′i-nes [a Latin word derived from *ab*, "from," and *ori′go* (gen. *ori′ginis*), "source," "origin"], the earliest original inhabitants of a country—that is, those who occupied it at the period when it began to be known, and who either were (according to a once prevalent opinion) indigenous to the soil, or had immigrated thither before the dawn of history. Some of the ancients supposed they had always inhabited the same soil, and sprang from it, as the Athenians, who thence called themselves *autoch′thones* (from αὐτός, "itself," and χθῶν, "earth," "soil," "land"); *i. e.* sprung from the land or soil itself. But the Romans and modern nations use the word aborigines to designate those inhabitants of a country of whose origin nothing certain is known. Thus the Indians of America are properly called aborigines, because they were found there at its discovery, and as to their origin we have only their own tradition (which is not uniform) that their ancestors came from a distant region in the North-west. (See AMERICAN INDIANS.)

Abor′tion [Lat. *abortio*], the premature birth or exclusion of the human fœtus. It is doubtful whether the act of causing an abortion is an offence at common law unless the mother is quick with child, on the untenable ground that life does not begin until that period. The early statutes took the same distinction. Later legislation in England wholly discards it, and makes it a felony to procure the miscarriage of a female by unlawful means at any period of her pregnancy. The laws of the various States in this country still maintain to some extent the older rule.

About (EDMOND), a popular French novelist and political writer, born at Dieuze (Meurthe) Feb. 14, 1828. In 1868 he wrote, as one of the contributors to the "Gaulois," a series of witty and satirical letters, in consequence of which that paper was suppressed by the authorities; but he was nevertheless assisted by the imperial government, which in 1870 appointed him councillor of state. At the beginning of the war he was for a short time war-correspondent for the "Soir." Sept. 14, 1872, he was arrested by the Germans, but was released Sept. 21. He published in 1855 a work on modern Greece, "La Grèce contemporaine," which was much admired. He had been sent to the French school of art in Athens by his government. Among his works are novels entitled "Tolla" (1855), "Germaine" (1857), a political treatise on "The Roman Question" (1860), "Madelon" (1863), "Le Progrès" (1864), "La vieille roche" (3 vols., 1865–66), "L'infame" (1867), "Les mariages de province" (1868). His "Le Roi des Montagnes" (1856) is one of his best works. D. Jan. 17, 1885.

Aboville (FRANÇOIS MARIE), COUNT, a French general, born at Brest Jan. 23, 1730. He directed the artillery at Yorktown, Va., in 1781, and was inspector-general of artillery under Napoleon I. Died Nov. 1, 1819.

Abrabanel′, or **Abarbanel′,** b. in Lisbon 1437; d. in Venice 1508; traced his pedigree back to King David; was the pensioner of Ferdinand and Isabella of Spain, but was afterward exiled as a Jew; lived mostly in Italy, whence he made short journeys to other countries, and wrote, besides some commentaries, his "Herald of Salvation," an elaborate exposition of the Jewish doctrine of the Messiah, first printed at Saloniki in 1526.

Abracadab′ra, a term probably of Persian origin, was in former times highly prized as a magical formula, and supposed to be efficacious in the cure of fevers.

A′braham, originally **Abram,** an eminent Hebrew patriarch, called the "Father of the faithful," was born at Ur, in Chaldea, according to Hales, 2153 B. C.; according to Ussher, 1996 B. C. (Bunsen says he lived about 2850 B. C.). "Abraham" signifies "the father of a numerous people." He migrated to Canaan, where he led a nomadic life in tents, was greatly renowned for piety and wisdom, and was called a friend of God. He died at the age of 175 years. (See Genesis xi.–xxv.; Acts vii.; Hebrews xi. 8–17.)

A′braham-a-Sanc′ta-Cla′ra, a popular German preacher and Augustine friar, whose name was ULRICH MEGERLE, was born in Suabia June 4, 1644. He was appointed preacher to the imperial court at Vienna in 1669, and published many religious works. His sermons were seasoned with witty, humorous, or whimsical expressions. Died Dec. 1, 1709.

A′brahamites, the name of a sect of Bohemian deists, who are said to have rejected all parts of the Bible except the Ten Commandments and the Lord's Prayer. They were suppressed in 1783.

A′braham Osh′ki, a Jew of Portuguese descent, who translated the Bible, word for word, into Spanish. It was published in 1553 at Ferrara, and although the first edition is now seldom met with, it is still esteemed in Spain both by Christians and Jews.

Abran′tes, a fortified town of Portugal, in Estremadura, on the Tagus, 73 miles N. E. of Lisbon. Grain, oil, and fruit are sent from it to the market of Lisbon. Pop. in 1878, 6076.

Abrantes, DUKE OF. See JUNOT.

Abraxas Stones is the name of a kind of gems found in Syria, Egypt, and Spain. They are of various forms, but all have the word Abraxas or Abrasax engraved on them in connection with certain mystical symbols, mostly consisting of fantastical figures, composed of the body of a serpent, the head of a bird, and other incongruous parts. The word Abraxas was first used by the Egyptian gnostic Basilides, and denoted not the supreme being, but the assemblage of the 365 world-spirits; the letters composing the word expressing, according to the Greek numeration, the number of 365. His disciples, who used this kind of gems as amulets or talismans, and after whom they are often called Basilidian stones, spread them all over Egypt and Syria, and in the fourth century the disciples of Priscillianus brought them to Spain.

Abridg′ment [Fr. *abréger*, to "shorten"], a condensation or compendium of a book or literary work. In the law of copyright an abridgment, when fairly made, is regarded as a new work, and accordingly its publication is not an infringement of the copyright. A distinction is taken in the legal decisions between an abridgment and a compilation. The latter is more readily regarded as an infringement, as the words of an author are reproduced, while in a true abridgment the thoughts are expressed in other words and in a condensed form.

Abro′lhos (*i. e.* "open your eyes"), a group of small rocky islands which belong to the province of Espirito Santo, Brazil. The largest of these, Santa Barbara, 40 miles from the coast, has a lighthouse in lat. 17° 58′ S., lon. 38° 42′ W.

Abru′zzo, the northern part of the former kingdom of Naples, but now included in the kingdom of Italy. It is bounded on the N. E. by the Adriatic. It is divided into three provinces—viz. Chieti, formerly called Abruzzo Citeriore (or Citra); Teramo, formerly Abruzzo Ulteriore (or Ultra) I.; and Aquila, formerly Abruzzo Ulteriore II.

Ab′salom, the third son of King David, by Maacah, a Syrian princess, was remarkable for his personal beauty. Having, by his popular arts and fair speeches, gained the favor of the people, he rebelled against his father and raised a large army, which was defeated by the army of the king. Retreating from this battle, Absalom was killed by Joab, although David had given orders that his life should be spared. (See 2 Samuel xiii.–xix.)

Ab′salon, called also **Axel,** an eminent prelate and general, born in Iceland in 1128, was a liberal patron of learning, and was distinguished for his wisdom in council. He was one of the ministers of the Danish king Waldemar I., and became archbishop of Lund in 1178. Died in 1201.

Ab′scess [Lat. *absces′sus*, from *abs*, "away from," and *ce′do*, to "go," because the pus separates itself from the rest of the body], in surgery, is a circumscribed collection of pus in any part of the animal organism, as distinguished from "purulent infiltration," which designates such a collection not circumscribed. The term "diffuse abscess" is, however, applied, though improperly, to purulent infiltration. An "acute abscess" is one which is the result of active inflammation. "Cold abscess" is the result of chronic inflammation. The tendency of an acute abscess is to "point" or "come to a head;" that is, from the outward pressure of the accumulating pus, the walls yield mechanically in the direction of least resistance. In favorable cases the evacuation of the pus, natural or artificial, is the initiation of recovery; but if the abscess be of the "cold" variety, or be deep-seated and extensive, or be associated with metastatic symptoms or septicæmia, the question of recovery becomes a much more complicated one. Deep-seated abscesses, when they traverse considerable tracts of the body and "point" at a distant part, are called "congestive abscesses"—a term which is very properly passing out of use. Such abscesses are often for a long time difficult of detection, and their treatment taxes, too often in vain, the best skill of the surgeon. In general, abscess is detected by observation of the general and local symptoms. The general symptoms are fever and subsequent rigors; the local are "pain, heat, redness, and swelling," followed by softness and fluctuation of the fluid contents. (See Pus.)

Abscis'sa [from the Lat. *abscindo, abscissum,* to "cut off"], a term used in geometry to denote a segment cut off from a straight line by an ordinate to a curve.

Abse'cum, or **Absecom,** Atlantic co., N. J. (see map of New Jersey, ref. 7–C, for location of county), on R. R., and near Absecum Bay, 7 miles N. W. of Atlantic City. Absecum lighthouse is a brick structure on the S. side of Absecum Inlet; lat. 39° 21′ 55″ N., lon. 74° 24′ 32″ W. It shows a fixed white dioptric light of the first order, 165 feet above the sea. Pop. in 1880, 507.

Absentee, a term applied to capitalists and proprietors of land who do not reside on their estates, but spend their incomes in other countries. This practice is very prevalent among the Irish nobility and gentry, and some political economists ascribe the poverty of Ireland partly to this absenteeism.

Absinthe [Fr. for "wormwood"], a liqueur much used in France, prepared from alcohol mixed with volatile oil of wormwood, oil of anise, and other ingredients. It has peculiarly intoxicating effects, which are due to the oil of wormwood, the state resulting from its use being very different from the result of alcohol poisoning. Trembling, vertigo, fearful dreams, and epileptiform convulsions are among its severer consequences. Absinthe-drinking is one of the most dangerous forms of stimulation yet invented—the more so because its immediate consequences are usually more agreeable than those of alcohol.

Ab'sis, or **Ap'sis** [Gr. ἁψίς, an "arch"], a name given formerly to that part of a church in which the clergy were seated or the altar was placed. It was either circular or polygonal on the plan, and covered with a dome.

Ab'solute [from the Lat. *ab,* "from," and *solu'tus,* "loosed," a "part" (from *sol'vo, solu'tum,* to "loose")], originally, loosed or freed from all conditions, absolutely independent; hence, positive, unconditional, unlimited. As a scientific term it is the reverse of relative, as *absolute velocity.* In metaphysics it represents the unconditioned infinite and self-existent. Absolute monarchy is that which is not limited or restricted by constitutional checks.

Absolute Alcohol. See Alcohol, by C. F. Chandler.

Absolu'tion [Lat. *absolutio*], in canon law, is the pardon and remission of sins which a Roman Catholic priest pronounces to a penitent offender.

Absor'bents [for etymology, see Absorption], a term applied to a set of vessels of a peculiar character in the animal body. (See Lymphatics.)

Abso'rokas, a tribe of American savages. (See Crows.)

Absorp'tion [Lat. *absorp'tio,* from *ab,* "from," and *sor'beo, sorp'tum,* to "sip or suck"] is the function by which nutritive matter is absorbed into an animal or plant. Plants absorb carbonic acid gas by their leaves and other green parts, and it is supposed that this absorption takes place principally through the *stomata* of the leaves, and both by the upper and under surface of the leaf; in some plants much more powerfully by the one surface than by the other. But plants also derive their nourishment partially, although not principally, from their roots, and it is at the extremities of their fibrils that absorption takes place most rapidly, by capillary attraction and a process called Endosmose (which see). Absorption in animals is known to be largely by endosmose, and that process, mechanical rather than vital, is affected, it is believed, only indirectly by the nervous energy.

Abs'tinence [from *abs,* "from," and *te'neo,* to "hold," to "keep"], the act or state of abstaining from food, drink, etc.

Abstinence, Total, that is, from all indulgence in the use of intoxicating beverages, was practised in early ages by the Nazarites and Rechabites, mentioned in Scripture. Some of the Hebrew prophets rigorously inveigh against the prevalence of drunkenness, yet hardly indicate total abstinence as the proper remedy. The Essenes (which see)—a Jewish sect contemporary with the Messiah—were distinguished for temperance in eating and drinking, eschewing generally the use of flesh and wine. Mohammed peremptorily forbade the use of wine as a beverage by his followers. In the feudal ages, societies designed to shield their members and others from the evils of drunkenness were often formed, but not on the basis of absolute disuse of stimulants. The discovery of alcohol by an Arabian chemist about 1000 A. D. had, through the art of distillation, greatly expanded and intensified the evils of intemperance, especially in Northern Europe, where beer had generally been the most potent stimulant attainable by the masses. The discovery and settlement of America, largely increasing the average rewards of manual labor, especially on this continent, rendered intemperance more common, by increasing the ability of the common people to purchase alcoholic stimulants; and this country, especially throughout the half century succeeding its Declaration of Independence, was hardly equalled in the prevalence of intoxication even by the British and Scandinavian kingdoms, and was unapproached by any other nation.

The earliest known organization of a total abstinence society in the U. S. was "The Temperate Society of Milton and Northumberland" (Saratoga co., N. Y.), founded by Dr. Billy J. Clarke in 1808, which at its commencement had forty-three members. Distilled liquors and wines were absolutely prohibited by its rules, but not the moderate use of beer. In 1813 was formed the "Massachusetts Society" for the suppression of intemperance. In 1826 the American Temperance Society was organized. The evils resulting from the free use of ardent spirits were so general and glaring that kindred societies were soon formed in many cities, villages, and rural townships, the movement being strongly aided, especially among zealous Christians, by Dr. Lyman Beecher's "Six Sermons on Intemperance." Dr. Eliphalet Nott, president of Union College, was also early and honorably distinguished as a pioneer in the temperance cause. It was not till 1833 that, at a national meeting of the friends of temperance, held in Philadelphia, the principle of "total abstinence from all that may intoxicate" was propounded, only to be voted down; but it was again proposed, and adopted, at a national convention held at Saratoga Springs in August, 1836, and became henceforth the basis of the temperance movement, to which a great impulse was given by the "Washingtonians" (in good part reformed drunkards), who began their work in 1841, and for a time seemed destined to sweep all before them. The first State to prohibit the sale of intoxicating beverages was Maine, in 1851. The other New England States soon followed her example. New York had already (in 1846) authorized the voters of her several cities and townships to forbid such sale by a popular vote; but her court of appeals pronounced this unconstitutional, as it likewise did (in 1859) a law of absolute prohibition enacted in 1855. Chief-Justice Shaw of Massachusetts held that every citizen injured or annoyed by the proximity of a grogshop might lawfully abate it as a nuisance, but his two associates, on appeal, overruled him.

Partial, if not general, prohibition was enacted in several Western States, but here, as elsewhere, most imperfectly enforced. The Washingtonian effort gradually spent its strength and faded out, being succeeded by new organizations, whereof the "Sons of Temperance," "Good Templars," "Rechabites," "Good Samaritans," and "Cadets of Temperance" are still active and flourishing.

The total abstinence movement in Great Britain first attracted public attention in 1831. The "pledge" to drink no intoxicating liquors was first adopted by a national gathering at Manchester in 1834. It has never yet become so influential in that as in this country, and its upholders have only ventured to ask of Parliament a "permissive" act—that is, one allowing any locality to forbid and outlaw the liquor traffic by a majority vote—and this has never been conceded. The votaries of total abstinence in Great Britain are generally found in the humbler walks of life.

In Ireland total abstinence was first effectively commended by Father Mathew, who, by his simple expositions and exhortations, persuaded millions of his countrymen and fellow-Catholics to take the pledge, which many of them have since broken. Since his death, in 1856, the reform has decidedly lost ground in Ireland, while it has as yet made little headway in any part of Continental Europe or South America. Horace Greeley.

Abstinents, a Christian sect of Gaul and Spain in the latter part of the third century A. D., who condemned marriage and the use of flesh-meats and wine, declaring that they were made by the devil, and not by God.

Ab'stract [from the Lat. *abs,* "from," and *tra'ho, trac'tum,* to "draw"], literally, that which is drawn away or separated (or viewed separately) from all external circumstances or conditions, and hence opposed to Concrete (which see).

Abstrac'tion (see preceding article), the intellectual process by which the mind separates one of the attributes of an object from the others, and thinks of it exclusively. An idea or notion of an abstract or theoretical nature is sometimes called an abstraction.

Abstract Science (metaphysics, logic, mathematics) starts from a proposition whose truth is tested by the necessary laws of thought; from which proposition a whole system is evolved by inference and deduction. All discoveries, so far as they are not incidental, are made by application of abstract science (experiment), as all inventions are made by application of knowledge of the real object (experience).

Absurd'um, Reduc'tio ad, a term used in geometry to denote a mode of demonstration, in which the truth of a proposition is demonstrated by proving that the contrary is absurd or impossible.

Abt (Franz), a German composer, born at Eilenburg Dec. 22, 1819. He became in 1855 first chapelmaster to the duke of Brunswick. His works are chiefly songs. They are very popular in Germany and the U. S. D. Apr., 1885.

Abu (also written in English *Aboo*), an Arabic word, signifying "father," occurs as a prefix to many Oriental names.

Abu, a mountain of India, in Rajpootana, connected with the Aravulli range, is about 5000 feet above the level of the sea. It is a celebrated place of pilgrimage for the Jainas, who have four temples at Dilwara, near the middle of the mountain. One of these is said to be the most superb of all the temples of India.

Abubekr', or **Aboo-Bekr,** a caliph, the first of Mohammed's successors, was born in Arabia about 570 A. D. His original name was Abd-el-Kaaba, which was exchanged for Aboo-Bekr (*i. e.* "father of the virgin"), because his virgin daughter Ayesha was married to the prophet. He began to reign in 632 A. D., and died in 634, leaving a high reputation as a man and a ruler.

Abugirgeh, a large Fellah town of Middle Egypt, about 2 miles W. of the Nile and 122 miles above Cairo.

Abukir', a village of Egypt, on the site of the ancient Canopus, and on the sea-coast at the west side of Abukir Bay, 15 miles N. E. of Alexandria. Here is a castle.

Abukir Bay is on the coast of Lower Egypt, between the village and castle of Abukir and the Rosetta mouth of the Nile. In this bay Admiral Nelson gained a decisive victory over the French fleet, Aug. 1, 1798, and the Turks were defeated by the French under Napoleon I., July 25, 1799.

Abulca'sis, or **Abulka'sis,** written also **Abul-Kasem, Khalaf Ebn Abbas,** a celebrated Arab physician and surgical writer, born near Córdova, in Spain. His principal work was published in 1778, under the title of "Abulcasis de Chirurgia." The portion of it devoted to surgery is regarded as the most valuable treatise of the kind that has come down to us from early times. Died about 1110.

Abulfa'raj [Lat. *Abulfara'gius*] (Gregorius), a learned historical writer, born in Armenia in 1226, became maphrian or primate of the eastern division of the Jacobite Christians in 1266. He wrote in Syriac and Arabic several valuable works, among which is a "History of the Dynasties." Died in 1286.—There was also a famous Oriental poet, Ali Abulfaraj (897–997).

Abul-Fazl, an eminent Oriental historian, who in 1574 became vizier or prime minister of the great Mogul emperor Akbar. He was a wise and liberal statesman. He was assassinated about 1600. Among his important works are a history of Akbar, called "Akbar Nameh," and "Institutes of Akbar" ("Ayeen Akbari").

Abulfe'da, a Moslem prince and celebrated Arabian author, was born at Damascus about 1273. He fought with distinction for the sultan of Syria against the Tartars or Mongols, and was rewarded with the title of prince of Hamah. He wrote an important work entitled "An Abridgment of the History of Mankind," and another, "The Description of the Countries," which is regarded as the best Arabic work on geography that is extant. Died in 1331.

Abu Sambul, Abusimbal, or **Ipsambul,** a ruined place in Nubia, on the W. bank of the Nile, 1014 miles above Cairo and 8 miles above the Second Cataract. It contains two of the best-preserved specimens of the great rock-hewn temples of ancient Egypt. It has also four sitting colossal statues, which are not only the largest, but are considered the finest, specimens of Egyptian plastic art. One of these figures is fifty feet high as it sits.

Abutment, the part of a pier or wall from which an arch springs, and which resists the lateral or outward pressure. (See Bridge, by Gen. J. G. Barnard, U. S. Army.)

Aby'dos, an ancient city of Upper Egypt, on the left bank of the Nile, 5 or 6 miles from the river, and about 100 miles below Thebes. Here are the ruins of a temple of Osiris and a temple of Memnon, in which Mr. Bankes discovered in 1818 the celebrated tablet of Abydos, now in the British Museum. A second tablet of Abydos, containing 76 shields, was discovered by Mariette in 1865. Bankes' tablet contained only 26 shields.

Aby'dus, or **Aby'dos** [Gr. Ἄβυδος], an ancient city on the Hellespont opposite Sestos, where Xerxes crossed over to Europe on a bridge of boats, 480 B. C. It was also celebrated for its connection with the story of Hero and Leander.

Ab'yla and **Cal'pe,** the names of the pillars of Hercules, standing on both sides of the Straits of Gibraltar. The former was in Africa.

Abyssin'ia, in its widest sense, comprises the Ethiopic plateau, extending S. W. from the Red Sea, descending on the N. to the Nubian lowlands, and on the W. to the plains and valleys of Sennaar and Kordofan. It is not generally used in this sense, however, but excluding the narrow strip of lowland which separates it from the Red Sea and forms its boundary on the N. E., the Galla country on the S., and Nubia on the W. and N. W. It lies between the parallels of 9° and 16° 20′ N. lat. and the meridians of 34° 40′ and 40° E. lon. Its area is 128,646 square miles.

Topography.—Abyssinia consists of a series of plateaus, average elevation 5000–8000 feet, from which rise mountain-groups, the loftiest of which are 15,200 feet above the sea. Near the Red Sea the land is low, waterless, and unhealthy. The plateaus and mountains are fissured by rivers—viz. the Abai, passing through Lake Dembea, the Atbara, and the Tacazze. The mountains are volcanic, but most of the volcanoes are now extinct.

Climate.—The valleys and lowlands are hot, subject to fevers, and ravaged by wild beasts; the mountains and hills have a healthy and temperate climate and few wild animals.

Soil and Productions.—The soil of the valleys and lowlands is very rich, and the vegetation of a tropical character. In the hills and mountains the soil is fertile, but the vegetation is not tropical. There are few forests, and the mountain-torrents carry the soil of the hills into the Nile valley on the W. All the cereals grow well and yield large crops. Cotton, sugar-cane, tobacco, and coffee are raised largely in the lowlands; coffee grows wild.

Industries.—The people are mostly farmers and herdsmen. There are some rude manufactures.

Education and Religion.—The Abyssinians are naturally intelligent and quick-witted, but there is very little education; few can read or write. The Copts are nominally Christians, but their religion is very corrupt. Circumcision precedes baptism, communion is administered daily to the laity, and confession rigidly enforced, but morals are at a low ebb. The Falashas adhere to the Jewish ritual. The Gallas and some other tribes are Mohammedans, and there are some heathen. The Roman Catholics have attempted repeatedly to gain a footing here, but have failed. There are some Protestant missionaries.

History.—The Copts of Abyssinia are a mixed race, originally, probably, from Yemen. They first became noted at Axum. Their rulers claimed to be lineal descendants of Solomon and the queen of Sheba, and governed them peacefully to the end of the fourth century. About A. D. 350 Christianity was introduced, and became the national religion. The first great advance of Mohammedanism cut them off from all connection with other Christian nations, and great corruption and debasement ensued. The patriarch must be a Copt, and was generally an ignorant monk. The Mohammedans attempted to destroy the kingdom in the sixteenth century, but the Portuguese defeated them, and they and the Jesuits converted the royal family to Catholicism. The people, however, refused to be converted, and in 1630 severed all connection with Rome. The power of the Hazie or royal family continued to decline, and at the beginning of this century was only nominal, the governors of Ambara being the actual rulers. About 1850, Lij Kassa, of the royal blood but of poor parentage, became governor of the province of Kuara; he soon revolted, and after several failures and some successes dethroned Ras Ali, the Amhara ruler, and defeated Ubië, prince of Tigre, and in 1855 was crowned *negus negussie* (king of kings), under the title of Theodore II. He was at first a good ruler, having an able adviser in John Bell, an Englishman, who had been in Abyssinia since 1842; but after Bell's death, in 1860, he became a cruel tyrant, and so oppressed the people as to drive them to rebellion. He insulted the British government and imprisoned its citizens and consuls, and in the autumn of 1867 an armed expedition with about 12,000 troops was sent to Abyssinia, and landed at Mulkutto Jan. 3, 1868, and on April 14 captured Theodore's last and strongest fortress, and Theodore killed himself. After the British army withdrew, anarchy prevailed. Gobazie, prince of Amhara, proclaimed himself king, but in 1871 was defeated by Prince Kassa of Tigre, who in 1872 was crowned Emperor John II. of Ethiopia.

Population, etc.—There are numerous petty states and provinces occupied by distinct tribes and races; Tigre, Amhara, and Shoa are the largest. The pop. of Abyssinia is 3,000,000. The Coptic race predominates; there are also Falasha (a peculiar Jewish tribe), negroes, Gallas, and Arabs. The principal towns are Gondar, in Amhara, the residence of the abuna, or bishop; Adowa, capital of Tigre; Ankobar, capital of Shoa; Antalo, Massowa, Angolola, Aliya, Amba, and Magdala. L. P. Brockett.

Aca′cia [from the Gr. ἀκή, a "sharp point," on account of the thorns on the tree], a genus of the order Leguminosæ, found in Asia, Africa, America, and Australia, comprising many beautiful trees, among which is *A. Arabica*, which produces some of the gum-arabic of commerce, but the most and best is yielded by *A. verek*. (See GUMS.) Catechu is an extract from the wood of *A. Catechu* of India and Burmah; this and other species are much valued for timber, etc. The species with willow-like foliage, cultivated in conservatories, are nearly all Australian.

Acacia Arabica.

Aca′cians, followers of Acacius, bishop of Cæsarea 340–365, and of Acacius, patriarch of Constantinople 471–489. The former neither held that Christ was a created being nor that he was of like substance, but simply that he was like the Father. His doctrines were condemned at the Council of Sardica, 347, and at the Council of Seleucia, 359. Acacius, patriarch of Constantinople, sided with the emperor Zeno, whose edict was issued in 482, and was drawn up, it was supposed, by Acacius himself.

Acad′emy [Gr. Ἀκαδημία; properly Ἀκαδήμεια; Lat. *acade′mia;* Fr. *académie*], a word originally applied to an Athenian garden or grove and to the school of philosophy which Plato founded in that place, which was in a suburb of Athens. The name is supposed to have been derived from Academus or Hecademus, a mythical person who, according to Greek tradition, presented the garden to the people of Athens. The modified systems or schools of philosophy which the successors of Plato adopted were designated by the titles of the Middle and the New Academy. The word academy is also applied to a society of authors, savants, or artists founded for the improvement of literature, science, or art. The first institution of which we read, at all corresponding to this idea, was the Museum, a society of scholars established at Alexandria by Ptolemy Soter in the third century B. C., which concentrated in that city all that was most eminent in science, philosophy, poetry, or criticism. The Jews in different cities, the Constantinopolitan emperors, and the Arabian caliphs founded societies of the same description. Charlemagne, among his various efforts for the propagation of literature, collected an association of learned men, who read and compared the works of antiquity, and gave themselves in their academic intercourse the assumed names of different ancient authors. But this institution was dissolved at the death of Alcuin; nor do we find any memorial of a similar society, except a few among artists, chiefly in France, until after the taking of Constantinople by the Turks, when the Greek scholars driven into Italy held literary meetings, which gradually assumed a more regular form. In 1560 a society called the Academia Secretorum Naturæ, was founded at Naples in the house of Baptista Porta, but was abolished by a papal interdict. It was, however, succeeded by the Academia Lyncei at Rome, of which Galileo was a member, the objects of which, like those of the former, were chiefly connected with the pursuit of natural history. From the beginning of the seventeenth century academies multiplied in Italy. Among the most eminent of those bearing a philosophical character was the Academy del Cimento at Florence in that century; and in more recent times the Academy of Sciences at Bologna deserves to be mentioned with honor. But Italy has been most prolific in academies of literature and philology, which form by far the greatest number in the catalogue of 550 such institutions which have been enumerated as existing or having existed in that country. A general and somewhat ridiculous fashion prevailed in the seventeenth and eighteenth centuries, among literary men of that country, of forming themselves into societies for the promotion of literary objects, to which they gave fanciful symbolic names, every member assuming in his own person some analogous appellation. Among the most celebrated was the Academy (It. *Accademia*) degli Arcadi at Rome, of which the meetings were held in a meadow, and the members enacted shepherds and shepherdesses. It was founded about 1690, and still subsists, having various affiliated societies in other places. The Accademia degli Umidi, one of the oldest of these associations, became afterwards the Florentine Academy. The Accademia degli Intronati ("of the Deafened"), degli Umoristi ("of the Humorists"), and others with similar quaint appellations, have acquired celebrity in Italy. Of her philological academies the most illustrious is the Accademia della Crusca (*i. e.* "Academy of the bran" *), founded at Florence in 1582, which by its famous dictionary established the Tuscan dialect as the standard of the national language. It is now incorporated with the Accademia Fiorentina.

The first institution of this kind in France, the Académie Française, was founded in 1635, by Cardinal Richelieu. It was formed for the purpose of refining the French language and style, and, although in its first period it was chiefly remarkable for the adulation which it bestowed on its vain though able founder, it became in process of time by far the most celebrated and influential of all European literary societies. It consisted of forty members, and a place among them was eagerly sought after for a long period as one of the highest honors which could be attained by an author. Like that of La Crusca, it published a dictionary of the national language in 1694. The Royal Academy of Sciences was founded by Louis XIV. in 1666, and published 130 volumes of memoirs up to the year 1793, when it was abolished by the Convention. The Academy of Painting and Sculpture, and that of Inscriptions and Belles-Lettres, were the other two principal academies of Paris. The latter was founded by Colbert in 1663, and remodelled in 1701. At the Revolution all four were abolished, and in 1795, at the suggestion of Condorcet, the National Institute of France was established in their stead. It consisted of four classes, arising out of the four academies of which it was composed. According to its reorganization by Napoleon in 1806, these classes were remodelled, and each of them consisted of a certain number of sections, each furnished with a specified number of acting and corresponding members. The first class, or that of sciences, had sixty-three members and 100 correspondents; that of languages, forty, and sixty correspondents; that of history and antiquities, forty, and sixty correspondents; that of the arts, twenty-eight, and thirty-six correspondents. The first, third, and fourth each named eight foreign associates. In 1816 the Institute was again remodelled by Louis XVIII. The four classes again took the name of academies, and became more independent of one another, their joint property being managed by a commission of eight members, two from each, under the superintendence of the minister of the interior. The first academy (that of sciences) retained the same number of members; the second and third were reduced to thirty-eight and thirty-seven respectively; the fourth was increased to forty. To the Academy of Inscriptions and Belles-Lettres and that of Sciences was added a class of free academicians, of the number of ten, with no privilege except that of attendance. The Academy of Arts had the right to choose its own number of free members.

Of similar institutions in Germany, the oldest was the Academia Naturæ Curiosæ, a scientific association, founded in 1662 in Franconia, afterwards taken under imperial protection, when it received the name of the Academia Cæsareo-Leopoldina. The Royal Academy of Sciences at Berlin was founded in 1700 by Frederick I. of Prussia; Leibnitz was its first director. Other German academies of sciences are those of Göttingen, established in 1750; the Bavarian Academy at Munich, established in 1759, chiefly for history, and in 1829 divided into three sections; and the Saxon Association of Science, founded in 1846, and divided into two classes. The Imperial Royal Academy of Sciences at Vienna originated in 1846. Turkey established a similar institution in 1851, and Egypt in 1859. The Imperial Academy of Sciences at St. Petersburg was founded by Catherine I., and endowed by Catherine II. with great munificence, but established on the French model. She separated from it the Academy of Arts.

In England the name of academy has been chiefly confined to associations for promoting the arts. The Royal Academy of Arts was founded in 1768, and consists of forty members. It has separate professors of painting, architecture, anatomy, and perspective, and a council of nine is elected annually. The Academy of Ancient Music was founded by private association in 1710; the Royal Academy of Music, under the patronage of George III., but dissolved shortly after. The present Academy of Music was founded in 1822. The principal literary and philosophical societies, answering in character to the branches of the French Institute, are: 1. The Royal Society of London, which is confined to objects of a scientific character. It had its origin as early as 1645, but was established by royal charter in 1662. Its acts have been published under the name of "Philosophical Transactions" from 1665 to the present day. 2. The Antiquarian Society, which was established in 1751, and whose acts are published under the title of "Archæologia." 3. The Society of Arts, which originated in 1718. 4. That of Literature, which was founded in 1823. Besides these, there are numerous societies which bear the name of the peculiar branch of science to which their exertions are confined. The Royal Society of Edinburgh obtained a charter in 1783, and another, with more liberal provisions, in 1811.

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* In allusion to its office of winnowing or purifying the national language.

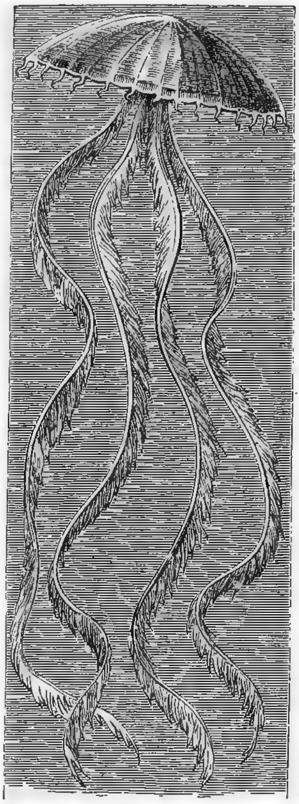
Among the most valuable published transactions of academies and similar societies, besides those already mentioned, are those of Colbert's "Académie des Inscriptions et Belles-Lettres" (50 vols. 4to, from 1701 to 1793); those of the Institute being continuations of the memoirs of the former academies of which it was composed; those of the Royal Academy of the Sciences and Belles-Lettres at Berlin; at first in Latin, then in French (from its remodelling in 1744 by Frederick the Great), now in German; the "Acta" of the Imperial Academy of St. Petersburg; the "Commentarii" of the Academy of Bologna; and the "Antichità d'Ercolano," published by the Herculanean Academy of Naples. The "Vetenskaparnes Sällskap" at Stockholm has published over 100 vols. of its valuable "Transactions."

The American Academy of Sciences and Arts was founded in 1780 by the council and house of representatives of Massachusetts. The National Academy of Sciences of the U. S., incorporated by the Thirty-seventh Congress in 1863, was limited by the original charter to fifty members, citizens of the U. S., fifty foreign associates, and a variable number of honorary members. Its stated meetings are held twice a year. Special meetings are held on call. Committees pursue at all times investigations required by the government. The Academy of Natural Sciences of Philadelphia was founded in 1812. Besides a valuable scientific library, it contains one of the best natural-history collections in the world, especially rich in birds. (See MILITARY ACADEMY, and also NAVAL ACADEMY.) J. THOMAS.

Aca'dia [Fr. *Acadie*], sometimes called **Arca'dia, Acca'dia,** or **Ca'die,** the peninsula now called **Nova Scotia.** It was settled by the French in 1603. Acadia originally included New Brunswick and a part of Maine. It was the subject of frequent quarrels between the French and English on account of the valuable fisheries near its coast, and was finally ceded to England in 1713. The inhabitants having refused to take the oath of allegiance to the British king and to bear arms against the French, the governor and his council resolved to remove them to the other British provinces. The French settlers, 8000 in number, were forced to give up their property, and were sent off in such haste that many families were separated. This event has furnished the subject of "Evangeline," one of Longfellow's most admired poems.

Acajut'la, a town and seaport in the Central American republic of San Salvador, is situated on the Pacific Ocean, 12 miles S. of Sonsonate. It consists, besides the custom-house and the dwelling of the captain of the port, of a large warehouse, almost entirely in ruins at present, and a few huts and sheds. Under the Spanish rule it was for a long time the only port on the W. coast between Acapulco and Realejo; at present it is second in importance in San Salvador, and has over one-third of the foreign trade of this republic. The chief article of export here is Peruvian balsam, of which 20,000 pounds are annually exported.

Acale'phæ (or, in English, **Ac'alephs,** and sometimes **Acale'phans**), [from the Gr. ἀκαλήφη, a "nettle"], (in the singular **Acale'pha** or **Ac'aleph**), a class of radiated animals according to the system of Cuvier. They are commonly called jelly-fishes or sea-nettles, and sometimes sea-blubber. The body of these animals is composed of a transparent, gelatinous substance, and in one section of the class, the true Medusæ, the body is entirely unsupported by any hard framework. The quantity of solid matter contained in them is very small, over ninety-nine per cent. being water; they may therefore be described as almost "living water." If one of them be taken from the sea and laid upon the surface of a dry board or rock, it deliquesces very rapidly. One of these, weighing fifty ounces when taken from the water, has been found not long afterwards to be nothing but a little dry cellular tissue, weighing only five or six grains. All the senses in the Acalephæ save that of touch are thought to be wanting. They possess, however, a muscular and a nervous system, as well as a distinct digestive apparatus. The digestive organs are lodged in a common centre or a longitudinal axis. From this centre proceed ray-like processes, with tentacular appendages presenting a great variety of form. In these are the peculiar *nettling* organs, which are generally composed of an oval capsule containing a spirally-coiled filament, which is suddenly thrown out whenever the animal is in any way disturbed. These filaments are lined to their very extremities by barbules, which are arranged in such a manner as always to point backward when the filament is projected. A system of vessels from the gastric cavity proceeds through the body. The existence of blood has not yet been detected. The acalephs have no teeth; in some of the animals of this class, such as the *Physalia* (or Portuguese man-of-war), food is obtained by suction through the flask-like appendages which hang down beneath, each possessing an orifice and a sucker. The Acalephæ are of various forms and sizes; many of them are shaped somewhat like an umbrella when spread. While most of them are extremely small, the larger sometimes attain a length of three feet or more. The phosphorescence of the sea is in part caused by multitudes of minute Acalephæ. The larger acalephs subsist on small fish and other marine animals; they are propagated by eggs, etc., according to the process of alternate generation. The eggs produce a brood totally different from the parent, and resembling Infusoria, which attach themselves to some stationary object and assume a polyp-like form, and by gemmation produce a progeny which in time attains to the original form, or, in other words, becomes like the grandmother. (See ALTERNATE GENERATION.) They possess the power, also, of multiplying by gemmation alone, little ones being almost ready formed from the substance of the parent, mostly from the walls of the peduncle or from the surface of the ovaries, and being very similar to their parents. These animals are classified according to the different powers of locomotion which are exhibited in them. They are grouped in three orders—the Ctenophoræ, Discophoræ, and Hydroids, ranking in the order named, the Hydroids being the lowest in development. In some instances the Hydroids closely approach the character of the polyps; but others are plainly acalephs, and there are many intermediate gradations.



Acalepha.

Acantha'ceæ [so named from *Acanthus*, one of its genera], a natural order of monopetalous exogenous plants, having irregular didynamous flowers, and particularly known by their calyx being imbricated in two broken whorls, and by their seed growing from hooks on the placenta. Several species of this order have beautiful flowers, like the *Thunbergia*. The U. S. have several genera.

Acanthas'pis [Gr. ἄκανθα, a "spine," and ἀσπίς, a "shield"], a genus of buckler-headed fishes found by Dr. Newberry in the corniferous limestone of Ohio. It somewhat resembles *Cephalaspis*, the buckler or carapace bearing similar denticulated spines, but the cranial plates are covered with a peculiar vermicular ornamentation, and were not ankylosed together.

Acan'thophis [from the Gr. ἄκανθα, a "thorn," and ὄφις, a "serpent"], a genus of venomous serpents allied to the viper, and natives of Australia. They have a horny spine at the end of the tail. The genus includes the dreaded death adder, *Acanthophis antarctica*, one of the most venomous of known reptiles.

Acanthopteryg'ians [Gr. ἄκανθος, a "thorn," and πτέρυξ (gen. πτέρυγος), a "wing" or "fin"], one of the two primary divisions of the Osseous fishes in the system of Cuvier. This order, which includes the perch and mackerel, is characterized by bony spines formed from part of the rays of their dorsal, anal, and ventral fins, and is the most extensive order of fishes generally recognized.

Acanthuridæ. See TEUTHIDIDÆ.

Acanthu'rus[*] **Chirur'gus,** or **Sea-Surgeon,** owes its name to the sharply-pointed and keen-edged spine on the side of the tail, which cuts and wounds like a surgeon's lancet. The scales of this fish are very small, and the single spine on each side of the tail is movable and set in a longitudinal groove. Its food is of a vegetable nature. It is found on the Atlantic coasts of tropical America and Africa, and is tolerably plentiful in the Caribbean seas.

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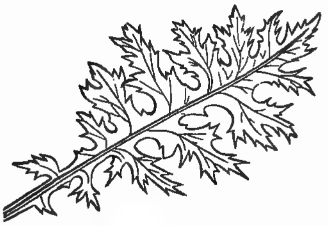
[*] Literally "thorn-tailed," from the Gr. ἄκανθα, a "thorn," and οὐρά, a "tail."

Acan'thus [from the Gr. *ἄκανθα*, a "thorn"], the systematic name of a genus of herbaceous plants, natives of Southern Europe, belonging to the natural order Acanthaceæ. The most remarkable species of this genus are the *Acanthus mollis* and the *Acanthus spinosus*, which have large white flowers and shining leaves of a beautiful form. This foliage is said to have suggested to the architect Callimachus the first idea of the ornate and beautiful capital which forms the most striking feature in the Corinthian order of architecture.



Natural form of the leaf.

Leaves artistically modified.

A Capel'la, or **A la Capel'la,** in music, means "in the church style;" it is equivalent to *alla breve*, a time-signature which frequently appears in church music. It likewise denotes that the instruments are to play in unison with the voices, or that one part is to be played by a number of instruments.

Acapul'co, a seaport-town of Mexico, on the Pacific Ocean, and in the state of Guerrero, 190 miles S. S. W. of Mexico; lat. 16° 55′ N., lon. 99° 48′ W. The harbor is nearly landlocked, and is one of the best in the world. The climate is hot and unhealthy. It formerly commanded the whole trade between the Spanish dominions in America and those in the East Indies. Since the discovery of the California gold-mines it has again become one of the most important ports of Mexico. The harbor is so deep that large ships can anchor close to the granite rocks. The steamers which ply between Panama and San Francisco touch here regularly. The greater part of the town was destroyed by an earthquake in 1852. Pop. about 5000.

Acari'dæ or **Acar'ida** [for etymology see Acarus], a family of small animals, including the acarus or mite and other minute insects belonging to the order Arachnida. Their food consists of both animal and vegetable substances. Some of them are free and lead a wandering life, while others are parasitic, living on other animals. Those of the former class have their mouths furnished with distinct mandibles, and are often found in great numbers in old cheese, brown sugar, and dried fruit, and in the cabinets of entomologists. One of the most destructive of these is the *Acarus destructor*. Those of the latter class are possessed of a sucker, by which they adhere to the skins of animals, where they are supplied with nourishment.* A few species of the Acaridæ are aquatic, and have their legs furnished with hairs, by means of which they swim with facility. The Acaridæ are propagated by eggs, and are extremely prolific. When mature they usually have eight legs, the young or imperfectly developed animals having only six. It was an *Acarus* whose appearance under the electrical experiments of Mr. Crosse startled the public several years ago with the supposition that it was generated or created by the electrical fluid. From its discoverer it was called *Acarus Crossii*. (See Spontaneous Generation.)

Acar'ina [for etymology see Acarus], a sub-order of spider-like insects, inferior in rank to true spiders, including the ticks, the mites (Acaridæ), and other families, having the various articulations merged into or closely joined to the abdomen.

Acarna'nia, a district of ancient Greece, bounded on the N. by the Ambracian Gulf, on the E. by the river Achelous, and the S. and W. by the Ionian Sea. According to tradition, it was named from Acarnan, the son of Alcmæon. It is mostly occupied by well-wooded hills or mountains. Acarnania and Ætolia constitute a nomarchy or province of modern Greece, with an area of 3025 square miles. Pop. in 1879, 138,444.

Ac'arus [from the Gr. *ἀκαρής*, "that which cannot be cut on account of its smallness" (from *α*, negative, and *κείρω*, to "cut")], a genus of minute animals, including the common mite found in figs and other dry provisions (the *Acarus domesticus*), and many other species. (See Acaridæ.) The itch is caused by an acarus which was formerly known as the *Acarus scabiei*, but which is now usually called *Sarcoptes hominis*.

Ac'ca Lauren'tia was the name of a woman to whose grave the ancient Romans brought sacrifices on the occasion of a festival, on the tenth day before the calends of January. According to a Roman legend, she married the rich Tarrutius, and upon her death left her whole property to the Roman people; while, according to another legend, she was the nurse and foster-mother of Romulus and Remus.

Accelerando, in music, signifies, with gradually increasing velocity of movement.

Accelera'tion [Lat. *accelera'tio*, from *ad*, "to" (implying "addition"), and *cel'ero, celera'tum*, to "hasten"], a continuous increase of the velocity or rate of motion of a moving body. The measure of velocity is, in general, the space through which that velocity, if unvarying, would carry a body in a unit of time (in mechanics, one second). When motion is uniform, the spaces passed over in successive units of time are equal. When it is accelerated or retarded, these spaces increase or diminish, and cannot be taken as measures of the velocity at either the beginning or the end of the period. In order, therefore, to compare the successive velocities of an accelerated or retarded body, the spaces must be taken which are passed over in consecutive equal but indefinitely small intervals of time. If these minute spaces increase, the velocity is accelerated; if they diminish, it is retarded. Their differences show whether retardation is uniform or otherwise. If they increase, it is increasing; if they diminish, it is diminishing. Thus, the differences of these differences, or the second differences, indicate the character of the variation. If the second differences are positive, the acceleration is increasing or the retardation is diminishing, and *vice versâ*. If the second differences are zero, the acceleration or retardation is uniform. The simplest case of a force producing a uniform acceleration is that afforded by the action of the earth on falling bodies. The increase of velocity in this case is proportional to the time, and nearly equal to 32.2 feet per second.

Acceleration of the Fixed Stars denotes the apparent greater diurnal motion of the stars than of the sun, the cause of which is that the sun's apparent yearly motion takes place (though much more slowly) in a direction contrary to that of its apparent daily motion. Compared with the sun, the stars thus seem to gain about three minutes fifty-six seconds each day, coming by that interval earlier each successive twenty-four hours, to the meridian.

Acceleration of the Moon, or Acceleration of the Moon's Mean Motion, is one of the most remarkable peculiarities of the lunar motions. It was noticed by Halley that when the ancient eclipses are compared with modern lunar observations, the moon is found to be moving faster now on her course round the earth than in former days. The explanation of this peculiarity was long sought for unsuccessfully by the leading professors of the Newtonian system of astronomy. Indeed, it may be said even now that the acceleration of the moon is a problem but partially solved. We owe to Laplace the first successful attempt to explain the difficulty. He showed that the moon's motion is accelerated through the slow process of diminution which the eccentricity of the earth's orbit is undergoing. Owing to this change, there results (on the whole) a slight diminution of the sun's influence upon the moon's motions. This explanation, however, fails fully to account for the phenomenon. The part still outstanding is attributed by Prof. Newcomb to the retardation of the earth's diurnal motion of rotation by the friction of the tides. This part, which is apparent only, may range from two to six seconds per century; the other part, which is real, is about six seconds.

Acceleration of the Planets. The motion of the planets in their orbits is variable, being quicker or slower according as the planet is at a less or a greater distance from the sun. Hence, in moving from the apogee to the perigee of the orbit, the motion of a planet is accelerated, and on the contrary, in moving from the perigee to the apogee, the motion is retarded. F. A. P. Barnard.

Ac'cent [Lat. *accen'tus*, from *ad*, "to" or "according to," and *ca'no, can'tum*, to "sing" or "sound"]. In English, accent usually denotes the greater stress which is laid on some one syllable of a word, as, for example, in *na'tion, protect', ev'ident, for'midable*. In our language the accent is seldom placed farther from the end of a word than the pre-antepenultimate (as in *ex'quisitely, hos'pitable, for'midable*). Even this is comparatively rare, and the pronunciation of such words is attended with some difficulty to many speakers. The accent on the antepenultimate (as in *ed'ucate, ev'ident, mortal'ity*), on the penultimate (as in *devo'tion, na'tion*, etc.), and on the ultimate (as in *exhort', proceed'*), is of continual occurrence.

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* For an account of the parasitic Acaridæ the reader is referred to Kuechenmeister's "Manual of Parasites," vol. ii.

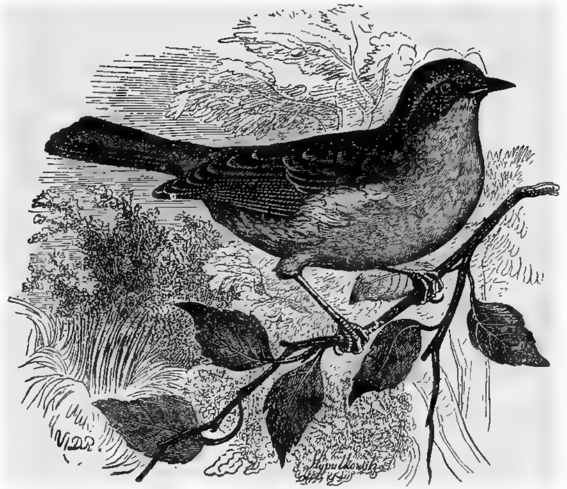
In French, accent denotes not a *stress of voice*, but for the most part simply a *quality of sound;* thus, *e* with the acute accent (*é*) represents a sound nearly similar to the English *a* in *fate;* with the grave accent (*è*) it indicates a sound nearly like our *e* in *met*, and with the circumflex (*ê*) a sound similar to the last, but still more open. *A* with the circumflex (*â*) is pronounced like our *a* in *far* or *farther* (å), while *a* without any accent approaches very nearly to our *a* in *fat* (å). The grave accent on the preposition *à* ("to") is merely used to distinguish this word from the verb *a* ("has"), which is always written without the accent.

In German, accent is essentially the same as in English; in Italian, Spanish, and most other European languages (including the modern Greek), it is similar, or very nearly similar, to that of our tongue.

With regard to the ancient Greek accent, there is a great diversity of opinion among scholars. The most probable theory seems to be that the acute accent of the Greeks caused the syllable on which it was placed to be sounded in a higher key than the other syllables, but without any greater stress or force of utterance, and that "when a high-tone ultima, followed by other words in close connection, dropped down to a lower key, it was written with a grave accent instead of the acute." (See on this subject an interesting paper read by Prof. Hadley before the American Philological Association, July 27, 1870.) The acute followed by a grave on the same long syllable combined to form the circumflex. They were at first probably written separately, as in the word σώ̀μα, but afterwards the two were joined, as in σῶμα. The invention of the Greek signs of accent is due to Aristophanes of Byzantium, a celebrated grammarian, who lived and taught in Alexandria, and who flourished about 260 B. C. (or about 200 B. C., according to some writers).

ACCENT in music is analogous to accent in language. It consists of a stress or emphasis given to certain notes or parts of bars in a composition, and may be divided into two kinds—grammatical and rhetorical or æsthetic. The first kind of accent is perfectly regular in its occurrence, always falling on the first part of a bar. It is true that long or compound measures of time have, besides the chief accent in every bar, some subordinate accent, but these are only slightly marked. As a general rule, we may observe that the grammatical or regular accent must not be exaggerated. It should be marked only so far as to give a clear sense of rhythm. The æsthetical accent is irregular, and depends on taste and feeling, exactly as do the accent and emphasis used in oratory. In vocal music well adapted to words, the words serve as a guide to the right use of æsthetical accents.

Accen'tor [Lat. the "warbler"], a genus of warblers, including the hedge-accentor or sparrow (*Accentor modularis*), a familiar and abundant European bird, five and a half inches long, brown above, steel-colored beneath. Its song is fine, but short. It has been introduced into the U. S. The *Accentor Alpinus* of the Alps is a larger bird.



Accentor.

Accep'tance, an engagement to pay a bill of exchange. (See BILL OF EXCHANGE, by PROF. T. W. DWIGHT, LL.D.)

Accep'tants, or **Constitu'tionists,** a name given in 1713 to the Jesuits in France who accepted the constitution or bull Unigenitus issued by Pope Clement XI. The Jansenists, who rejected the pope's bull, were called Appellants or Recusants, and appealed to a general council. They were imprisoned and persecuted, but after the death of Louis XIV., the regent, the duke of Orleans, prevailed on the greater part of the recusant bishops to accept the bull with certain modifications. The Appellants continued their resistance after the Unigenitus became national law (1730).

Acces'sary, or **Acces'sory** [from the Lat. *ad*, "to," and *cedo, cessum*, to "go"], in criminal law, a participant in a felony who is not the chief actor, and is not present at its commission, but yet in some way is connected with it, either before or after the fact (or act committed). An accessary before the fact is one who, though not present, procures, counsels, or commands another to commit it. An accessary after the fact is one who, knowing a felony to have been committed, receives, relieves, comforts, or assists the felon.

In offences below the grade of felony there are no accessaries. All implicated are regarded as principals. By the common law of England the same rule is applied to the case of treason. In manslaughter, as defined by common law, there can be no accessary before the fact.

Acces'sion [Lat. *accessio*, from *ad*, "to," and *cedo, cessum*, to "go"], in law, a species of title to property borrowed from the civil (or Roman) law, and defined to be the right to all which one's own property produces, whether that property be movable or immovable, and the right to that which is united to it by accession, either naturally or artificially. By this principle the increase of an animal belongs to its owner, or a building becomes the property of the man on whose soil it is erected. An important instance of the application of this doctrine is found in the manufacture by one person of materials belonging to another. The property in its manufactured state belongs, in general, to the owner of the materials. A leading exception to the principle is, that if the manufacturer, acting in good faith, without the consent of the owner, changes the identity of the materials, as if he converts grapes into wine or grain into whisky, he will become the owner of the manufactured article. This rule would not be applied in favor of a wilful wrong-doer. The word "accession" is also used to indicate the fact of succession in government, such as the "accession" of a new dynasty in monarchies, as in the case of the House of Hanover in England. T. W. DWIGHT.

Accessory, or **Accessary,** in painting, a term applied to everything introduced into a picture that is not an essential part. In an historical painting the human or animated figures are the principal objects, and all the others are accessories.

Ac'cidens, or **Per Accidens** (*i. e.* "by accident"), a Latin phrase used by the older philosophers to denote an effect not following from the nature or essence of the thing, but from some accidental quality. It is opposed to *per se:* thus, fire burns *per se;* heated iron burns *per accidens*.

Ac'cident [from the Lat. *ad*, "to," and *ca'do*, to "fall," to "happen"], in logic, is one of the predicables; in its strictest logical sense it is that which may be absent from or present in the subject, the essence of the species to which the subject belongs remaining the same. Thus, if it be predicated of a man that he is "walking," or that he is "a native of Paris," the first expresses what is termed a separable accident, the latter an inseparable; *i. e.* the individual may cease to walk, but cannot cease to be a native of Paris, but neither of these alters the species, man, to which the individual belongs. It is to be observed with regard to the accident, as well as the other predicables, that they exist only relatively to each other, so that the same quality may be accidental when predicated of the species which is a property when predicated of the individual. Thus, "malleability" is an accident of the subject "metal," because many metals are not malleable. But it is one of the properties of gold, iron, etc., as distinguishing these from the non-malleable metals.

Accident. This is an important topic in equity jurisprudence. It has been defined to be such an unforeseen event, misfortune, loss, act, or omission as is not the result of any negligence or misconduct in a party. It is, however, difficult to bring all the cases in which the court assumes jurisdiction within the bounds of a definition. Some of the leading cases of interference by the court are—1. Where negotiable or other instruments have been lost, and there is no adequate remedy in a court of law. 2. Where a clause has been inadvertently omitted from or inserted in an instrument. The court in such a case makes the instrument conform to the intent of the parties. 3. Penalties and forfeitures. In this class of cases the court relieves against the penalty or forfeiture where the injury occasioned by the breach of duty is susceptible of complete compensation, as in the case of an omission to pay rent on an appointed day. There would be no relief in case of a wilful wrong, nor where the forfeiture is in the nature of a statutory remedy for a breach of duty. 4. Cases of omission, through inadvertence or want of knowledge of facts, to defend an action. The court has power to allow the necessary steps still to be taken. It is a general rule that the court will not interfere in favor of a mere volunteer, such as a donee or devisee in a will. Thus, if a seal were accidentally omitted from a conveyance made without consideration, or a clause were omitted from a will, there would be no relief. It is a further rule that relief will not be granted as against a purchaser who has acquired legal rights in good faith and for a valuable consideration.

Acciden'tal Col'ors are colors depending on the hypersensibility of the retina of the eye for complementary colors, the eye, when strongly impressed by one color, spontaneously producing the complementary color for its own relief. If we look for a short time steadily with one eye upon any bright-colored spot, as a wafer on a sheet of white paper, and immediately after turn the same eye to another part of the paper, a similar spot will be seen, but of a different color. If the wafer be red, the imaginary spot will be green; if blue, it will be changed into yellow; the color thus appearing being always what is termed the complementary color of that on which the eye was fixed.

Accidentals, in music, are those flats and sharps which are prefixed to the notes in the course of a movement, and are not indicated by the signature at the commencement.

Accidentals, in painting, are those fortuitous or chance effects, occurring from luminous rays falling on certain objects, by which they are brought into stronger light than they otherwise would be, and their shadows are consequently of greater intensity. This sort of effect is to be seen in almost every picture by Rembrandt, who used them to a very great extent. There are some fine instances of accidentals in Raphael's Transfiguration, and particularly in the celebrated picture, the *Notte* of Correggio, in which the light emanates from the infant Christ. With these effects may be classed such accidental lights as those from a forge or a candle, or some such object, of which the use is extremely important to the painter of still-life.

Accip'itres [from the Lat. *accip'io*, to "take"], the plural of the Latin *accip'iter*, the name given by Linnæus to an order of carnivorous birds, including the eagle, vulture, hawk, and owl. More recent ornithologists have named this order Raptores. This order comprises all the true birds of prey, though the shrikes and a few other birds, from their habits, almost deserve the latter title. As may be seen in the accompanying illustrations, the beaks and claws of the Accipitres are marvellously adapted, by their sharpness and curvature, to the predatory habits of these birds.

Head and Foot of the Osprey.

Head and Foot of Peregrine Falcon.

Head and Foot of American Sparrow-hawk.

Acclama'tion [Lat. *acclama'tio*], a term used in public and deliberative assemblies. A motion or proposition is adopted by acclamation when the assent is so nearly unanimous that the counting of votes is omitted. The different modes of electing a pope are called scrutiny, acclamation, and inspiration.

Acclima'tion [from the word *climate*], the adaptation of a human being to a climate different from that to which he is accustomed. Such adaptation is accompanied by a change in the organism, assimilating it to those of natives of the country which the acclimatized person has adopted. Certain tropical climates, it would appear, can never be safely endured by any native of cold or temperate regions. The British troops in Bengal never become truly acclimated, but the ill-health and mortality increase with the length of stay in that climate. The same experience has been met with in West Africa and elsewhere. On the other hand, the French island of Réunion, which is very unhealthy even for planters and merchants and most others, has a healthy and hardy peasantry of French descent, whose immunity from disease is probably to be ascribed to their abstinence from alcoholic stimulants and from all excesses—an abstinence which is enforced by their utter poverty. This important subject has only of late received careful attention.

Acclimatiza'tion, the adapting an animal or plant to a foreign climate. Although many plants and animals have a remarkable capacity of adapting themselves to changes of climate, yet such changes are often attended with maladies called "diseases of acclimatization." Special associations (called "acclimatization societies") for acclimatizing animals, plants, etc. have been formed in many countries. Instead of "acclimatization," the French use the word "acclimatation."

The acclimatization of foreign field and singing birds in the U. S. has been attempted near most of our larger cities with considerable success. The "Acclimatization Society" of Cincinnati in 1873 imported many hundred pairs of German birds at great expense. The object is not only to naturalize foreign songsters, but to increase the number of birds destructive of insects injurious to vegetation. Similar societies exist at Sandusky, St. Louis, and other points, both in the Northern and Southern States. Among the birds imported are the blackbird (a singer), thrush, golden finch (very beautiful and a sweet singer), green-bird, bullfinch (easily tamed and trained), redbreast, starling (a fine singer), lark, greenfinch, goldfinch, knotpecker, the wagtail, the magpie, hedge-sparrow, titmouse, nightingale, redtail, German quail (a singer), and fence-sparrow.

Accolade, a ceremonious act by which, in former times, knighthood was conferred. It was an embrace and a gentle blow or "dub" on the shoulder of the new-made knight, made by the sovereign.

Accol'ti (Benedetto), an Italian writer and lawyer, born at Arezzo in 1415, became chancellor of the republic of Florence in 1459. He wrote a Latin history of the crusade which Godfrey of Bouillon conducted to Palestine. This was the basis of Tasso's great poem. Died in 1466.

Accomack Court-House, capital of Accomack co., Va. (see map of Virginia, ref. 6–J, for location of county), 95 miles E. by N. of Richmond. Pop. not in census of 1880.

Accommodation Paper. See Bill of Exchange.

Accom'plice [*ad-con-plicare*, to "fold up together"], one of several persons associated in a crime. In its broadest use it includes all connected with the offence, whether as principals or accessaries; but it is generally applied to those who give evidence against their fellow-criminals.

Accord' and Satisfac'tion, in law. The word "accord" by itself denotes an agreement, but as used in this common phrase it denotes an agreement between the parties to a legal claim or demand that something different from a complete payment or discharge, according to the terms of the claims, shall be received in satisfaction thereof; and such accord, if it have the proper legal requisites and result in the satisfaction agreed upon, is a complete defence to a suit upon the original demand. This defence is available in actions both of contract and of tort. The subject is governed by well-settled rules, such as that the thing to be done must not be uncertain, that it must be advantageous to the injured party, and that the agreement must be fully carried into effect. Thus, it would not be a valid accord to give the injured party something to which he was already entitled; as, *e. g.*, to pay a portion of a debt when the whole became due. Sometimes a new agreement, though unperformed, amounts to a satisfaction of a prior claim, but this happens only when there is a positive agreement to this effect. George Chase.

Accord, in music, is synonymous with concord, the relation of two sounds which are agreeable to the ear.

Accor'dion, a musical instrument, in which the tones are produced by the vibration of metallic springs moved by wind, which is applied by a bellows. It was invented by Damian, a Viennese, about 1829.

Account' [remotely from the Lat. *ad*, "together," and *compu'to*, to "reckon"], a computation or calculation; a statement of the receipts and payments of one who acts in a fiduciary relation, as an executor or a trustee, or a statement showing in detail the transactions between merchants or others who have dealt together. An account current is one that is open, running, and unsettled. An account stated is one which has been adjusted between the parties, and a balance struck. An account may also become stated without any express agreement, and by implication, as where one of two merchants who have dealt together draws up a formal statement of their dealings and sends it to the other, and the latter receives it and retains it without objection for a reasonable time. He is thus presumed to assent to its correctness.

Account, or account render, is the name of a common-law action which lay against one who by virtue of his position or office ought to have rendered an account and refused to do so. This action is now almost obsolete. A court of equity has much more complete power to grant relief in all cases of mutual accounts, and in cases where the taking of an account is incidental to other matters over which that court has jurisdiction. Some of the instances in which an account may be taken on the one ground or the other are agency, general average, apportionment, contribution between sureties, waste, trusts, express or implied, including administration, guardianship, and partnership. In suits for an account both parties are deemed to be substantially plaintiffs for many purposes, and an affirmative decree may be made for the defendant, if a balance be found in his favor, as well as for the plaintiff. T. W. Dwight.

Accra, or **Ac′ra,** a small territory in Africa, on the Guinea coast, belongs for the most part to England. It is about lat. 5° 30′ N., lon. 0° 12′ W. The English portion has about 3000 inhabitants, chiefly negroes.

Accre′tion [from the Lat. *ad*, "to," and *cresco, cretum*, to "grow"], the gradual accumulation of soil along the banks of a river or the sea, formed by the washing of the water. In the case supposed the increase belongs to the owner of the adjacent land. If the increase be sudden, the alluvion formed upon the sea-shore or navigable river belongs to the state.

Ac′crington, a manufacturing town of England, in Lancashire, is situated in a deep valley between several hills, and at the junction of two railways, 13 miles E. of Preston and about 22 miles N. by W. of Manchester. It has increased rapidly in population and importance, and is considered the centre of the cotton-printing business. It has also extensive manufactures of cotton cloth, and coal-mines in which many of the inhabitants are employed. Among the public buildings is a fine Gothic church built in 1838. Pop. in 1881, 31,435.

Accuba′tion [Lat. *accuba′tio*, from *ad*, "to," "upon," and *cu′bo*, to "lie"], the reclining posture in which the ancient Greeks and Romans took their meals. Two or three couches were spread around the dining-table, each of which was capable of containing three persons. The guests lay on their left sides, their heads or elbows being supported by pillows, the feet of the first being behind the back of the second, and those of the second behind the third. The middle place was generally deemed the most honorable.

Ac′cum (Friedrich), a German chemist, born at Bückeburg in 1769. Having removed to London in 1793, he became professor of chemistry in that city about 1802. He promoted the use of gas for illumination by a valuable work entitled a "Practical Treatise on Gas Light" (1815). He wrote other works. Died in Berlin in 1838.

Accu′mulated [from the Lat. *ad*, "to," "up," and *cu′mulo, cumula′tum*, to "heap"] **Force** is the power of a moving body to overcome resistance. When a force acts on a body so as to produce its motion, the force must be in excess of the resistance to the motion, and, as power is imparted to the body at each instant, this is termed accumulated force. Thus, if a strong man should pull on a rope attached to a ship at rest, but floating free in still water, his efforts at first would seem unavailing, because his strength would be so slight compared with the *vis inertiæ* (which is proportioned to the weight) of the ship. If, however, he continue to pull steadily, the force applied will gradually impart a slow motion to the vessel. This is an example of the accumulation of force, which, however, is less manifest in this instance, owing to the fact that not merely the *vis inertiæ* of the vessel, but also the weight and friction of the opposing water, are to be overcome. But let us suppose a mass of iron or lead of many thousand tons to be suspended by a huge chain or cable extending to an immense height.* In this case, as there would be no appreciable resistance from the air, the constant application of a very small force would at length, by accumulation, communicate a rapid motion and prodigious momentum to the huge mass in question—a momentum which a force a thousand times as great could not suddenly overcome, and indeed could only overcome at all by a continual application, and consequent accumulation, of force in an opposite direction.

Accusative. See Declension, by J. Thomas.)

Aceph′ala ["without a head," from the Gr. α, priv., and κεφαλή, the "head"], a term applied to a class of mollusks called otherwise Conchifera or Lamellibranchiata. (See Conchology, by George W. Tryon, Jr.)

Aceph′ali [etymology the same as the preceding], a term applied in the early Christian Church to bishops exempt from the jurisdiction of their patriarchs.

Aceph′alocysts [from the Gr. α, priv., κεφαλή, "head," and κύστις, a "bladder"] are hydatids without head or visible organs, and were formerly considered to be parasitic animals, but more recent observations establish the fact that they are scolices or larvæ of cestoid worms, especially of the tape-worm. They are found in various parts of the body of man, as the liver, cavity of the abdomen, etc., and consist of simple sacs filled with a transparent liquid. These sacs are oval or approaching to spherical, and vary in size from the head of a pin to that of a child. They appear to increase by gemmation, developing smaller cysts between the laminæ of the parent, which are discharged from its inner or outer surface. They are composed of a homogeneous substance resembling albumen. (See T. S. Cobbold's "Entozoa," 1864, p. 259 *et seq.*)

Acer′ra (anc. *Acer′ræ*), a town of Italy, in the province of Caserta, 8 miles by railway N. E. of Naples. It has a cathedral and a seminary. The sluggish channels of the Lagni render the place unhealthy. Pop. 11,717.

Ace′sius, a bishop of Constantinople, lived about 320–340 A. D. He favored the Novatian doctrine. Constantine said to him, "Place a ladder, O Acesius, and ascend alone into heaven." (Socrates i. 10.)

Acetab′ulum [a Latin word signifying a "vinegar cup or cruet"], a term applied to the suckers on the arms of the cuttle-fish and other dibranchiate cephalopods, which have been, hence, recently termed Acetabulifera. These suckers are called by Aristotle κότυλοι ("cups"), which has sometimes been erroneously translated "joints." In anatomy, acetabulum signifies the cavity of the hip-joint. In entomology, it is the socket on the trunk of an insect in which the leg is planted.

Aç′etal [from the Lat. *ace′tum*, "vinegar"], a colorless, inflammable liquid obtained by the action of spongy platinum upon the vapor of alcohol. It is convertible by slow combustion into *acetic acid.*

Aç′etate [Lat. *ace′tas, -atis*]. The acetates are a class of salts composed of acetic acid and various oxides. They are all soluble in water, and, for the most part, crystallize readily. Many of these are extensively used either in dyeing or for medical purposes. The following are among the most important: *Acetate of Aluminium.*—This salt exists only in solution, being decomposed by evaporation. It is largely used in dyeing and calico-printing as a mordant, and is prepared by precipitating alum with acetate of lead, sulphate of lead being thrown down, and a mixture of acetate of aluminium and sulphate of potassium remaining in solution. *Acetate of Ammonium.*—The neutral acetate is a white crystalline salt, readily soluble in water and alcohol, and evolving ammonia on evaporation, so that it is difficult to obtain it in its crystalline form. Its solution is known in pharmacy as Spir′itus Mindere′ri. *Acetate of Copper.*—Copper forms several acetates; the normal salt is known as crystallized verdigris. It forms dark, bluish-green prismatic crystals, which are efflorescent and very poisonous. There are three basic acetates of copper, named, respectively, the sesquibasic, the dibasic, and the tribasic. These are all contained in common verdigris, which is largely used both as a pigment and as a mordant in dyeing. It is obtained by submitting metallic copper to the joint action of air and acetic acid. *Aceto-arsenite of Copper.*—A beautiful but very poisonous green pigment, known in commerce as arsenic green, imperial green, Paris green, and Schweinfurt green. It is insoluble in water, and is prepared by boiling verdigris and arsenious acid together. *Acetate of Iron.*—Iron forms two acetates; the only one of importance, however, is the ferric acetate, which is generally prepared by mixing persulphate of iron with acetate of lead. It has not been obtained in the crystalline state, but forms a red-brown solution, which decomposes on ebullition. A very crude mixture of the ferrous and the ferric acetate, known as pyrolignite of iron, is largely used as a mordant in dyeing black. *Acetate of Lead.*—Lead forms a normal and several basic acetates. Normal acetate of lead (known as sugar of lead) is a white crystalline salt, having a sweet astringent taste. When oxide of lead is digested with a solution of normal acetate, the tribasic acetate is formed in long, silky needles. A solution of this salt is frequently used on account of its power of precipitating many vegetable substances, such as gum and coloring matters. It is used in medicine under the name of Goulard water or

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* It is obvious that if the chain or cable were not very long, the weight soon after it began to move (acting like a pendulum) would necessarily rise considerably higher than the point at which it was first suspended; hence a great part of the force applied would be lost in overcoming the attraction of gravitation.

Goulard extract (*liquor plumbi subacetatis*). *Acetate of Potassium* is a very deliquescent salt, and is obtained with difficulty in a crystallized state; it melts to a limpid liquid below redness. It exists in the juices of many plants, and is prepared artificially for medicinal purposes by neutralizing acetic acid with carbonate of potassium. *Acetate of Sodium.*—An efflorescent crystalline salt, prepared by saturating acetic acid with carbonate of sodium. On evaporation it separates into large transparent prisms. It is similar in its medical properties to the acetate of potassium.

Acet'ic Aç'id [Lat. *aç'idum acet'icum*] is the most common of the vegetable acids, and is the essential principle of vinegar. It is composed of carbon, oxygen, hydrogen, and water. It occurs in the juices of many plants, and in some animal secretions. It is produced by the decomposition and oxidation of many organic bodies. It is prepared from weak alcoholic liquids, as wine, cider, and beer, by oxidation, "acetous fermentation," and by the destructive distillation of wood, "pyroligneous acid."

The chemical formula of acetic acid is $HC_2H_3O_2$. Alcohol may be converted into acetic acid by bringing it into contact with spongy platinum, from which it absorbs oxygen. (See FERMENTATION.) Crystallizable or glacial acetic acid, the most concentrated form of acetic acid, is obtained by distilling dry acetates with concentrated sulphuric acid.

Acetic Anhydride, Anhydrous Acetic Acid, or **Oxide of Acetyl,** obtained by the action of oxychloride or chloride of phosphorus on acetate of potassium, a colorless, very mobile, strongly refracting liquid, possessing a powerful odor.

Acetic Ethers are acetates of the alcohol radicals, such as acetate of ethyl ($C_2H_5C_2H_3O_2$); acetate of methyl, "æther lignosus" ($CH_3C_2H_3O_2$), found in crude wood vinegar; acetate of amyl ($C_5H_{11}C_2H_3O_2$), made by distilling acetate of potassium, fusil oil, and sulphuric acid. (For other members of the group see WATTS's "Dictionary of Chemistry," i. 21.)

Ac'etone, or **Pyro-acetic Spirit,** a limpid, mobile liquid of agreeable odor and biting taste, like that of peppermint. It mixes with water, alcohol, and ether, and dissolves many camphors, fats, and resins. Acetone is the representative of a class of organic bodies, called ketones, which are derived from the aldehydes by the replacement of one atom of hydrogen by an alcohol radical.

$$\underset{\text{Aldehyde.}}{C_2H_4O.} \qquad \underset{\text{Acetone.}}{C_2H_3(CH_3)O.}$$

Ac'etyl, Acetox'yl, or **O'thyl,** a radical not yet isolated, but supposed to exist in acetic acid and acetates.

Acetyl is C_2H_3O.

$$\text{Acetic acid, } \left.\begin{matrix} C_2H_3O \\ H \end{matrix}\right\} O.$$

$$\text{Acetate of potassium, } \left.\begin{matrix} C_2H_3O \\ K \end{matrix}\right\} O.$$

$$\text{Acetic anhydride, } \left.\begin{matrix} C_2H_3O \\ C_2H_3O \end{matrix}\right\} O.$$

C. F. CHANDLER.

Achæ'an [an adjective derived from ACHAIA (which see)] **League,** a confederation of Grecian cities formed about 280 B. C. Previous to the invasion of Macedonia by the Gauls, the Achæans had performed an insignificant part in the history of Greece, but soon after that event four Achæan towns formed a league for mutual protection. Aratus of Sicyon induced his native town to join the league (251 B. C.), and was himself made strategos (general-in-chief) of the confederacy. Corinth joined the league in 243 B. C., and was soon followed by Epidaurus, Megara, and several other cities. Philopœmen, called the "last of the Greeks," became strategos of the league in 208 B. C. In 191 B. C. the confederacy included Sparta, Athens, and nearly all the cities of the Peloponnesus, and for fifty years maintained the cause of Grecian independence against the Ætolians and against the encroachments of Rome. The confederates, under Diæus, were defeated at Corinth by the Roman general Mummius, and Southern Greece was made a Roman province under the name of Achaia (146 B. C.). The Achæan confederacy may be said to furnish the most perfect example of the federative system which ancient Greece affords, and its history forms one of the most glorious chapters in the annals of ancient times.

Achæ'ans [Gr. 'Αχαιοί], one of the four races of inhabitants of ancient Greece. The name is often extended in the Homeric poems to the whole Greek people. The Achæans proper inhabited parts of Thessaly, and in the Peloponnesus they anciently occupied Argos, Laconia, and the neighboring regions, whence they were, for the most part, expelled by the Dorians, the exiles settling along the northern shore of the Peloponnesus, and founding there a new community. They remained an obscure people till the founding of the ACHÆAN LEAGUE (which see).

Acha'ia [Gr. 'Αχαία], a state of ancient Greece, in the N. part of the Peloponnesus, was bounded on the E. by Sicyonia, on the N. by the Bay of Corinth, and on the S. by Arcadia and Elis. It was about 65 miles long from E. to W. The surface was hilly or mountainous. (See ACHÆAN LEAGUE.) Achaia and Elis constitute a nomarchy or province of modern Greece. Area, 1908 square miles. Pop. in 1879, 181,632. In the days of the New Testament writers, Achaia signified the whole Peloponnesus.

Achard (FRANZ KARL). See APPENDIX.

Achard (LOUIS AMÉDÉE EUGÈNE), a French novelist, born in 1814, was contributor to the "Courrier de Paris" in 1845, and after the revolution of 1848 became a political writer in the camp of the royalists. He wrote, among other works, "Miss Tempête" (1861), "Histoire d'un homme" (1863), "Madame de Sarens" (1865). D. Mar. 28, 1875.

Acha'tes, a friend and companion of Æneas, was noted for his fidelity. The proverbial phrase *fidus Achates* is often applied to a man who is a devoted follower of his chief.

Acheen', an independent kingdom in the N. W. part of Sumatra, has an area of about 25,500 square miles. It was formerly much larger, but in recent times its power and extent have considerably decreased. The interior is entirely unknown. The E. coast consists of large fertile plains, while on the W. are high mountain-ridges. The chief productions are rice, cotton, tropical fruits, pepper, and vegetables. Horned cattle, horses, and goats are raised in large quantities and of an excellent breed. The inhabitants are Mohammedans, and are divided into Acheenese, Pedeerese, and Malays. The former are found all over the empire, and are again divided into three tribes. The Pedeerese are found in the region of Pedeer on the N. coast, which formerly was a powerful kingdom. They are of a much darker complexion than the Acheenese. The Malays come from the southern coasts of Sumatra, and prevail in some parts of the S. W. They are of small stature, dark complexion, more agile and ingenious than the neighboring tribes, but also sensual, treacherous, and proud. They are good sailors, very fond of cockfights, and addicted to the use of opium and betel. Their language is a Malay dialect. The estimates of the population range between 450,000 and 2,000,000. The sultan is nominally the highest authority, but in reality the government is in the hands of a shahbandar appointed by him. The sultan has generally very little authority, because he has not the means to make himself felt. In many kampongs (*i. e.* villages), especially those situated at a distance from the capital, and which have become wealthy through trade, he possesses no authority whatever. Each of the three subdivisions of the Acheenese proper has two chiefs, whose position is hereditary, and who bears the title panglima or tivwanku. The sultan must consult with these six chiefs on anything that he intends to undertake, and must ask for their consent, which they only give after consultation with the chiefs of the second grade. These six chiefs of the Acheenese elect the new sultan from the reigning family, and have the right to depose him if he acts contrary to the popular custom, or does anything injurious to the public welfare. Every village has its own chief, called panghulu, imam, or datu, and in a larger kampong a rajah. He must consult with the members of his community on every question, and report the result to his panglima.

The income of the sultan consists of 5 per cent. of the value of all goods imported into the capital, Acheen, and the duties levied on the goods imported in the provinces, as well as on the sale of pepper. In return, he must pay each of the panglimas five catti, gold (each at 480 Spanish dollars). The panglimas, however, deliver just as much as they please of the money raised in the sultan's name, and this explains the lowness of his finances. To improve his financial affairs he carries on trade, and his mercantile affairs are conducted by the shahbandar, who of course does not neglect his own interest.

Acheen was visited by the Portuguese in 1506, by the Dutch in 1595, and by the English in 1612. In 1659 the East India Company established a factory at the capital. In 1818 a long internal war was brought to a close by the interference of Sir Stamford Raffles in favor of the sultan Janhar, who in return granted the English valuable trading privileges to the exclusion of the other European nations. In 1824, England exchanged her possessions in Sumatra against Malacca, and the protectorate over Acheen was transferred to Holland, which, however, engaged not to destroy the independence of Acheen. This provision was revoked by a treaty of Feb. 5, 1871. In the beginning of 1873 a war arose between the Dutch and Acheen. In the memorial published by the Dutch government in April the treachery of the sultan is declared to be the cause. He is accused of having solicited the aid of the Dutch against some native tribes, and at the same time the aid of other European powers, especially Turkey, France, and Italy, against the Dutch. In consequence of this, the Dutch governor was instructed to demand a satisfactory explanation and guarantees for the future conduct of the sultan, and only to declare war if these demands were not complied with. As they were refused, the governor declared war on Mar. 26, 1873. The first operations of the Dutch were not successful, but they were to be resumed in the fall on a large scale.

The city of Acheen, the capital of the above state, in lat. 5° 35′ N., lon. 95° 19′ E., is rapidly decaying. According to an old estimate, it had 30,000 inhabitants, which number, however, is at present by far too large. It is situated on a river, about one mile from the sea-shore. The harbor is guarded by a small fort with four or five cannons. Some coasting trade is carried on with Malacca, Singapore, and Penang.

Achelo′us [Gr. 'Αχελῷος], now **As′pro-Pot′amo,** the largest river of Greece, rises in Mount Pindus, flows nearly southward, forms the boundary between Acarnania and Ætolia, and enters the Ionian Sea after a course of about 100 miles.

A′chenbach (Andreas), a German landscape and marine painter of the Düsseldorf school, was born at Cassel in 1815. He obtained a medal of the first class in Paris in 1855.

Achenbach (Heinrich), a German statesman, born Nov. 23, 1829, became in 1858 *privatdocent*, and in 1860 professor at the University of Bonn, in 1866 chief councillor in the Prussian ministry of commerce, in 1872 secretary of state in the ministry of public worship, and on May 14, 1873, minister of commerce. He also became in 1866 a member of the Prussian Diet. While professor in Bonn he published valuable works on the agrarian relations of the Germans in ancient times, on German and French mining laws, and founded an excellent periodical exclusively devoted to mining law.

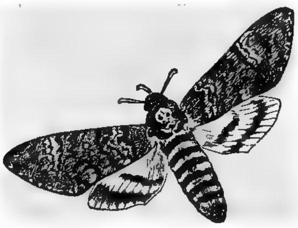
Achenbach (Oswald), a landscape painter, a brother of Andreas, was born at Düsseldorf in 1827. In 1863 he became professor of painting in the academy of his native city.

Ache′nium [from the Gr. α, negative, and χαίνω, to "gap," to "open"], a term applied by botanists to a dry, hard, one-seeded, indehiscent fruit or pericarp, as that of the buttercup and the thistle.

A′chenwall (Gottfried), a distinguished German writer on statistics, born at Elbing in 1719, is reputed to have originated statistical tables. He became professor of philosophy at Göttingen about 1750. He first introduced the term "Staatswissenschaft," by which he proposed to include all the knowledge essential to statesmanship. Died in 1772.

Ach′eron [Gr. 'Αχέρων, gen. 'Αχέροντος], the ancient name of a river of Elis; also a river of Epirus. It was also applied in mythology to a river of the infernal regions.

Acheron′tia [from *Ach′eron*, in the Greek mythology a river of the dead], or **Death's-head Moth,** is a genus of lepidopterous insects belonging to the family Sphingidæ. There is found in England and other European countries a species of this genus (the *Acheron′tia at′ropos*), having on the back of the thorax a remarkable representation of a human skull, and it has hence received the name of death's-head moth. This is a very handsome insect, and is from four and a half to five and a half inches in expanse of wing. If disturbed or handled, it makes a peculiar squeaking noise, the only known example, it is said, of a lepidopterous insect having what may be called a voice. It is much dreaded by the ignorant and superstitious, who consider its appearance to be ominous of evil. It does not hesitate to attack bee-hives, devouring the honey and putting the bees to flight. Though possessing no weapons of defence that have yet been discovered, it appears to suffer no harm from its armed enemies. Its larva is a large caterpillar about five inches in length, with beautiful markings; the color is a kind of greenish-yellow, and the back is traversed by lines partly blue and partly white, speckled with black spots. The caterpillar feeds mostly on the leaves of the potato plant; and it retires deep into the earth, and changes into a chrysalis in the month of September. It emerges the following June or July, transformed into a perfect insect. This moth is seen most frequently in the mornings and evenings of autumn.



Death's-head Moth.

Acheru′sia. I. A lake in Epirus, into which the river Acheron flows. II. A cavern in Bithynia, near the city of Heraclea; through it Hercules is said to have dragged Cerberus up to the light of day.

A-Cheval [Fr., meaning "on horseback" or "astride"], as a military term, indicates the position or situation of a body of troops *astride*, as it were, of a river or road, etc., which separates or divides one portion from another.

Achill, âk′il, or **Eagle Island,** an island off the W. coast of Ireland, forming part of the county of Mayo. It is about 15 miles long by 12 miles broad. Pop. about 5000. On the coast is a sheer precipice 2200 feet high.

Achil′les [Gr. 'Αχιλλεύς], a famous Grecian warrior, the hero of Homer's "Iliad," was the son of Peleus, king of Thessaly, and the sea-nymph Thetis. From the name of his father, he was often called PELI′DES. At the siege of Troy he was pre-eminent for courage, strength, and swiftness, but, having been offended by Agamemnon, he refused to fight. But when his friend Patroclus had been killed, he returned to the war to avenge his death. He slew Hector and many other Trojans. According to a poetic legend, his mother, by dipping him in the river Styx, had rendered him invulnerable except his heel, by which she held him. He was killed with an arrow by Paris, who shot him in the heel.

Achilles (Tatius). See Appendix.

Achil′les′ Ten′don [Lat. *ten′do Achil′lis*] connects the soleus and gastrocnemius muscles of the calf of the leg with the heel-bone. It is capable of resisting a force equal to 1000 pounds weight, and yet is sometimes ruptured by the contraction of these muscles in sudden extensions of the foot. The name was given in allusion to the death of Achilles, the Grecian hero, by a wound in the heel. Ancient surgeons regarded wounds or serious bruises of the Achilles tendon as fatal. In modern surgery, however, tenotomy, or the division of this or other tendons, is a not infrequent operation, especially in the treatment of clubfoot. In that form of this affection called *Tal′ipes equi′nus* the tendo Achillis is unnaturally shortened, so that the heel in standing does not touch the ground.

Achil′li (Giovanni Giacinto), Dr., an Italian Protestant, formerly a Dominican friar, was born at Viterbo in 1803. He left the Catholic communion about 1839, and issued an Italian version of the New Testament, which is regarded, by some, as the best in that language. In 1850 he went to England, and became involved in a lawsuit (in 1852) which was brought against Dr. John Henry Newman for slander. The case was tried before Lord Campbell, and a verdict given for the plaintiff, Dr. Achilli. Dr. Achilli has also been professor of the Italian language and literature in the English College at Malta.

Achromat′ic ["without color," from α, priv., and χρῶμα, "color"], a term applied to lenses and telescopes through which objects appear colorless, or without the discoloration which arises from the unequal refrangibility of the rays of light. (See next article.)

Achro′matism [for etymology, see preceding article]. (See Aberration, Chromatic.) A prism of flint glass will cause a certain amount of refraction and of dispersion, and if a similarly-shaped prism of the same glass be placed behind it, in the reverse position, the refraction and dispersion in one direction by the first prism will be exactly neutralized by the refraction and dispersion in the opposite direction by the second prism, and as a result there will be no refraction and no color. But suppose a prism of *crown glass*, having the same dispersion as the one of flint glass, be placed behind the latter in the reverse position, the two dispersions, being opposite and equal, will neutralize each other, and the result will be white light; but the mean refractions being different, they will not neutralize each other, and the beam of light will pass through achromatic, or almost free from color, but refracted more or less. As a lens may be looked upon as a combination of prisms with curved surfaces, achromatic lenses may be produced in the same way as achromatic prisms. Absolute achromatism is perhaps unattainable by art, owing to the spectra from different dispersive media not having an exact proportionality to one another. This is called irrationality of dispersion. It may be remedied in some degree by introducing a third lens of plate glass in addition to the flint and crown glass lenses. An under-corrected lens is one in which the correcting lens of flint does not quite accomplish the purpose, and the violet ray will come to a focus a little within the red. In an over-corrected lens the error is of the opposite kind, and the order of colors inverted. F. A. P. Barnard.

Achromatic Telescope. See Telescope.

Achtkarspe′len (the "eight parishes"), a town of the Netherlands, in the province of Friesland. Pop. in 1879, 10,224.

Achtyr'ka, a town of Russia, in the government of Kharkov, 69 miles N. E. of Kharkov, on the Vorskla River. Pop. in 1882, 17,820.

Aci, or **Aci Reale,** a town and seaport of Sicily, in the province of Catania, at the mouth of the river Aci, near the foot of Mt. Etna, and 7 miles by rail N. E. of Catania. It is built mostly of lava, and has many fine edifices. Here are mineral springs and the Cave of Polyphemus. Pop. in 1881, 38,547.

Aç'id [Lat. *açidus*, "sour"], in chemistry, a term applied to an important class of compounds. The various acids usually have the following properties: (1) solubility in water; (2) a sour taste; (3) the power of turning vegetable blues to red; (4) the power of decomposing carbonates, and displacing the carbonic acid with effervescence; (5) the power of neutralizing more or less the alkalies, at the same time losing most of their own characteristic properties, forming salts. (See Salts.) A great number of acids are compounds of oxygen with various elements. Others contain chlorine, iodine, or other elements, instead of oxygen. (See Chemistry.) Various theories have been advanced to account for the peculiar properties of acids. That of Dulong, proposed in 1816, is now generally accepted. It is known as the binary or hydrogen theory of acids. All acids are considered *salts of hydrogen* (Gerhardt)—*i. e.* compounds of hydrogen with simple or compound acid radicals; thus:

Hydrochloric acid	$H(Cl)$,
Hydriodic acid	$H(I)$,
Hydrocyanic acid	$H(CN)$ or $H(Cy)$,
Nitric acid	$H(NO_3)$,
Sulphuric acid	$H_2(SO_4)$,
Phosphoric acid	$H_3(PO_4)$.

Salts, according to this theory, are produced by replacing the hydrogen by metals or basic radicals; thus, hydrochloric acid and potassic hydrate form potassic chloride and water: $HCl + KHO = KCl + H_2O$. Nitric acid and ammonic hydrate yield ammonic nitrate and water: $H(NO_3) + (NH_4)HO = (NH_4)(NO_3) + H_2O$. Sulphuric acid and calcic hydrate yield calcic sulphate and water: $H_2(SO_4) + CaH_2O_2 = Ca(SO_4) + 2H_2O$. Phosphoric acid and sodic hydrate yield sodic phosphate and water: $H_3(PO_4) + 2NaHO = Na_2H(PO_4) + 2H_2O$. Acids are monobasic, bibasic, tribasic, etc., according as they contain one, two, or three atoms of replaceable hydrogen. Acids may produce several classes of salts, according as they contain more or less atoms of hydrogen. Hydrochloric acid forms one salt with potassium, KCl. Sulphuric acid forms two—the *neutral*, $K_2(SO_4)$, in which both atoms of H are replaced by K; the *acid*, in which only one is replaced, $KH(SO_4)$. Phosphoric acid forms three classes, thus: $K_3(PO_4)$, $K_2H(PO_4)$, $KH_2(PO_4)$. An atom of a monatomic radical replaces one atom of hydrogen, as shown above in the case of K,(NH_4) and Na. An atom of a diatomic radical, as calcium, replaces two atoms of H, as shown above in the case of sulphuric acid and calcic hydrate. This is further illustrated by the following formulæ:

Acids.	Radicals.	Salts.
HCl	K'	$K(Cl)$.
"	Ca''	$Ca(Cl_2)$.
"	Bi'''	$Bi(Cl_3)$.
$H_2(SO_4)$	K'	$K_2(SO_4)$.
"	K'	$KH(SO_4)$.
"	Ca''	$Ca(SO_4)$.
$H_3(PO_4)$	K'	$K_3(PO_4)$.
"	"	$K_2H(PO_4)$.
"	"	$KH_2(PO_4)$.
"	Ca''	$Ca_3(PO_4)_2$.
"	"	$Ca_2H_2(PO_4)_2$.
"	"	$CaH_4(PO_4)_2$.

Compound ethers are salts in which the hydrogen of the acid is replaced by the alcohol radicals. (See Ether.)

Ethyl chloride $(C_2H_5)'Cl$; amyl nitrate $(C_5H_{11})'(NO_3)$; ethylene iodide $(C_2H_4)''I_2$.

Acids are of three types:

(1) The water type: water $= \left.\begin{matrix}H\\H\end{matrix}\right\}O$, $\left.\begin{matrix}H_2\\H_2\end{matrix}\right\}O_2$, $\left.\begin{matrix}H_3\\H_3\end{matrix}\right\}O_3$; nitric acid $\left.\begin{matrix}(NO_2)'\\H\end{matrix}\right\}O$; sulphuric acid $\left.\begin{matrix}(SO_2)''\\H_2\end{matrix}\right\}O_2$; phosphoric acid $\left.\begin{matrix}(PO)'''\\H_3\end{matrix}\right\}O_3$.

(2) The hydrochloric acid type: hydrochloric acid HCl; hydriodic acid HI; hydrocyanic acid H(CN).

(3) The ammonia type: ammonia $NH_3 = N\left\{\begin{matrix}H\\H\\H\end{matrix}\right.$; cyanic acid (carbamide) $N\left\{\begin{matrix}(CO)''\\H\end{matrix}\right.$; succinamide $N\left\{\begin{matrix}(C_4H_4O_2)''\\H\end{matrix}\right.$; sulphocyanic acid $N\left\{\begin{matrix}(CS)''\\H\end{matrix}\right.$.

(4) Intermediate acids are formed from two or more atoms of two different types. Sulphamic acid (SO_3H_3N) is derived from $\left.\begin{matrix}H_3N\\H_2O\end{matrix}\right\}$; chlorhydrosulphuric acid (SO_3HCl) from $\left.\begin{matrix}HCl\\H_2O\end{matrix}\right\}$. (See Amic Acids.)

(See a very interesting paper on normal and derived acids by G. F. Barker, in the "American Journal of Science" [2] xliv., 1867, p. 384.) C. F. Chandler.

Acidim'eter [from the Lat. *aç'idum*, an "acid," and the Gr. *μέτρον*, "measure"], an instrument for determining the strength of an acid by its saturating power. It usually consists of a glass tube graduated into a hundred equal parts, and containing an alkaline liquor of known strength, the proportion of which requisite to saturate a given quantity of any acid is the equivalent of that acid. (See Chemical Analysis and Volumetric Analysis.)

Acipenseridæ. See Sturgeon.

Ack'land (Lady Harriet Caroline Fox), a daughter of the earl of Ilchester and wife of Major John D. Ackland of the Twentieth regiment of foot in the British army, was born in 1750, and accompanied to America her husband, who was wounded and made prisoner at Saratoga Oct. 7, 1777. She attended upon her husband (who died in the following year) with great constancy and heroism. Died July 21, 1815.

Ack'ley, R. R. junction, Hardin co., Ia. (see map of Iowa, ref. 4–H, for location of county), 132 miles W. of Dubuque. Pop. in 1880, 1517; in 1885, 1473.

Acknowl'edgment [from the English word *knowledge*], in law, the act by which one who has executed an instrument declares or acknowledges, before some authorized officer, that it is his act or deed. The term is also applied to the officer's certificate of this fact endorsed on the instrument. The general object of an acknowledgment is twofold: first, to comply with the recording acts, so that the instrument may be lawfully recorded; secondly, to give the instrument such authenticity that it may be put in evidence in courts of justice, without further proof of its execution. As a general rule, it is not necessary to the validity of the instrument, though the laws of some of the States provide that a wife's conveyance of real estate or release of dower is invalid unless on a private examination apart from her husband she acknowledges that she executed it freely and without fear or compulsion of her husband. This rule is borrowed in its substance from an English practice under a so-called statute of fines. The officers generally authorized to take acknowledgments are judges and clerks of courts, mayors, justices of the peace, commissioners of deeds, and notaries public.

Acknowledgments of conveyances of real estate should correspond in form with the requirements of the law of the State where the land is situated, though that law sometimes permits them to be valid if they conform to the law of the place where they are executed. T. W. Dwight.

Ac'land (Henry Wentworth), M. D., D. C. L., F. R. S., born in 1815, was educated at Christ Church, Oxford, where he took his degree of M. D. in 1848. He was one of the founders of the University Museum, and became in 1858 regius professor of medicine. He accompanied the prince of Wales to America in 1860, and has published "The Plains of Troy" (1839) and a valuable "Memoir on the Visitation of Cholera in Oxford in 1854," besides numerous scientific and medical papers.

Acœme'tæ (*i. e.* the "sleepless"), [from the Gr. *α*, priv., and *κοιμάομαι*, to "fall asleep"], an order of monks, sometimes called Watchers, which was founded at Constantinople early in the fifth century. They performed divine service day and night, and were divided into three classes, each of which had its share of duty. They established many monasteries and were held in high estimation. Studius, a Roman noble and a member of this order, built a monastery called Studium, and the monks were styled Studitæ. Having afterwards favored the doctrines of Nestorius, their credit declined.

Ac'olyte [from the Gr. *ἀκόλουθος*, a "follower"], a functionary who, in the Roman Catholic Church, assists the priest in the performance of religious services. According to Roman Catholic authorities, acolytes formed the second of the inferior orders of clergy in the primitive Church, subdeacons being the first. It is now the fourth of the minor orders.

Aco'ma, a village of Valentia co., N. M., supposed by some to be *Acuco*, mentioned by the Spanish historians. It is inhabited by Indians, is built on a high sandstone rock, and is reached by a spiral staircase cut in the rock. It has a church and a missionary station, but no priest.

Aconca'gua, one of the highest peaks of the Andes, is in Chili, lat. 32° 38′ 30″ S., lon. 70° 0′ 30″ W., on the frontier between Chili and the Argentine Republic. Its height is 22,422 feet above the level of the sea.

Aconca'gua, a province of Chili, is bounded on the N. by Coquimbo, on the E. by the Argentine Republic, on the S. by Santiago and Valparaiso, and on the W. by the Pacific. Area, 4932 square miles. This province is the most mountainous part of Chili, and contains the highest peak of the Chilian Andes, Aconcagua. The climate is very dry, and owing to the high mountain-ranges there is very little vegetation in this province. Pop. in 1878, 135,190. Chief town, San Felipe.

Ac'onite [Lat. *Aconi'tum*], a plant of the genus *Aconi'tum* and the order Ranunculaceæ. The Old World contains many species of this genus, some of them, particularly *Aconitum ferox* of India, very poisonous. The Atlantic U. S. have two native species. The *Aconitum Napellus*, or monkshood, a native of Europe, Asia, and the Rocky Mountains of the U. S., is the plant which yields the aconite used in medicine. This plant abounds in the deadly alkaloid aconitine, but when administered in suitable doses is useful in rheumatism, neuralgia, and in fevers. This remedy, in minute quantity, is a favorite with homœopathists, but was employed by physicians before the rise of homœopathy. The "winter aconite" (*Eranthis*) of Europe is of the same family, but is more nearly related to hellebore.

Aconitia. See MONKSHOOD.

Ac'orus Cal'amus (sweet flag), a medicinal plant of the order Araceæ. Its aromatic stem (rhizoma) is used as a stomachic and tonic. It is a native of both continents, and is known as "sweet flag."

Acos'ta (GABRIEL), a Jewish reformer, born in 1587 in Oporto, Portugal, was educated in the Catholic religion, but went to Holland, where he embraced the faith of his fathers, and changed his name to Uriel. He was condemned and persecuted as a heretic by the rabbis, and died by suicide in 1647. His autobiography was published in Latin and German in 1847.

Acotyled'onous Plants [from the Gr. *a*, priv., and *κοτυληδών*, a "seed-leaf"], plants without cotyledon or seed-lobes. The term is synonymous with CRYPTOGAMOUS PLANTS (which see), for the latter plants are propagated by spores, and not by true seeds. A few seed-bearing plants, like the dodders, have, however, no cotyledons.

Acous'tics. The term acoustics is derived from the Greek *ἀκουστικός*, from *ἀκούω*, to "hear"—"belonging to the sense of hearing." Acoustics has for its object the study of the nature, the production, and the perception of sound.

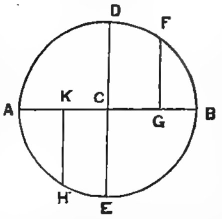
Strictly speaking, sound is a sensation which is produced when vibrations of a certain character are excited in the auditory apparatus of the ear. These vibrations are generated by progressive tremors in the atmosphere, called sound-waves, the nature of which we shall briefly consider. Let it be premised that the particles of the air, and of all elastic media, are ordinarily maintained in a state of equilibrium and rest by mutually repellent forces. If any particle be disturbed from its position of equilibrium, it must be by an impulse received from some body foreign to the medium; and when so disturbed it is solicited to return by a force directly proportioned to the distance, or *amplitude*, of its displacement from that point. Also, the velocity with which it will be animated on reaching in its return the point of original rest will be directly proportioned to the extreme amplitude of its displacement; so that, in virtue of its inertia, it will make an equal and similar excursion in the opposite direction. When in its return from this it reaches once more the point of equilibrium, it will have passed over the entire range of its movement in both directions; and this is said to constitute one complete oscillation or double vibration.

From the law of force above stated the following deductions are made by the help of the calculus. Put a to represent the extreme amplitude of displacement; V, the maximum velocity of the vibrating particle (the velocity with which the particle passes the point of equilibrium, expressed by the distance such velocity, continued uniformly, would carry a body in one second of time); T, the time of a complete double vibration; and π, the ratio of the circumference to the diameter of the circle. Then $V=2\pi\frac{a}{T}$, and $T=2\pi\frac{a}{V}$; from which last expression it appears that the time of vibration is constant, whatever be the amplitude of displacement, since a varies directly as V.

But in an elastic medium one particle cannot be displaced from the position of equilibrium without disturbing the equilibrium of its nearest neighbors. The neighboring particle towards which it is driven will begin, almost but not quite in the same instant, to move in the same direction; and this will disturb the next, and through it the third, and so on, the tremor being rapidly propagated throughout the medium. The distance to which this tremor will have reached when the particle first disturbed has completed one entire double vibration is the length of the sound-wave, or of one complete undulation.

The relation between vibration and undulation may be made more clear by the following illustration. Since VT is the distance accomplished in time, T, with velocity, V, and since $VT=2\pi a$, it follows that if, with radius, $a=CA$ or CB, we describe a circle, ADBE, a particle p' will describe the circumference, ADBE, with velocity V continued uniform, in the same time, T, in which the vibrating particle p performs a complete double vibration on the diameter AB. If p' leaves D in the same instant in which p passes C, the two will be together at B, and again at A; and it is further provable that, at any intermediate instant, the line joining p and p', as FG or HK, will always be parallel to CD, and perpendicular to AB. Also, that if the arcs of revolution be reckoned from D, and the time from D to F, or from D to H, be called t, the distance $y=CG$ or CK, of p from the point of equilibrium, C, will always be representable by the formula $y=a\sin 2\pi\frac{t}{T}$; and the velocity, v, of the same particle will always be $v=V\cos 2\pi\frac{t}{T}$.

FIG. 1.



Now the rapidity of the propagation of the tremor through the elastic medium is, for all tremors producing the sensation of sound, vastly greater than the velocity v or V; and this velocity of propagation is uniform, although the several velocities of the particles of the medium which successively take up the tremor, diminish with the increase of distance from the origin, because of the diffusion of the exciting force through a constantly increasing number of particles. This diminution for moderate distances may be disregarded. If the foreign body which disturbs p be, for instance, the limb of a tuning-fork making 500 double vibrations per second, the time of describing CB will be but the 2000th part of a second. During this time the tremor in the air will advance more than six inches, while CA will hardly exceed $\frac{1}{40}$th of an inch. The velocity of propagation in this case, therefore, exceeds the mean velocity of vibration more than 240 times. But if we consider the movement of p through CB to be made up of an indefinite number of exceedingly minute elementary motions, these elementary motions will have all the different velocities corresponding to the possible values of FG between C and B; and each one of these velocities will be successively transmitted along the line of propagation, one behind the other; so that, when p reaches B and comes to rest, all these velocities will still be living in a row of particles extending over a distance of six inches, the largest being foremost, and the least, which is zero, being that of the particle p itself. As p returns towards C, it leaves its next neighbor towards the right partially unsupported, and that neighboring particle follows it. There occurs then a second series of propagated movements, all the molecules moving in the returning direction, though the tremor advances, forming the wave of dilatation, as the former was the wave of compression. Sound-waves may accordingly be represented graphically by a curved line, as in Fig. 2, where the portion of the curve above the horizontal straight line represents the wave of compression, and the part below the wave of dilatation. The ordinates to the different parts of this curve represent the velocities animating the particles in the different parts of the wave; those above being advancing velocities, and those below, receding. The distance between M and N is the length of a complete undulation, commonly represented by λ. Then if x (Fig. 3) be

FIG. 2.

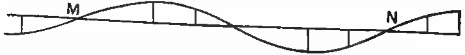
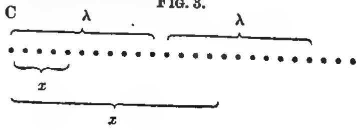


FIG. 3.



taken to represent any distance from the point of rest, C, of the disturbing or sounding body, the distance, y, of the particle at x from its place of equilibrium will be expressed by the formula

$$y = a \sin 2\pi \left(\frac{t}{\mathrm{T}} - \frac{x}{\lambda}\right);$$

and the velocity animating that particle at the instant by the formula

$$v = \mathrm{V} \cos 2\pi \left(\frac{t}{\mathrm{T}} - \frac{x}{\lambda}\right).$$

For examples under the first formula, let $t = n\,\mathrm{T}$; *i. e.* let p have made an exact number of complete oscillations; then by giving different values to x we ascertain the condition of corresponding points along the line. Thus if $x = 0$, we have $y = 0$; or p is at this moment in its position of equilibrium. Making x successively $= \frac{\lambda}{8}, \frac{\lambda}{4}, \frac{\lambda}{2}, \frac{3\lambda}{4}, \lambda, 2\frac{1}{8}\lambda$, and substituting these values, we have the corresponding values of y equal to $-a\,\frac{7}{10}, -a, 0, +a, 0_{\wedge}$; positive signs indicating displacement to the right, and negative signs the reverse.

For examples under the second formula, let $t = n\,\mathrm{T}$, as before, and put $x = \frac{\lambda}{6}, \frac{\lambda}{3}, \frac{2\lambda}{3}, \frac{7\lambda}{8}, \frac{5\lambda}{3}, \frac{\lambda}{2}, \frac{7\lambda}{4}$, successively. We shall then have $v = +\frac{1}{2}\mathrm{V}, -\frac{1}{2}\mathrm{V}, -\frac{1}{2}\mathrm{V}, +\frac{7}{10}\mathrm{V}, -\frac{1}{2}\mathrm{V}$, V, 0, for the corresponding velocities; positive signs indicating movement towards the right, and negative signs the reverse. The signs of displacement and movement for the same particle are half the time alike and half the time unlike.

Velocity of the Propagation of the Sound-waves in the Air.—This has been the subject of a considerable number of experiments, of which we give below the most important. In 1822 a determination of this kind was undertaken by some members of the French Academy; the stations selected were at Montlhéry and Villejuif, the distance being 18622.27 mètres. Cannon were alternately discharged at the two stations at night, and the time which elapsed between the flash and the perception of the sound noted. On the first night twelve and seven shots were heard—on the second only one. The result was, that at a temperature of 0° C. sound travels with a velocity of 331.2 mètres per second. It is somewhat strange that to this important experiment only two nights were devoted.[*] We have besides this, the more careful experiments of Moll and Van Beek[†] in the following year, who obtained for their result at 0° C., 332.05 mètres per second; and finally we must add the experiments of Bravais and Martins,[‡] who measured the velocity of sound in a slanting upward direction from the Lake of Brienz to a station on the Faulhorn, obtaining as result at 0° C. a velocity of 332.37. This last experiment is interesting as showing that sound travels with the same velocity in an upward direction as on a level, as is required by the formula of Laplace.

Recently several pieces of apparatus have been devised by which the velocity of sound can be measured when the distance travelled over is only a few feet; so that it is now possible to make this experiment in a small apartment. Suppose that we generate a sharp, short sound at the open extremity of a tube, the other end being closed by a membrane; the sound-impulse, reaching the closed end of the tube, would announce its arrival by giving the membrane a little push outward; and if we had fastened on it a pencil, this might be caused to make a mark on a sheet of paper at the same instant. Let us now imagine that we had, near each other, *two* such tubes, the second one being longer than the first, but bent so that both still terminated side by side, each with its membrane and pencil, and that finally our sheet of paper, instead of being stationary, were in motion. Then, under these circumstances, the sound-wave travelling through the shorter tube would make its mark first, and the paper would have a chance to move a few inches before receiving the pencil-mark due to the companion wave; and if we knew the rate of the paper's motion, it is evident that we could easily calculate the velocity with which the sound had travelled through our apparatus. This general explanation will give an idea of the principle involved in a number of new contrivances, with some of which it is even possible to experiment at various temperatures and on other gases than our atmosphere. A simple and cheap apparatus of this kind was, in 1866, devised by Dr. Ernst Neumann,[§] a school-teacher in Dresden; the difference in the paths of the sound-waves was about twenty feet, although the length of the apparatus was only three; the sound was generated by the discharge of a child's brass cannon. The paper was attached to a circular disk arranged with a handle, which enabled the experimenter to revolve it with a velocity of only one turn per second, which was roughly accomplished by watching a seconds pendulum, consisting of a ball attached to a string having a length such as to cause it to vibrate seconds. The mean of a number of experiments gave a result far more accurate than would have been expected. Using the same general idea, but causing the sound-waves to act on little gas-burners connected with the two membranes, in the same year Ivan Zoch[‖] in Erlangen contrived a far more delicate instrument, with which he obtained results rivalling those of the French Academy in 1822, although in his case the difference of the paths was only three or four feet. With it he measured the velocity in various gases, and by driving a current of air through during the experiment was actually able to ascertain the change due to this cause. A somewhat similar idea was used in this fruitful year by Prof. Quincke[¶] of Berlin, in a very beautiful contrivance, where, unlike the two preceding, the signal was given not to the eye, but to the ear, the two sounds being made to destroy each other, producing silence in a manner presently to be explained. With this instrument Dr. Seebeck[**] has proved that in *small* tubes sound travels slower than in the open air, partly, as it would seem, owing to friction, and partly to loss of heat developed by the sound-wave itself through conduction by the walls of the tube. He has also shown that in *small* tubes the velocity is less in the case of deep notes than with those which are higher.

Laplace's formula for the velocity of sound in gases and vapors is

$$v = \sqrt{\frac{gh}{d}\,\mathrm{K}};$$

v = the number of mètres traversed by the sound-wave in a second of time; g = the accelerating force of gravity = 9.8088 mètres; h = the height of the mercury in the barometer reduced to the height it would have at 0° C.; d = the specific gravity of the gas, mercury at 0° being taken as unity; K = the quotient of the specific heat of the gas at a constant pressure, divided by its specific heat at a constant volume = 1.42. It is seen from this formula that the velocity is directly proportional to the square root of the pressure the gas is under, and inversely proportional to the square root of its specific gravity. It is evident also that the velocity is independent of the height of the barometer, for a change in the barometer affects not only h in the numerator, but also d in the denominator, in such a way that the value of the fraction remains constant. No term relating to the distance of the sounding body enters the formula; hence the velocity is independent of the distance—that is, of the amplitude of the sound-wave. The following is a convenient formula for calculating the velocity of sound in air at various temperatures:

$$v = 333.\ \mathrm{M}\sqrt{1 + at};$$

a = coefficient of expansion of air for 1° C. = 0.003665; t = the temperature in degrees of the centigrade scale; M standing for mètres. It was also found experimentally that sound moves quicker with the wind and slower against it; the final velocity being in the one case equal to the sum, in the other equal to the difference, of the velocity of wind and that of the sound-wave itself. In gases, the velocity of sound, of course, as indicated by the formula, increases with the temperature; in air this increase is about two feet per second for each degree centigrade. The velocity of sound in oxygen gas at 0° C. is 1040 feet; in carbonic acid, 858 feet; in hydrogen, 4164 feet.

In 1827, Colladon and Sturm determined experimentally the velocity of sound in fresh water. The experiment was made on the Lake of Geneva, and it was found to be 4714 feet per second at a temperature of 15° C. Laplace has also given a formula for the velocity of sound in liquids:

$$v = \sqrt{\frac{g}{\lambda}};$$

g as before = 9.8088 mètres, and λ is the amount which a column of the liquid one mètre long shortens under a pressure equal to its own weight; it hence is necessary to determine the compressibility of the liquid in order to employ this formula, as the velocity is inversely proportional to the square root of the compressibility. The velocity of sound in alcohol at 20° C. is 4218 feet; in ether, at 0°, 3801; in sea-water, at 20° C., 4768.

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[*] "Ann. de Chim. et de Phys.," T. xx., p. 210.

[†] Pogg. "Ann." Bd. v., s. 351, 469.

[‡] Pogg. "Ann." Bd. lxvi., s. 351.

[§] Pogg. "Ann.," cxxviii., s. 307.

[‖] Pogg. "Ann.," cxxviii., s. 497.

[¶] Pogg. "Ann.," cxxviii., s. 177.

[**] Pogg. "Ann.," cxxxix., s. 104. Compare also the experiments of Regnault on this subject ("Comp. Rend." t. lxvi., p. 209); also those of Kundt (Pogg. "Ann.," cxxx., s. 337); and finally those of Schneebeli (Pogg. "Ann.," cxxxvi., s. 296).

The velocity of sound in solids can be calculated by this last formula, and can also be experimentally determined; that in

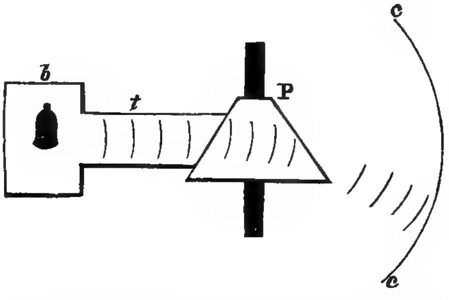
		At 20 C.°	At 100°.
Gold	is	5,717	5,640
Lead	"	4,030	3,951
Copper	"	11,666	10,802
Iron	"	16,822	17,386

The Intensity of Sound varies inversely as the square of the distance of the sounding body from the ear; it is also proportional to the square of the amplitude of the sound-wave. Thus far, we can hardly be said to possess a phonometer, or instrument for the purpose of comparing the relative intensities of two sounds or sets of sound-waves; hence we must regard with interest a step recently taken in this direction by Prof. A. M. Mayer of Hoboken, who, by employing small vibrating flames and the principle of interference, succeeded in solving this problem in certain cases. For details we must refer the reader to the original article, published in the January number of the "American Journal of Science and Arts," 1873.

Reflection of Sound.—The waves of sound can be reflected like the waves of light, and obey the same law, the angle of incidence being equal to the angle of reflection; this can be proved indirectly with the aid of spherical or parabolic mirrors, though, from the circumstance that the sound-waves are large relatively to such reflecting surfaces as can be used, the experiments are far more difficult than with the almost infinitely shorter waves of light. The author has recently contrived a new method by which the reflection of sound can be studied, and the relative reflecting powers of different substances examined. A circular disk with open and closed sectors, or with sectors of different materials, is made to revolve rather slowly near a sounding-reed, in such a way that the sound is from time to time reinforced by reflection. The result is, that a sound resembling "the beats" is produced, these alternations of sound and comparative silence disappearing when the disk is made complete, or when its alternate sectors are composed of substances having the same power of reflection. The same apparatus can be used to determine the relative powers of different bodies for the transmission of sound. Echoes are cases of the reflection of sound, and the wonderful power of very long tubes in conveying sounds to a great distance is due to the same property.

Refraction of Sound.—Sound-waves can be refracted or bent out of their course by denser or rarer bodies in a manner corresponding to light; this can be demonstrated by the use of a large lens of carbonic acid enclosed in a thin membrane, when it will be found that the sound-waves from a watch will be concentrated just as a glass lens concentrates the rays of light. Recently, the refraction of sound has been directly studied with a prism, according to the method which has long been used in light. Prof. C. Hajech generated sound-waves in the interior of a box *b*, by the aid of a bell which was struck by clockwork; travelling along a tube *t*, they reached the prism *P*, and were refracted by it as indicated in Fig. 4. The amount by which they were bent out of their path was ascertained by moving the ear over the graduated circle *cc*, which was in an adjoining room, till the position of maximum intensity had been ascertained. The sides of the prism were made of thin membrane, of paper, or finally of sheets of mica. Experiments were performed on hydrogen, ammonia, illuminating gas, carbonic acid, and on sulphurous acid gas. Besides these gases, two liquids were also employed—ordinary water and water saturated with common salt. Amongst other results it was found that the same prism refracted waves of different lengths (or different tones) alike. The results of these measurements corresponded with those indicated by the known velocities of sound in the substances employed, taken in connection with the explanation of refraction as given in the undulatory theory of sound.

FIG. 4.

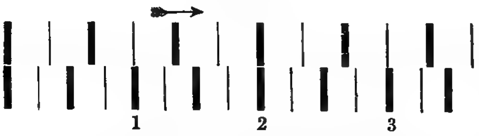


Sound-waves rendered Visible.—Quite recently this feat has been accomplished by the German physicist Töpler, who employed the snap of an electric spark for the generation of the sound-wave, and then illuminated it by the instantaneous light of a second spark. He was thus not only able to see with distinctness a simple sound-wave, but also to observe its reflection, refraction, and the interference of two sound-waves. (*Pogg. Ann.*, cxxxi., s. 180, 1867.)

Inflection of Sound-waves.—From the circumstance that the sound-waves are not minute relatively to the obstacles they encounter, it happens that they manifest this property of travelling around corners in a high degree. The corresponding experiments with light require some care, but the inflection of sound-waves is something that we with difficulty escape from, obstacles placed in their path casting but little acoustic shadow.

Interference of Sound-waves.—Thus far, we have occupied ourselves with single sets of waves, and have supposed the particles of air to be acted on by only one wave at a time. It will, however, more commonly happen that it is necessary to deal with particles which are at the same instant being acted on by more than a single wave. Let us take the simplest case, and suppose our particles acted on by two equal and similar sound-waves; now, it may happen under these circumstances that the two waves agree in their action, any particular layer of air being at the same moment subjected to a condensation or rarefaction from both these sources. When this happens the motion of its particles will be twice as great, and we shall hear a louder sound. But something else is equally likely to occur: it may happen that just at the moment when the layer ought to be condensed by one wave, its companion attempts to rarefy or expand it; these two motions will then neutralize each other, and instead of sound we shall have silence. This can be illustrated with two similar organ-pipes which give exactly the same note; sounding them both together may give a louder tone, or one which is quite faint. If closed organ-pipes are used, the silence, as far as the musical note is concerned, is quite complete, nothing but the hoarse *noise* which is always mingled with it being perceptible. We can combine both these experiments into a single one by employing organ-pipes which give slightly different tones; if now both sets of waves start fairly together, the condensations and rarefactions being in harmony, this state of things cannot long remain, owing to the inequality in their length, as is shown in Fig. 5, where condensation is marked heavily, rarefaction lightly. Already at 1 the condensation coincides with the rarefaction; farther on, at 2, the old state of things has returned; and the condition at 3 is the same with that at 1. Hence, in this experiment we must expect to have alternations of sound and silence, the tone rising and swelling to a maximum, then dying away again to repeat itself, etc. These alternations are called *beats*, and furnish even to the unmusical ear a very accurate means of judging of the identity of musical tones.

FIG. 5.



Having considered briefly these general properties of sound-waves, we pass on to some of their distinguishing characteristics. Among the most important of these is—

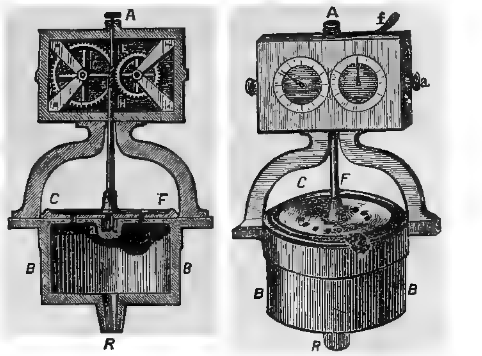
Length of Sound-waves.—The pitch of the note, other things being equal, depends on the length of the wave; long waves give low notes—short waves, those that are high. The longest waves, in the air at a temperature 0° C., which are capable of producing the sensation of sound, have a length of about 66 feet. The tone, from a musical point of view, is imperfect, and in order to remove this defect entirely it is necessary to shorten the wave to about 27½ feet. On the other hand, when the waves are reduced to a length of three or four tenths of an inch, they again become inaudible; to have a useful musical effect their length must be increased to about 3.2 inches. Instead of speaking of the *length* of the sound-waves, which evidently must vary with temperature, it is more customary to use the *number of vibrations* producing a given sound; thus, as sound travels at the rate of 1090 feet per second in the air at 0° C., it follows that a wave 66 feet long will execute in a second 16½ vibrations, and one which is 27¼ feet long, forty vibrations, etc. We give below a table, arranged in octaves, of the number of vibrations of the notes used in music:

16½	33	66	132	264	528	1056	2112	4224
$\underline{\underline{C}}$	$\underline{C}$	C	c	$\overline{c}$	$\overline{\overline{c}}$	$\overline{\overline{\overline{c}}}$	$\overline{\overline{\overline{\overline{c}}}}$	$\overline{\overline{\overline{\overline{\overline{c}}}}}$
$C_{\prime\prime}$	C′	C	c	c′	c″	c‴	c⁗	c′′′′′
C″	C′	C	c	c′	c″	c‴	c⁗	c′′′′′
C_2	C_1	C	c	c_1	c_2	c_3	c_4	c_5
c–3	c–2	c–1	c^0	c^1	c^2	c^3	c_4	c^5
ut_{-2}	ut_{-1}	ut_1	ut_2	ut_3	ut_4	ut_5	ut_6	ut_7

As will be seen, several modes of notation are employed, the last being the French—that preceding, the method proposed by Sondhaus for scientific purposes. In large organs $\underline{\underline{C}}$ with 16½ vibrations is reached, the effect being imperfect; the piano reaches $\overline{\overline{\overline{\overline{a}}}}$ with 3520 vibrations, and sometimes $\overline{\overline{\overline{\overline{\overline{c}}}}}$ with 4224. The highest note employed in the orchestra is d_5, with 4752 vibrations (piccolo flute). The practical range in music is from 40 to 4000 vibrations, embracing seven octaves. The human ear is, however, able to reach eleven octaves; that is, the sensation of sound is produced by vibrations varying from 16½ up to 38,000 in a second.

It is not difficult to measure the length of the sound-waves or the number of vibrations producing them; a very simple means is with the sirene of Cagniard de Latour. This instrument consists of a circular revolving disk C F (Fig. 6), which is provided with fifteen small apertures cut in its substance in a slanting direction; below this disk is a second one, which is stationary, and also provided with a similar set of holes. When air is driven through the apparatus by a wind-bellows the upper disk is set in rotation after the manner of a reaction mill, which has the effect of rapidly opening and closing the set of apertures, so that when a sufficient velocity of rotation has been attained, the pulses of air rushing through produce a low musical note, the pitch rising with the velocity or number of vibrations communicated to the air in a second. Upon the axis is an endless screw, E H, which, acting on a toothed wheel, S, registers the number of turns made by it in a given time, say in fifteen seconds. In using this apparatus it is only necessary to raise the pitch of the note furnished by it till it is in unison with the note whose number of vibrations we wish to determine. If, then, this unison is maintained for fifteen seconds, we can, without calculation, read the required number of vibrations directly on the dial-plate of the sirene; then, by dividing the velocity of sound in the air by this number, we have the length of the wave. In the case of a tuning-fork the number of vibrations can be still more directly ascertained by attaching to one of its arms a small piece of fine wire or a minute portion of a feather, and causing this to act as a pen on a revolving cylinder. This latter is covered by a sheet of paper which has been smoked by burning camphor, and when set in revolution registers the vibrations made by the tuning-fork on the lampblack surface. Seconds marks are simultaneously impressed on the smoked paper by an electro-magnetic attachment; so that afterwards it is not difficult to obtain the desired result with a high degree of accuracy. There are also other methods of measuring the length of sound-waves, based on the principle of interference, and quite recently Prof. Mayer of Hoboken has succeeded in measuring wave-lengths directly in the air. (*American Journal of Science and Arts,* for Nov., 1872, p. 387.)

Fig. 6.



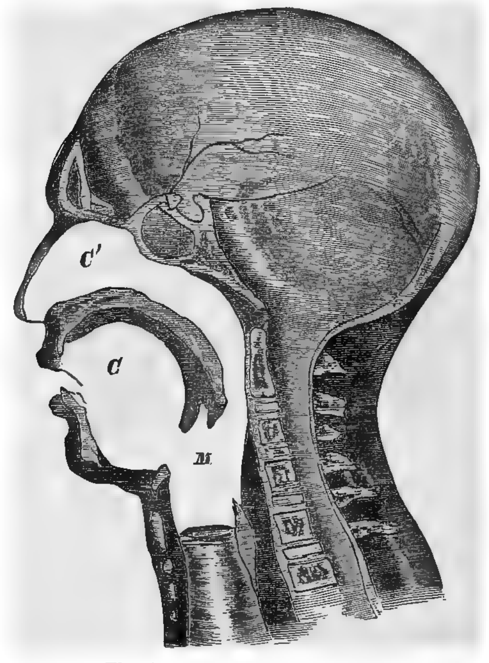
The Form of a Sound-wave.—In all that has preceded, and also in the formulas for the sound-wave, we have assumed that the particles of air swing backward and forward, obeying the law of the pendulum; and this is true for pure, simple tones, such as those furnished by tuning-forks. The ear is so constructed as to be able to take up these pendulum-like vibrations, which then produce appropriate sensations in the brain, but it is not capable of directly taking up vibrations which are executed according to laws different from that of the pendulum. Let us take a simple case, and suppose the air acted on by two pendulum-like sets of impulses, due to the joint action of two tuning-forks, one of which in a second executes twice as many vibrations as the other. The particles of air will then obey a new law, and will assume positions and velocities which are the *resultants* due to the action of the two original forces, and the form of the wave will be entirely altered. When this new kind of wave strikes upon the ear it is instantly analyzed into its two constituents, which independently affect their corresponding nerve-fibrils, and a peculiar sensation is produced, due to the presence of two distinct sensations; indeed, as Helmholtz, to whom we owe these interesting facts, has shown, it is possible after some practice to actually recognize the two original constituents. If we add a third, a fourth, or any number of new sets of impulses, the law changes with each, and also the resulting form of the wave, and consequently the final sensation. Conversely, if by any other means we generate waves having forms *not normal,* and present them to the ear, they will instantly be analyzed into a sufficient number of normal forms to meet the requirement, and a corresponding number of sensations will be produced. For example, reed-pipes, or a reed alone, furnish waves with an abnormal form, and the sound from them is analyzed, as Helmholtz has shown, by the ear into sixteen to twenty sets of normal waves or pure simple tones. We may add here that, as in this example, it is not necessary that these distinct sets of waves or notes should be independently generated, but merely that the original wave should have a form capable of being analyzed into these simple constituents. Even the form of the wave furnished by the sirene is not normal; along with its proper or fundamental note the octave is *virtually present* in an amount which is often somewhat embarrassing. These higher notes, which accompany the proper or fundamental tone, are called over-tones, or harmonicals, and it is their presence which determines the quality of the sound, or its *timbre* or *clang-tint.* In the case of tuning-forks the over-tones are absent, hence the hollow and somewhat poor character of the sounds they emit; with closed organ-pipes they are scarcely present to any extent, though more so with open pipes, where the first and second over-tones can be distinctly recognized—*i. e.* the octave and the twelfth. In reed-pipes they are present in great abundance and strength, so as quite to change the character of the fundamental note; the same is true of stringed instruments. It is the presence of these over-tones which enables us to distinguish between different instruments, even when sounding the same fundamental note, and finally which, as we shall see, enables us to recognize the voices of different persons under similar conditions. Our inability to distinguish at once the presence of particular over-tones is simply the result of want of practice, and is shared alike by the musical and unmusical. This can be corrected by practice, or by the use of the resonators contrived by Helmholtz. These instruments have usually the form of a hollow sphere, open at both ends of its diameter; one of these openings has a shape adapting it for insertion into the ear; the other aperture is larger, its size being determined by experiment. The size of this opening and the capacity of the sphere are so related that when the sphere is placed in connection with the ear the experimenter is rendered comparatively deaf to all notes but one, the strength of this latter being greatly exalted by the instrument. The analysis of which we have just spoken was to a great extent effected by the aid of these contrivances, a large number of these spheres being of course necessary for purposes of investigation. We may add here that Mr. R. Koenig, so celebrated for his beautiful acoustic apparatus, has pushed this matter one step farther, and by connecting these resonators with manometric capsules and small gas-flames has succeeded in rendering *visible* the phenomena of which we have been speaking, thus enabling a person who is deaf still to pursue these investigations.

Cause of Dissonance or Discord.—This peculiar effect, which sometimes attends the reception of two or more sets of sound-waves, has also recently been explained by the investigations of Helmholtz, which have thrown a flood of light on this obscure subject. It has for a long time been known that when two sets of sound-waves are simultaneously presented to the ear, the relation between their length being in some simple proportion, such as 1 : 2, 2 : 3, 3 : 4, or 4 : 5, an agreeable effect is produced, the sounds seeming to melt into each other, producing what is known as consonance; while, on the other hand, more complicated relations often generate discord. To account for this, many fanciful theories have been proposed, of which we will merely allude to that of Leibnitz, who imagined that the mind delighted in the perception of simple mathematical relations, and was displeased by the reverse! It is hardly necessary to say that this is not the true explanation, which we must seek in certain relations of the nerves of sensation to external stimulating causes. The nerves of vision, touch, and hearing are endowed with the following property: when stimulated, the sensation produced is at the first instant at a maximum, and rapidly becomes less intense; if, however, the nerves are allowed to rest for small intervals of time, they quickly regain their former sensitiveness, and this process may be repeated indefinitely. If, now, we expose the eye, for example, to light, we obtain the maximum sensation; then the periodic withdrawal and return of the light may readily be so arranged as to produce in succession a long series of these maxima of sensation, which quickly become disagreeable, and even may be dangerous: it is the case of a flickering light, whose bad effects are so well known. The sensation of tickling is strictly analogous to the above, and is produced by corresponding causes. The nerves have, however, another well-known property: after stimulation the sensation produced is found to remain, or "persist," for a minute interval of time with undiminished strength; so that in the case of light and sound, if the successive stimulations follow each other at sufficiently rapid intervals, these evil effects are naturally abolished, and only continuous sensations are perceived. Discord is, then, as Helmholtz has ascertained, due to the presence of the beats, or to rapid alternations of sound and comparative silence, they corresponding to the flickerings of a flame. When from any cause these beats follow each other at the rate of about 33 in a second, the discord is at its maximum, becoming more tolerable with twice this number, and finally disappearing altogether as their number is increased to about 120 in a second. On the other hand, if the beats follow quite slowly —for example, at the rate of three to five in a second—the effect is not unpleasant, and can even be employed in music, suggesting as it does the idea of trilling. Discord is then due to the production of beats by the interference of the over-tones, which almost always accompany the fundamental notes, and, as has been shown by calculation, this can be entirely or partially avoided only by the use of such simple ratios as those above indicated. For further details we must refer the curious reader to the original work of Helmholtz ("Die Lehre von den Tonempfindungen," 1865).

Effect of Communicating Motion to the Source of Sound or to the Ear.—In all the foregoing it has been tacitly assumed that during experiment the position of the source of sound and of the recipient ear remained invariable; when this ceases to be true, certain curious changes are produced, which recently have grown into importance, owing to their correspondence with certain optical phenomena by which it is possible to study the motion of the fixed stars towards or away from our planet. Let us suppose that the sounding body is stationary, and that the ear of the observer is moved with some rapidity towards it; then it will result that in a given time the observer will receive a larger number of impulses than at first, and that the pitch of the sound will be correspondingly elevated. The same effect will be produced by moving the sounding body towards a stationary ear. And from the same cause it is evident that motion of the ear away from the source of sound will lower the pitch of the note, etc. These ideas were first brought forward by Christian Doppler in 1842, and since then have been repeatedly subjected to the test of experiment. Dr. Ballat in Belgium, with the aid of a locomotive and a party of musicians, proved their correctness in a quantitative manner, and Dr. Mach has contrived an apparatus with a moving reed-pipe by which they can be studied in an ordinary room; and finally by the use of tuning-forks Prof. Mayer of Hoboken has succeeded in illustrating them before large audiences. (*American Journal of Science and Arts*, April, 1872, p. 267.)

The Voice.—As the human vocal organs are built essentially on the plan of a reed-pipe, it is desirable at the start to understand the construction and action of one of these instruments. A reed organ-pipe consists, then, of two parts, a vibrating tongue or reed, and a variously shaped pipe. When connected with a wind-bellows the reed is thrown into vibrations, and after the manner of a sirene permits the air to pass through in a series of puffs, which, linking themselves together, generate a musical tone. The waves furnished by the reed are not, however, normal in form, but, as previously explained, have a form such as would be generated by the joint action of a fundamental normal tone or wave, combined with a set of shorter waves or over-tones: in other words, practically it furnishes a fundamental note with a series of strong over-tones, the particular fundamental note and corresponding set of over-tones depending on the construction of the reed itself and the manner in which it is tuned. The function of the pipe is to strengthen any or all of these notes; thus, conical pipes strengthen all the over-tones up to a certain height, excluding those that are not much longer than the aperture of the pipe itself, while cylindrical pipes strengthen the odd over-tones, or those whose rates of vibration are related to each other as 1, 3, 5, etc. Hence, the pitch of the note is determined by the rate of the reed's vibrations—the quality, or clang-tint, of the sound by the shape and size of the pipe. In the human vocal organs the reed is supplied by two vibrating membranes at M (Fig. 7), called the vocal cords. For the production of sound it is necessary that they should be stretched, and that at the start the opening between them should be closed. Air is then forced through them from the lungs; they are set in vibration, and allow it an interrupted passage, exactly as in the case of a reed, as has been shown by experiments on the living and dissected larynx, or with the aid of artificial vocal cords made of sheet india-rubber. The pitch of the voice depends on the extent to which the membranes are stretched. Müller, by increasing the tensive force half an ounce up to eighteen ounces, raised the tone with one of his dissected preparations more than two octaves. The pitch depends also to some extent on the strength of the current of air employed, rising as the latter is increased. The human voice includes not quite four octaves, though no one single voice would be able to compass a scale of this extent. The pitch also, other things being equal, depends on the length of the vocal cords; that of men is about 18 millimètres, with women it is only 12. The clearness of the voice depends on the accurate closure of the slit between the cords, from time to time, while they are in operation. Theory and experiment alike point to the fact that when the vocal cords are set in action waves having an abnormal form are generated, corresponding to a fundamental note with a set of over-tones. The function of the cavity of the mouth and nose CC' (Fig. 7) is to strengthen or weaken the fundamental tone and various sets of the over-tones; and in this action the size of the opening of the mouth also plays an important part; thus, the quality of the sound uttered, or its clang-tint, depends finally on the shape and size of the cavity of the mouth and nose. This cavity, then, corresponds to the pipe of a reed organ-pipe. The vocal cords retaining all the time the same tension, by altering the shape and size of the cavity of the mouth and its opening we can generate sounds having a different clang-tint, as, for example, Ah, O, etc. It is not even necessary to set the vocal cords into action if a complex sound consisting of many tones is supplied from some outward source; thus, we were recently informed by President Barnard of Columbia College that by taking advantage of the complex sounds or noise of a railroad car, and by varying suitably the cavities just referred to, he has succeeded in producing musical notes in rapid succession, such as the notes of any familiar melody, at pleasure.

FIG. 7.



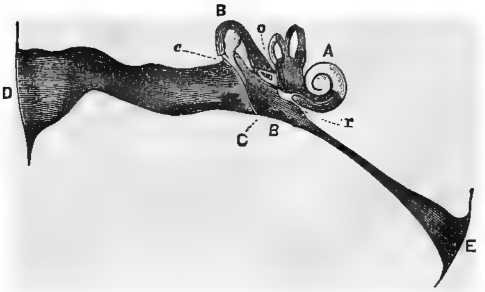
The Vowel-sounds are the simplest which can be uttered by the human voice, and have frequently been made the subject of investigation. In 1831, Willis in England found that by mingling certain tones produced by reed-pipes he could to some extent imitate the vowel-sounds. (*Pogg, Ann. Bd.*, xxiv., s. 397.) In this mode of working there is the obvious difficulty that reed-pipes furnish large sets of notes, so that it is not possible to obtain very accurate knowledge by such experiments. More recently, Helmholtz, with the aid of his resonators above described, succeeded in analyzing the vowel-sounds, although they present greater difficulties than most other sounds of equal complexity. This results from the circumstance that, from childhood upward, we all have been accustomed to regard the tones of the vowel-sounds as independent wholes, making no attempt to ascertain their musical components, since in the case of a vowel-sound the clang-tint is all important, and is indeed the only means by which we judge of its identity. Helmholtz ascertained that vowel-sounds are produced by the presence of a fundamental note mingled with its higher over-tones in various proportions; he even was able to prove that the intensity of the highest of these over-tones varies somewhat in different individuals, being greater in voices that are shrill than in those whose sound is softer. Having finished this labor, he undertook the artificial reconstruction of the vowel-sounds from pure constituents. These are best furnished by vibrating tuning-forks. One of these instruments, alone by itself, furnishes a tone which at a little distance is quite inaudible, but by causing it to vibrate directly in front of a hollow *metallic* cylinder of exactly the right capacity, its sound is greatly strengthened, and can be distinctly heard in a room of large dimensions. The cylinder is of course entirely closed with the exception of a circular opening at the end near the fork. When the fork is thus caused to vibrate in connection with a resonator, the sound is instantly extinguished if the aperture in the cylinder be closed, but as it is gradually opened the sound correspondingly gains in intensity; so that it is evidently in the power of the experimenter to regulate the loudness of the tone produced. A tuning-fork, however, soon ceases to vibrate, and accordingly must be provided with a contrivance to obviate this difficulty. By placing it between the arms of an electro-magnet having the form of a horseshoe, it can be caused to vibrate for any period of time, provided the magnetic attraction is intermittent, and always exercised at exactly the right moment. This is accomplished by breaking and re-establishing the electric current with the aid of another tuning-fork, which vibrates at exactly the same rate; and the second fork, being also provided with a similar electro-magnet, is able independently to maintain itself in vibration for any length of time, as is the case with the vibrating attachment so often found on electrical apparatus for medical purposes. It would not be possible with this arrangement to sustain in vibration a third fork whose rate was a *little* slower or faster than that of its two companions; but if its rate should be exactly twice, three, or four times as great, this end could easily be accomplished; for then, though the attractive impulses might be fewer than desirable, at least they would always be rightly timed. Hence, it is evident that a series of forks whose rates of vibration are as 1, 2, 3, etc. can be kept simultaneously in vibration by a contrivance of this nature. This was, then, the plan actually employed by Helmholtz; keys being connected by strings with the valves of the resonators, and being opened by the pressure of the fingers, the proper notes were obtained with the desired strength. Helmholtz's vowel-sound apparatus, as made by Mr. Koenig of Paris, consists of eight tuning-forks with their resonance-cylinders, the fork which establishes and regulates the current being on a separate stand. These forks give the following notes: Ut$_2$, Ut$_3$, Sol$_3$, Ut$_4$, Mi$_4$, Sol$_4$, Ut$_5$, Si$_5$. When all these forks are set in vibration, their resonance-cylinders remaining closed, only a low humming sound is heard, but by pressing one or more keys the corresponding notes are called forth with any desirable degree of strength. The German vowel-sound *u* can be approximately imitated by sounding the Ut$_2$ fork alone, or better by adding the two first over-tones—*i. e.* the octave and twelfth, Ut$_3$ and Sol$_3$. *O* is obtained with a weak Ut$_2$ and strong Ut$_4$; Ut$_3$, Sol$_3$, and Mi$_4$ mingling to a small extent. The German *a*, with Ut$_5$ and Mi$_4$ strong; Ut$_3$, Ut$_4$, Sol$_4$ having a moderate strength. In the same language the *æ* is given by Mi$_5$ and Sol$_5$ strong, with the notes Ut$_4$, Ut$_5$, Sol$_4$ weaker; and finally the *e* by the aid of Sol$_5$, Si$_5$, and Ut$_6$ strong; Ut$_3$ and Ut$_4$ being weaker.

Of course, since only pure musical notes are employed, they can only reproduce the musical constituents of the vowel-sounds; hence the effect resembles the sound of the vowels as sung rather than pronounced. Corresponding with these remarkable experiments, Helmholtz also found it possible to imitate with the same apparatus certain varieties of organ-pipes; at least to reproduce the musical constituents of their tones, though of course the noise with which they are often accompanied was absent; he in addition imitated the nasal tones of the clarionet by the use of a portion of the forks, while the joint action of the whole set gave the softer tones of the bugle-horn. For exciting the apparatus into action he used only two of Grove's cups, though other experimenters have since then found it somewhat difficult of manipulation, and lately an attempt has been made by Appun to replace it by a series of reeds provided with resonators, with which it has been found possible to reproduce some of the sounds in question (*u* and *a*).[*] We must here mention the remarkable results attained in the last century by Prof. v. Kempelen in Vienna with his speaking machine, which more recently has been greatly perfected by the two Fabers, uncle and nephew.[†] Some months ago the latter exhibited in Columbia College this wonderful apparatus, which is capable of uttering not only syllables, but words and sentences, with a certain mechanical precision. In it the human vocal organs are directly imitated by vibrating plates of ivory, and it is remarkable that it is operated on by only fourteen keys or stops, which give the five vowels and the nine consonants, *l, r, w, f, s, b, d, g, sch.* The other consonants are produced partly by combinations of the above, and partly by increasing the strength of the current of air from the bellows. For the purpose of causing the machine to speak French, an extra attachment is provided, whereby more nasal tones can be generated. Mr. Faber has also connected with it a singing attachment, in which, by means of quick changes in the form of the vocal cords, the musical scale can be executed.

Consonants.—These sounds are generally regarded not as constituted of notes having any particular musical relation to each other, as in the case of the vowel-sounds, but rather as consisting of different varieties of noise. Thus, as examples of explosive noise we have *p* and *b, t* and *d, k, g, q;* of frictional noise, *s, z, sch, l, f, v, m, n,* and *h;* of intermittent noise, *r.*[‡] The mechanical mode by which the consonants are produced is to a considerable extent understood, but their actual acoustic elements resist all attempts at complete analysis. That they have an acoustic character cannot, however, be doubted, and some progress has been made towards ascertaining the natural pitch of their predominant notes. Thus, upon repeating (in German) the consonants *b, k, t, f, s,* it will be found that *b* is the deepest in tone, *s* the highest; and that, taken together in the above order, they constitute a series of perceptible musical gradations. For further information we must refer the reader to the original investigations of Dr. Oskar Wolf, who seems to have succeeded in actually determining the pitch of the predominating constituent in the case of most of the consonants.[§]

The Ear.—The sensation of sound is produced by the stimulation of certain nerve-fibrils in the interior of the ear, and this result is brought about by the *sound-waves* in the following manner: These waves first strike upon the external ear, and possibly are, to some slight extent, concentrated by it; afterwards they travel along the tube D (Fig. 8), and reach the tympanum or drum of the ear at C. This consists of a thin membrane which closes the external passage, and which is capable of being set in vibration or of responding to an immense variety of waves or impulses. It may here be remarked that a catholicity of this kind has not thus far been observed in experiments on membranes artificially stretched, whose range is found to be far more limited. There is also some reason to believe that the tympanum is capable of a certain degree of "accommodation" to the sounds that are presented to it, following the well-known analogy of the eye in this respect. Attached to the inner side of the tympanum is a series of

Fig. 8.



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[*] "Sprache und Ohr," by Dr. Oskar Wolf, page 11.

[†] "Der Mechanismus der menschlichen Sprache nebst Beschreibung einer Sprechenden Machine von Wolfgang v. Kempelen," Vienna, 1791.

[‡] See the work of G. Gattfied Weiss, Braunschweig, 1868.

[§] "Sprache und Ohr," Dr. Oskar Wolf, Braunschweig, 1871.

three small bones, called respectively the malleus, *c*, the incus, and the stapes, *o* (the hammer, the anvil, and the stirrup. See Figure 8). These bones are rather closely bound together, and transmit the vibrations of the tympanum finally to the stirrup, which is destined to communicate them to the inner ear. The portion we are now engaged with has a communication with the mouth by means of the Eustachian tube, E, which is closed except in the act of swallowing; its function is to preserve an equilibrium between the pressure of the air in the middle ear and that on the other side of the drum. While the middle ear is filled with air, the inner ear is filled with a liquid, and is completely enclosed for protection in solid bone. In Fig. 9 a section of the inner ear is given. SSS are the semicircular canals cut open; V is the vestibule; *o* and *r* are the foramen ovale and the foramen rotundum; C is a section of the cochlea. We give in addition a *plan* of the ear, after Helmholtz (Fig. 10), the cochlea, for the sake of clearness, being supposed to be unrolled. A is the vestibule, C the cochlea, *a* the foramen ovale, *b* the foramen rotundum, *f* the nerves of hearing. The sacs at *d* contain attached to their walls small crystals of carbonate of lime in contact with the nerves, and their function, as it appears, is to render us sensible of simple short sounds or shocks, which probably would not affect the vibratory apparatus presently to be described. They act as *drags* on the nerves when the latter vibrate with the water in which they are bathed, and thus produce sensation. This is the simplest portion of the apparatus for hearing, and is found in many of the lower animals, where the more complicated arrangements are entirely absent. These sacs contain also, in connection with the nerves, certain microscopic hairs, that are quite elastic and brittle, and probably capable of being set into vibration when the particular notes to which they are tuned are presented to them, just exactly as a tuning-fork can be set in vibration by the waves proceeding from a second fork of the same pitch. (See Fig. 11.) In the cochlea we also find a membrane (the organ of Corti) with a great number of fine microscopic cords stretched in it, which probably have the same function. The reader will find, by opening a piano and pressing the foot on the right-hand pedal, that if then the vowel-sounds, for example, are pronounced in a loud, clear voice over the strings, it will result that the strings which are capable of giving the notes of which they are built up will be set in vibration, and will echo back somewhat faintly the original sounds. And so it is probably in this portion of the ear; these microscopic strings, being thus set in vibration, stimulate the nerves connected with them and produce corresponding sensations. If the sound is compound or the form of the wave abnormal, this sound is analyzed into its constituents, since the cords (and rods) can only execute normal vibrations; which circumstance explains much that was said under the head "Form of the Wave;" and we see finally that the clang-tint is the sensation produced by the simultaneous action of two or more of these strings upon their appropriate nerves. The cochlea contains about 3000 of these strings, and if, with Helmholtz, we suppose that 200 of them are useful for rendering us sensible of tones not used in music, there will remain for the musical tones proper 2800 for the seven octaves, or 400 for each octave, $33\frac{1}{3}$ for each half tone. Now, according to the experiments of E. H. Weber, skilful musicians can distinguish $\frac{1}{64}$ of a half tone, which is a smaller quantity than corresponds to the number of these strings. It would appear, then, that in this case *two* of these strings are at the same time excited into action, and the musician by practised attention is able to notice which of them vibrates the more strongly.

FIG. 9.

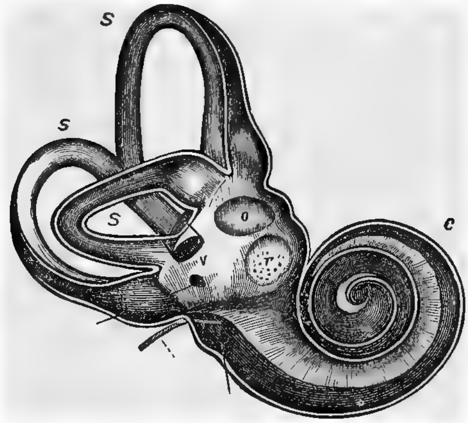


FIG. 10.

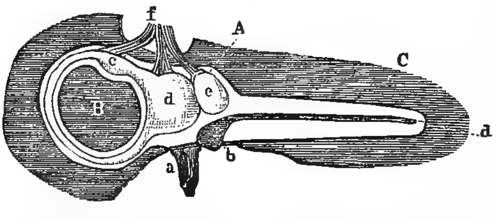
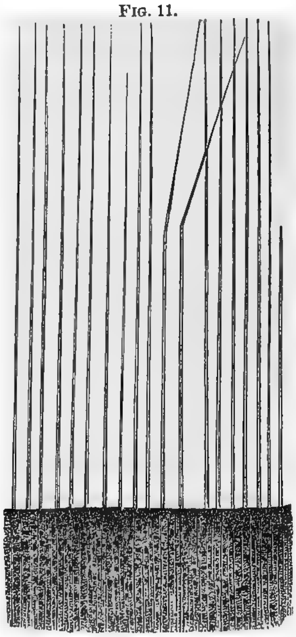
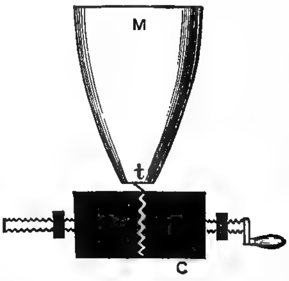


FIG. 11.



As rendering the above views more probable, we may mention the experiments of Von Hensen on the ears of certain minute forms of crabs, which he enclosed in an artificial ear corresponding to the labyrinth. The ears of these crustaceans are partially external, and consist of sets of hairs capable of vibration, connected with the nerves, as in the case we have just been considering. When different notes were sounded, Von Hensen was able with the microscope to notice that certain hairs responded, etc.* The functions of certain portions of the ear are still involved in much obscurity; this is the case, for example, with the three semicircular canals, concerning whose object and use we possess as yet no certain information. Among the fishes the myxine has one of these canals, the lamprey has two, the higher forms, three; and it appears that in birds of prey they become highly developed.

FIG. 12.



In closing this article it may be proper briefly to mention the results obtained with the *phonautograph* of Scott and Koenig. This may be regarded as a gigantic ear, endowed with the power of permanently registering the vibrations of its own tympanum. It consists of a parabolic mirror, M (see Fig. 12), of zinc, which concentrates the sound-waves, and causes them to set in vibration a thin membrane, *t*, which is provided with a "pen" attached to its centre. The vibrations are in this way finally inscribed on the surface of a revolving cylinder, C, which is covered with paper smoked by burning camphor. The figure gives a view of this apparatus seen from above. With this instrument Koenig succeeded in obtaining the autographic curves due to single notes, or to the joint action of several within the compass of an octave. Donders, however, was able, after much trouble, to obtain the complex curves due to the vowel-sounds. For *u* (German) it was a common sine curve, as it should be; this was also true for *ü* and *i*, the instrument being able to reproduce neither the weak over-tones of the first, nor the high over-tones of the second. The form of the curve altered with the pitch of the voice uttering the vowel, but changes in dialect produced only slight modifications. With diphthongs the duration of the sound and modifications due to change from one diphthong to another were rendered visible. Consonants spoken just before a vowel altered only the beginning of the curve, and produced only a corresponding modification when uttered immediately after the vowel.* The duration of *a* in the word *daag* = 42, in *dagen* = 37, in *dag* = 16 vibrations, each single vibration consuming $\frac{1}{216}$ of a second, so that the actual durations were, 0.16, 0.142, 0.061 of a second of time. O. N. Rood.

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* Von Hensen, "Studien über das Gehoerorgan der Dekapoden;" Von Siebold u. Kölliker, "Zeitschrift für wiss. Zoologie," Bd. xiii.

Acquavi'va, a town of Italy, in the province of Bari, 16 miles S. S. W. of Bari. Pop. 6517.

Ac'qui, a town of Italy, in the province of Alessandria, on the Bormida, 21 miles by rail S. S. W. of Alessandria. Here are sulphurous springs, which are much frequented, and ruins of an old Roman aqueduct. Acqui is of great antiquity, and its hot sulphur baths were known to the Romans, who called the place *Aquæ Statiella.* Good wine is made in the vineyards of the district, and the rearing of silkworms is followed with much care. It has a cathedral, several fine buildings and silk-factories, a royal college, and is a bishop's see. Pop. in 1881, 11,283.

Acquit'tal [from the Old Fr. *acquiter,* to "forsake"], in law, a release from a contract or other obligation; more usually employed in criminal practice, where it denotes a judicial deliverance from a charge of guilt, either by a verdict of not guilty by a jury upon a trial, termed "acquittal in fact," or by mere operation of law, as where one has been charged simply as accessary, and the principal is acquitted. An acquittal is a bar to any future prosecution for the same offence. In the U. S. this is secured by a constitutional provision that "no person shall be twice put in jeopardy for the same offence." The judicial construction of this clause prevents a second trial for the same offence after an acquittal.

A'cre [from the Ang.-Sax. *acer* or *æcer,* a "field," etymologically allied to the Lat. *ager* and Ger. *Acker*], a superficial dimension of land, is equal to 4840 square yards. The English acre is the same as that of the U. S. A French acre contains about one *arpent* and a half.

Acre, Ak'ka, or **St. Jean d'Acre** [Phœnician *Accho,* and called by the Greeks *Ptolema'is*], a city and seaport of Syria, is on the Mediterranean, 30 miles S. of Tyre, and 8 miles N. of Mount Carmel; lat. 32° 54′ N., lon. 35° 6′ E. The "key of Palestine," it has been the scene of many famous sieges and battles. It was taken by the Crusaders in 1104, and retaken by the Saracens in 1187. In 1191 it was recovered by the Crusaders (under Guido of Jerusalem, Philip of France, and Richard the Lion-hearted of England), and held by them till they were finally driven out of Palestine in 1291. Bonaparte besieged it for sixty days in 1799, but failed to take it. In 1840 it was bombarded and captured by the English fleet. Pop. about 8000, of whom 5600 are Moslems.

Acre'lius (Israel), a clergyman, born at Ostaker, Sweden, Dec. 25, 1714, was educated at Upsal, and was appointed in 1749 a provost to take charge of the Swedish congregations on the Delaware. After a sojourn in America of seven years, he returned to Sweden in 1756. He wrote a description of the Swedish colonies in America (1759). Died April 25, 1800.

Ac'robat [literally, "one who goes or moves upon his extremities (toes)," from ἄκρος, "extreme," and βάτης, "one who treads or goes"], a term applied to a rope-dancer or to a person who entertains the public by performances on the tight rope or slack rope, and by gymnastic feats of agility, such as vaulting and tumbling.

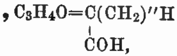
Acrob'ates (i. e. the "acrobat"), a genus of Australian marsupials, includes the "pigmy acrobat," "dwarf phalanger" or "opossum mouse" (*Acrobates pygmæus*), which in its character and habits resembles the flying squirrel. It is two inches long, and its tail is of about the same length.

Acrocerau'nia [from ἄκρον, a "peak" or "promontory," and κεραυνός, "thunder"], the ancient name of a chain of mountains on the western coast of Greece, and extending into the sea by a bold promontory; so called because violent thunder-storms are said to be frequent in that region. The modern name is Chimara. The Acroceraunian promontory is Cape Linguetta; lat. 40° 27′ N., lon. 19° 18′ E.

Ac'ro-Corin'thus, a steep rocky hill near the city of Corinth, in Greece, is about 2000 feet high. On this hill stood the acropolis or citadel of Corinth. The view from the top is very extensive and beautiful.

Acrog'enous [from the Gr. ἄκρον, "summit," and γένω, to "be born"], a name applied to certain cryptogamous plants (acrogens), as ferns and mosses, in which the stem increases by the coherence of the bases of the leaves and by elongation at the summit, and not in diameter by the addition of fresh matter to their outside, as in exogens, or to their inside, as in endogens.

Acro'lein, Acryl'ic-Al'dehyde,



$C_3H_4O = \underset{\displaystyle COH}{\overset{}{C}}(CH_2)''H$,

an intolerably pungent body produced by the dehydration of glycerine. It is always produced when neutral fats containing glycerine are subjected to destructive distillation, and is chief cause of the offensiveness of that operation.

Acronuridæ. See Teuthididæ.

Acron'ycal [from the Gr. ἄκρος, "extreme," and νύξ, "night"]. A star or planet is said to be acronycal when it is opposite to the sun, or passes the meridian at midnight. It rises acronycally when it rises as the sun sets, and sets acronycally when it sets as the sun rises.

Acrop'olis [from the Gr. ἄκρον, a "peak" or "summit," and πόλις, "city"], the name given to the citadel of an ancient Grecian city, usually built on the peak or top of a hill. The Acropolis of Athens was especially celebrated, and was adorned with the temple of Minerva or Athena, called the Parthenon, and the Erechtheum, the ruins of which still excite the admiration of all travellers.

Acros'tic [Gr. ἀκρόστιχον, from ἄκρος, "extreme," and στίχος, "order," "line," "verse"], a term applied to a poem so contrived that the first, last, or other series of letters of the lines shall form some name or phrase. Sir John Davies wrote twenty-four hymns to Astræa, each of which is an acrostic on Elizabetha Regina (Queen Elizabeth). On a somewhat similar principle, in the poetry of the Hebrews the initial letters of the verses were made to correspond to the letters of the alphabet in their proper order. The 119th Psalm affords perhaps the most remarkable example of this. Every line in the first division of the psalm begins with א (aleph), and in the second division with ב (beth), and so on.

Acs, a village of Hungary, in the county of Komorn, on the right bank of the Danube, has a beautiful palace of the prince of Liechtenstein, and in the Hungarian revolution was the scene of several battles, of which that of Aug. 3, 1849, was the most important. Pop. 3933.

Act [Lat. *ac'tus* (from *a'go, ac'tum,* to "do")], in dramatic literature, is a division of a drama; it is again subdivided into scenes. The Greek dramas of the old model were naturally divided into separate portions by the choric odes (or stasima), which occur at intervals, during which the stage was left to the sole occupation of the chorus. Nevertheless, the Greek writers do not notice this division in express terms; nor do we know the origin of the famous rule of Horace, that every dramatic piece should be restrained within the limits of five acts, neither more nor less. The division into acts must be in great measure arbitrary,† although rules have been laid down by various writers to define the story or plot which should be contained in each of them. Thus, Vossius gives it as a rule that the first act should present the intrigue, the second develop it, the third be filled with incidents forming its knot or complication, the fourth prepare the means of unravelling it, which is finally accomplished in the fifth.

Act, a term applied in legal and political language to a law or statute which is approved and ordained by the legislature, as an act of Parliament, an act of Congress. The proposed law is called a bill until it has passed through the first, second, and third readings, and has been approved by both houses of Parliament (or Congress) and signed by the executive.

Act, in the English universities, is an exercise performed by students before they receive a degree. The student who is said "to keep the act," and is called the respondent, chooses certain propositions, which he defends by syllogisms. Several other students, called "opponents," who are nominated by the proctor, try to refute his arguments.

Act of Settlement, in Great Britain, is the title of the statute 12 and 13 of William III., c. 2, by which the crown was limited to the House of Hanover, and all Roman Catholics were excluded from the throne.

Ac'ta Diur'na ("Daily Acts"), the name of an official gazette or journal published by authority in ancient Rome. It contained brief notices of the transactions of public assemblies, legal tribunals, etc. Julius Cæsar was the first to order that the Acta Diurna should be drawn up in regular form and published.

Ac'ta Erudito'rum ("Acts of the Learned") was a literary journal founded at Leipsic in Germany in 1682 by Otto Mencke and others. It had a high reputation, and was continued until 1782.

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* F. C. Donders, "Zur Klangfarbe der Vocale;" Pogg. "Ann." 1864, cxxiii., s. 527, 528.

† "Sakoontalâ" (a drama by Kâlidâsa), perhaps the most exquisite production of the poetic genius of the Hindoos, was divided into *seven* acts.

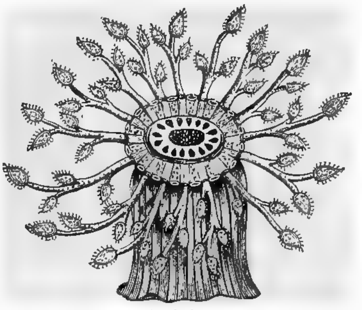
Ac′ta Mar′tyrum ("Acts of the Martyrs"), a collection of the lives of Christian martyrs. The most noted is that of Ruinart, Paris, 1689, commemorating the martyrs of the first four centuries.

Ac′ta Sancto′rum ("Acts of the Saints"), a collection of the lives of Christian saints of all ages. The most extensive collection is that of the Jesuit Bollandists, which begins with January and follows the calendar. The first volume appeared in 1643; the fifty-fourth, which comes down to Oct. 14, in 1793; the fifty-fifth in 1845; the sixtieth, which comes down to Oct. 29, in 1867; the sixty-first in 1875.

Actæ′on ['Ακταίων], in Greek mythology, a grandson of Cadmus, was a famous hunter. It is said that he was changed into a stag and killed by his own hounds because he had seen Diana bathing.

Ac′tian Games, games celebrated at Actium, in Greece, in honor of Apollo. They were restored by Augustus to commemorate his victory over Antony at Actium (31 B. C.).

Actin′ia [from the Gr. ἀκτίς or ἀκτίν, a "ray"], a genus or sub-order of radiated marine animals, of the class Zoophyta, and order Actinoida, often called sea-anemones. They are generally attached to rocks or shells, are of a soft, gelatinous texture, and have numerous tentacula, by which they seize their prey. Some species of *Actinia* are very beautiful, and resemble flowers. Among the most remarkable genera of the order Actinoida is the BUNODES (which see).



Actinia.

Ac′tinism [from the Gr. ἀκτίν or ἀκτίς, a "ray"]. The effects produced by the rays of the sun are of three kinds, illumination, warming, and chemical change. The first two of these are obvious enough, and are always perceived wherever the solar rays penetrate. The chemical changes produced by light occur only under certain conditions, and are not obvious to common observation. Certain salts have very long been known to undergo decomposition in the sunlight, or even in the diffuse light of day; and among these the salts of silver are especially remarkable. To this property, the so-called indelible inks, of which silver nitrate is the basis, owe the permanency of the traces left by them. The chloride, bromide, and iodide of silver are more sensitive still.

When a beam of compound light is dispersed by the prism, the most energetic action upon silver salts is found in the violet rays of the spectrum; but this effect, as shown by Stokes, extends very far into the darkness beyond the violet. Stokes made the additional remarkable discovery that these non-luminous chemical rays become luminous when certain substances are presented to them. Such substances among others are solution of quinine sulphate, infusion of horse-chestnut bark, glass tinted yellow by oxide of uranium, and fluor spar. This phenomenon was named by its discoverer, *fluorescence.* (See FLUORESCENCE.) The heating effects of the spectrum, on the contrary, are found to be more remarkable in the red than anywhere else among the luminous rays; while the maximum heating effect is entirely outside the spectrum and in the dark. This discovery, made long ago by Sir William Herschel, is a counterpart to the more recent one of Stokes just mentioned; and both taken together show that the sunlight, as dispersed by the prism, spreads through a wide space, in which the rays exciting vision occupy only the middle part.

The luminous, heating, and chemical effects of light being so broadly different, it was natural, in the earlier stages of this investigation, to ascribe them to agencies or forces essentially differing from each other in physical character. It was common, therefore, to say that the sunlight is made up of three independent species of rays, the colorific, the calorific, and the chemical. Instead of the word chemical, Dr. Draper, of New York, proposed, in 1842, to substitute the term *tithonic* to distinguish the rays of the class last mentioned; this term being derived, by a fancied analogy, from the beautiful myth of Tithonus and Aurora. Sir John Herschel, a little later, suggested the term *actinic*, which ultimately prevailed. To the three kinds of rays above mentioned, Dr. Draper, in 1844, proposed to add a fourth, under the name phosphorogenic rays; that is to say, rays which cause certain substances, which have been acted upon by them, to continue, for some time afterwards, to *phosphoresce*, or to give light in the dark. Dr. Draper believed it to have been established by his experiments, that these rays, though imparting to material bodies the light-producing power, are themselves totally distinct from light. The more recent labors of this eminent investigator have led him, however, to the conclusion—which is the doctrine now generally received—that, physically considered, the sunlight is homogeneous, the variety of effects produced by it being consequences of the different degrees of rapidity with which the vibrations of the luminiferous ether are performed, and being especially dependent on the nature of the surface and of the substance upon which the rays are received.

Tyndall has recently made some interesting additions to our knowledge of the actinic properties of light, in experiments upon the vapors of a variety of volatile compounds which when highly rarefied are instantly decomposed by it. In the course of these experiments he has incidentally demonstrated the cause of the blueness of the sky, or of distant mountains seen through a large body of intervening air. This tint is owing to the presence in the air of exceedingly minute particles of precipitated vapor.

The actinic properties of light have formed the basis of an art having an almost endless variety of useful applications. (For particulars in regard to this, see the article PHOTOGRAPHY, by PROF. HENRY B. CORNWALL, E. M.)

F. A. P. BARNARD.

Actinom′eter [from the Gr. ἀκτίν, a "ray," and μέτρον, a "measure"], an instrument for measuring the actinic or chemical rays of light. (See ACTINISM.) Several methods of doing this have been proposed; thus, a sensitive surface of chloride of silver is found to darken, when exposed to the light, in proportion to the intensity of the light and the duration of exposure; and since this darkening is produced entirely by the actinic rays, the depth of tint produced by exposure for a few (say five) minutes will give an approximate idea of the intensity of the actinism present. The difficulty in this case is to prepare chloride of silver paper which shall always have the same degree of sensitiveness. Dr. Draper employed for the above purpose the reaction originally observed by Gay-Lussac and Thénard, that chlorine and hydrogen, when mixed in equal volumes, do not combine in the dark, while they unite to form hydrochloric acid when exposed to the actinic rays of light. Draper discovered the important law that this action varies in direct proportion to the actinic intensity of the light and to the time of the exposure. Other actinometers have been proposed, based upon other chemical reactions; thus, a solution of chloride of gold and oxalic acid will remain clear in the dark, but precipitates gold when exposed to actinic rays.

Ac′tion [from the Lat. *ago, actum*, to "perform," to "move"], in law, means a proceeding before a court of justice by one person against another to obtain redress for the infringement of a right, in the manner prescribed by law. This definition would exclude such proceedings as mandamus and prohibition. The word is not properly applied to courts of equity, but the corresponding proceeding is there termed a suit. Actions are distinguished into civil and criminal. A civil action is instituted for the enforcement of a private right or the redress of a similar wrong. In reference to the place in which they are to be brought, they are either local or transitory. Civil actions are either real, personal, or mixed. Criminal actions are prosecuted in the name of the state against some person charged with the commission of a crime. The distinction between real and personal actions refers to the point whether the recovery of land is sought, or damages by way of compensation, or specific personal property. An action is local when by a rule of law it must be brought in a particular locality, such as a county. Actions not so localized are termed transitory.

The number of actions under these rules is quite considerable. The distinctions between them are sometimes subtle and perplexing. There is a marked tendency in this country to modify or to do away with them, and to establish a single form of civil action, embracing proceedings both in law and in equity. The New York code of procedure assumes to give a definition sufficiently comprehensive to include both an action at law and a suit in equity. It abolishes all the old forms of action, and recognizes but one action, termed a "civil action." The rule of this code has been extensively followed in the Western States, and has had much influence upon legal opinion in England.

T. W. DWIGHT.

ACTION, a series of events forming the subject of an epic; thus, the adventures of Æneas form the action of the "Æneid." Epic action should have three qualifications: It should be but one, should be entire, and should be great.

Action, in oratory, signifies gesture, or the adaptation of the countenance and gesture of the speaker to his subject and sentiments. This *sermo corporis* ("language of the body"), as Cicero calls it, is a very important part of oratory. Demosthenes said that action was the "beginning, the middle, and the end of the orator's office or art."

Action, in painting and sculpture, is the state of the subject as imagined in the artist's mind at the moment chosen for representation.

Action, in mechanics, denotes the effort which a power or body exerts upon another body. It is an axiom in mechanics that action and reaction are always equal. Thus, if an anvil be struck with a hammer, the resistance of the former to the latter is exactly equal to the force with which the hammer acts upon the latter.

Ac'tium [Gr. Ἄκτιον], (now called **A'zio**), a promontory and town of ancient Greece, in Acarnania, near the entrance of the Ambracian Gulf. Here occurred the great naval battle of Actium (31 B. C.), between Octavius Cæsar and Mark Antony; the former gained a decisive victory.

Ac'ton, a piece of defensive armor, formerly worn in the shape of a shirt with short sleeves. It was made of leather, to which pieces of iron were sewed.

Acton (Lord John Emeric Edward Dalberg), born in 1834, was elected to Parliament for Carlow in Ireland in 1859. He belonged to the liberal Catholic party, in whose interest he founded in 1861 the "Home and Foreign Review." In 1865 he was returned to Parliament, and in 1869 created a baron.

Acts of the Apostles. See Apostles, Acts of.

Ac'upuncture [Lat. *acupunctu'ra*, from *a'cus*, a "needle," and *pun'go*, *punc'tum*, to "prick"], or **Acu'punctura'tion,** a term applied to the surgical operation of puncturing a diseased part with needles. This method is extensively used in Japan and China for the cure of many diseases, and has been successfully applied in the treatment of rheumatism. Steel needles are made use of, about three inches long, and set in handles. The surgeon, by a rotary movement, passes one or more to the desired depth in the tissues, and leaves them there from a few minutes to an hour. Their insertion causes no pain except the first prick—a fact of which the quacks of the sixteenth century did not fail to take advantage. The relief to pain afforded by this simple operation is sometimes astonishing, and the wounds are so minute as to be harmless if skilfully made.

Ada, a town of Hungary, in the county of Bacs, on the river Theiss, 30 miles S. of Szegedin. Pop. in 1880, 9693.

Ada, on R. R., capital of Norman co., Minn. (see map of Minnesota, ref. 4–A, for location of county). Pop. of tp. in 1885, 720.

Ada, on R. R., Hardin co., O. (see map of Ohio, ref. 3–D, for location of county), 57 miles W. of Crestline. It has a college, the North-western Ohio Normal School, and numerous manufactories. Pop. in 1880, 1760.

Adagio, ȧ-dȧ'je-o [composed of *ad*, "at," and *agio*, "ease," "leisure"], an Italian musical term, signifies a slow movement or measure of time.

Adair (John), an American general, born in South Carolina in 1759. He commanded a body of Kentuckians at the battle of New Orleans in 1815, and was governor of Kentucky from 1820 to 1824. He was U. S. Senator (1805–06) and member of Congress (1831–33). Died May 19, 1840.

Adal', a narrow tract of Eastern Africa, bordering on the Red Sea, and extending from Massowa to the Strait of Bab-el-Mandeb. It has two great salt plains, Asali in the N. part and Aussa in the S. The noted salt lake of Bahr Assal is 570 feet below sea level. Adal is inhabited by nomadic tribes of Donakila (or Danakil).

Adalbert. See Appendix.

Ada'lia, or **Satalieh** (anc. *Attalia*), a seaport of Turkey in Asia, in Anatolia, on the gulf of the same name, 175 miles S. E. of Smyrna, in lat. 36° 52′ 2″ N., lon. 30° 45′ E. It is built on the slope of a hill, has narrow, dirty streets, and a small but good harbor. Tropical fruits are exported hence. Pop. estimated at 13,000, of whom about 3000 are Greeks.

Ad'am [Heb. אדם, *i. e.* "man"], the first man (see Gen. i., ii., and iii.), is supposed to have been created, according to the Hebrew chronology, 4004 B. C., and according to the Septuagint chronology 5411 B. C., though some writers contend that no chronology of the creation of man was intended to be given in Genesis.

Adam (Adolphe Charles), a celebrated French composer, born July 24, 1803, published numerous popular operas and ballets, of which the most celebrated are "Le postillon de Longjumeau," which was played for the first time in 1836, and gained great applause; "Le roi d'Yvetot" (1842), "Richard in Palestine" (1849), and "La jolie fille de Gand" (1839). Died May 3, 1856.

Adam (Lambert Sigisbert), an eminent French sculptor, born at Nancy in 1700. Some of his works adorn the garden of Versailles. He became professor in the Royal Academy at Paris in 1744. Died in 1759.—Nicholas Sébastien, a skilful sculptor, a brother of the preceding, was born at Nancy in 1705. Among his works is "Prometheus Bound." Died in 1778.

Adam (Robert), the most celebrated British architect of the eighteenth century, was born in 1728, went to Italy in 1754, and from Italy to Dalmatia, where he visited the ruins of the palace of the emperor Diocletian, on which he published "The Ruins of the Palace of the Emperor Diocletian at Spalato" (1764). Among his most prominent works are the university building and St. George's church in Edinburgh, the buildings known as the Adelphi in London, besides many private residences. He died in 1792.

Adam of Bremen (Adam Bremensis). See Appendix.

Ad'amant (Lat. *ad'amas;* Gr. ἀδάμας, "that cannot be subdued or broken," from α, negative, and δαμάω, to "subdue"], the ancient name of the diamond, is also a word used to denote a substance of extraordinary hardness and strength or durability.

Ad'amites, an heretical sect who are said to have sprung up in the second century, who rejected marriage and appeared in public naked. This name was also assumed by a sect of fanatics who arose in Bohemia in the fifteenth century and advocated a community of wives. They still exist in Bohemia, and are said to be guilty of great excesses, though outwardly discreet.

Adams, on R. R., Berkshire co., Mass. (see map of Massachusetts, ref. 2–C, for location of county), contains Mount Greylock, 3600 feet high, the highest point in Massachusetts. In 1878 part of the township was set off as North Adams, which is the western terminus of the Hoosac tunnel. Pop. in 1880, 5591; in 1885, 8282.

Adams, on R. R., Jefferson co., N. Y. (see map of New York, ref. 2–G, for location of county), 156 miles W. N. W. of Albany, is the seat of Hungerford Collegiate Institute; it also contains a foundry, a malt-house, tanneries, a cabinet-shop, a sash-and-blind factory, and carriage manufactories. Pop. in 1870, 1352; in 1880, 1250.

Adams (Alvin), born 1804 in Vermont; went to Boston, Mass., about 1837, and engaged in the produce business. A few years after, the first express-route in the United States was started by William Harnden, between New York and Boston. Soon after, Mr. Adams started an opposition route, and for three years did all his business alone. He entered into partnership with Ephraim Farnsworth, who was succeeded by William B. Farnsworth. Adams & Co. then rapidly extended their business over a large part of the United States. About 1850 the style of the firm was changed to "The Adams Express Company" and additional capital invested. The California express was then started, and an immense business done there. Mr. Adams acquired great wealth, and died Sept. 2, 1877.

Adams (Charles Baker), an American naturalist, born at Dorchester, Mass., Jan. 11, 1814. He graduated at Amherst College in 1834, served as tutor there 1836–37, was professor of chemistry and natural history in Middlebury College 1838–47, when he became professor of zoology and astronomy in Amherst College, which post he held till his death, Jan. 19, 1853. He wrote reports upon the geological survey of Vermont, also "Contributions to Conchology."

Adams (Charles Francis), LL.D., D.C.L., an American diplomatist, the son of John Quincy Adams, was born in Boston Aug. 18, 1807. He graduated at Harvard in 1825, and was admitted to the bar in 1828. In 1848 he was nominated for Vice-President by the Freesoilers, who supported Mr. Van Buren for the presidency. He published "Life and Works of John Adams." Having joined the Republican party, he was elected a member of Congress in 1858 and in 1860. In 1861 he was appointed minister to England, the duties of which position were, during the American civil war, very arduous and critical. He performed these duties with much ability and prudence, and returned in 1868. In 1871 he was appointed one of the arbitrators on the Alabama claims.

Adams (Charles Francis, Jr.). See Appendix.

Adams (Daniel), M. D., was born at Townsend, Mass., Sept. 29, 1773, and graduated at Dartmouth in 1797. He was prominent in New Hampshire politics, and was widely known as an educator, editor, and physician, and as the author of an excellent arithmetic and other school-books. Died at Keene, N. H., June 8, 1864.

Adams (Hannah), born at Medfield, Mass., in 1755, was one of the first women of America to engage in literary pursuits. She was a person of great excellence of character, and possessed real merit as a writer. She wrote a "View of all Religions" (1784), "History of New England" (1799), "Evidences of the Christian Religion" (1804), "History of the Jews" (1812), "Letters on the Gospels," an "Autobiography," and other works. Died at Brookline, Mass., Nov. 15, 1831. She was the first person whose remains were buried at Mount Auburn.

Adams (Henry A.), U. S. N., born in 1833 in Pennsylvania, graduated at the Naval Academy in 1851, became a passed midshipman in 1854, a master in 1855, a lieutenant in 1856, a lieutenant-commander in 1862, a commander in 1866. While attached to the sloop-of-war Levant in 1856 he took part in the engagement with the Barrier Forts at the mouth of the Canton River, China. He served on board the Brooklyn at the passage of Forts St. Philip and Jackson and the capture of New Orleans in 1862, and participated afterwards, while attached to the North Atlantic blockading squadron, in both attacks on Fort Fisher. Of his services at Fort Fisher, Admiral Porter, in his official despatch of Jan. 28, 1865, writes: "I recommend the promotion of Lieutenant-Commander H. A. Adams, without whose aid we should have been brought to a stand-still more than once. He volunteered for anything and everything." D. Feb. 1, 1878. Foxhall A. Parker.

Adams (Henry Brooks). See Appendix.

Adams (Isaac), born in 1803 at Rochester, N. H., invented in 1828 the well-known Adams printing-press, which he further improved in 1834. D. 1883.

Adams (Rev. Jasper), D. D., was born at Medway, Mass., in 1793, graduated at Brown University in 1815, was professor of mathematics there (1819–24), was president of Charleston College, S. C., in 1824 and again in 1827–36, of Geneva College in 1825–27. He was (1838–40) a professor of geography, ethics, etc. at West Point. Died Oct. 25, 1841.

Adams (John), the second President of the United States, was born in Braintree, Mass., on the 19th of Oct., 1735, O. S. He graduated at Harvard College in 1755, studied law, and was admitted to the bar in 1758. For this profession he was well fitted by a clear, sonorous voice, a ready fluency of speech, and a quick conception. In 1764 he married Abigail Smith, a woman of superior intelligence. His attention was drawn to political affairs by the passage of the Stamp Act in 1765, and he offered on that subject a series of resolutions which were very popular. He removed to Boston in 1768, became one of the most courageous and prominent advocates of the popular cause, and was chosen a member of the General Court (the legislature) in 1770.

He was one of the delegates that represented Massachusetts in the first Continental Congress, which met in Sept., 1774. In a letter written at this crisis he declared: "The die is now cast; I have passed the Rubicon. Sink or swim, live or die, survive or perish with my country, is my unalterable determination." He distinguished himself in Congress by his capacity for business and for debate, and advocated the movement for independence when the majority of the members were inclined to temporize and to petition the king. In May, 1776, he moved and carried a resolution in Congress that the Colonies should assume the duty of self-government. In June a resolution that the United States "are and of right ought to be free and independent" was moved by Richard Henry Lee, seconded by Mr. Adams, and adopted by a small majority. Mr. Adams was a member of the committee of five appointed June 11 to prepare a declaration of independence, in support of which he made an eloquent speech about July 2. He was the chairman of the board of war appointed in June, 1776, and was sent as commissioner to France in 1778, but returned in July, 1779. Having been appointed as minister to negotiate a treaty of peace and commerce with Great Britain, he went to Europe early in 1780. Conjointly with Franklin and Jay he negotiated a treaty, the preliminary articles of which were signed Nov. 30, 1782. He was employed as minister to the court of St. James from 1785 to 1788, and during that service wrote his "Defence of the American Constitutions" (1787). In 1789 he became Vice-President of the United States, and about that time identified himself with the Federal party, by which he was re-elected to the office of Vice-President in 1792.

In 1796, Mr. Adams was chosen President of the United States, receiving seventy-one electoral votes, while his competitor, Thomas Jefferson, received sixty-eight votes. He sympathized with the anti-Gallican party, and pursued the policy of neutrality between France and England. Involved in a quarrel with the French Directory, which interfered with the maritime interests of the Americans, he sent Mr. Murray as minister to France early in 1799, in order to avert a war. This act gave much offence to the Federalists, and broke the unity of that party. Among the unpopular measures for which Mr. Adams was held responsible were the Alien law and the Sedition law. In 1800 he was the Federal candidate for the office of President, but he was not cordially supported by Gen. Hamilton, the favorite leader of his party. Receiving sixty-five electoral votes, he was defeated by Thomas Jefferson, who received seventy-three votes.

Mr. Adams then retired from public life to his large estate at Quincy, Mass., and gave his attention partly to agriculture. The general neglect and odium which he experienced were at last compensated by the election of his son John Quincy to the presidency of the United States. He died on the 4th of July, 1826, on the same day with Thomas Jefferson. It is a curious coincidence that three Presidents of the United States (Monroe being the third) have died on that anniversary. J. Thomas.

Adams (John), LL.D., eminent as a classical teacher, was born in Canterbury, Conn., Sept. 18, 1772, and graduated at Yale College in 1795. After presiding over Plainfield Academy, and Bacon Academy in Colchester, Conn., he was made principal of Phillips Academy, Andover, Mass., May, 1810, resigned that position after great success in 1833, and died April 24, 1863. Prof. Thomas C. Upham and many other distinguished scholars and philanthropists were among his pupils at Andover.

Adams (John Couch), an English astronomer, born in Cornwall June 5, 1819, was educated at Cambridge. In 1841 he began to search for the causes of the irregularities in the motion of Uranus. He ascertained that they were caused by the attraction of a planet then unknown, and thus partakes with Leverrier the honor of the discovery of Neptune, for which he received the Copley medal in 1848. He became Lowndean professor of astronomy at Cambridge in 1858.

Adams (John Quincy), the sixth President of the United States, was born in Braintree, Mass., on the 11th of July, 1767. He was eldest son of President John Adams and his wife, Abigail Smith, who was descended from the family of Quincy. In 1778 he was placed at a school in Paris, and in 1780 passed to the University of Leyden. He returned home in 1785, and finished his education at Harvard College, where he graduated in 1788, after which he studied law with Theophilus Parsons, and was admitted to the bar in 1791. Having gained distinction by some political essays, he was appointed minister to The Hague in 1794. In 1797 he married Louisa Catherine Johnson of Maryland, and in the same year was sent as minister to Berlin, from which he was recalled in 1801, when the Republicans obtained power.

He was elected a Senator of the U. S. by the Federalists in 1803, but voted for Jefferson's embargo in 1807, and thus separated himself from the Federal party, and lost his seat in the Senate in 1808. Before this date he had distinguished himself as a public speaker, and had been appointed professor of rhetoric at Harvard College (1805). In 1809 he was sent as minister to Russia. He was one of the commissioners that negotiated the treaty of peace with Great Britain, signed Dec. 24, 1814, and he was appointed minister to the court of St. James in 1815. In 1817 he became secretary of state in the cabinet of Monroe, in which position he remained eight years. In 1824 four candidates for the presidency were presented—John Q. Adams, Andrew Jackson, Henry Clay, and William H. Crawford—all of whom professed to be Democrats. Mr. Adams received eighty-four electoral votes, Jackson ninety-nine, Crawford forty-one, and Clay thirty-seven. As neither had the requisite majority, the election devolved on the House of Representatives, which chose Mr. Adams. This result was due to the influence of Henry Clay, and when Mr. Adams nominated him as secretary of state, the friends of Jackson accused Adams and Clay of "bargain and corruption," but the charge is not generally credited. His administration was opposed by a powerful party, formed by a coalition of the Jacksonians with the friends of Crawford. This party had a majority of the members of Congress, and, uniting on General Jackson as their candidate, triumphed in the election of 1828, when Mr. Adams received only eighty-three electoral votes out of two hundred and sixty-one, which was the whole number.

In 1830 he was chosen by the voters of his native district to represent them in Congress, in which he distinguished himself by his application to business, his assertion of the right of petition, and his resolute opposition to what he considered to be the encroachments of the slave-power. "With unwavering firmness," says W. H. Seward, "against a bitter and unscrupulous opposition, exasperated to the highest pitch by his pertinacity—amidst a perfect tempest of vituperation and abuse—he persevered in presenting these petitions [against slavery] one by one, to the amount sometimes of two hundred in a day." He continued to represent the same district in Congress for seventeen years, during which he maintained a position independent of party. He was seized with paralysis in the Capitol on the 21st of Feb., 1848, and died on the 23d of that month. In religion he was a Unitarian. He left many writings in prose and verse, which have been published; also a voluminous diary of his public life. He had an only surviving son, Charles Francis Adams, noticed above. J. Thomas.

Adams (John Quincy), a grandson of the preceding, and son of Charles Francis Adams, noticed above, was born at Boston, Mass., Sept. 22, 1833, graduated at Harvard in 1853. He was the Democratic candidate for governor of Massachusetts in 1867 and 1868, but was both times defeated. He was also a candidate for the vice-presidency in 1872, on the ticket with Charles O'Conor.

Adams (John R.), D. D., born in Plainfield, Conn., graduated at Yale College in 1821, was three years a teacher in Phillips Academy, Andover, Mass., was Presbyterian and Congregational minister in various towns of New Hampshire, New York, Massachusetts, and Maine; was chaplain during the civil war in the 5th Maine and 121st New York regiments. For his services he received public acknowledgments from the governor of Maine. Died April 26, 1866, at Northampton, Mass., aged sixty-four.

Adams (Julius W.). See Appendix.

Adams (Nehemiah), D. D., an American theologian, was born at Salem, Mass., Feb. 19, 1806, graduated at Harvard in 1826, and at Andover Theological Seminary in 1829. He first settled at Cambridge in 1829, and in 1834 became pastor of the Essex street church in Boston. He resigned his pastorate in 1870. He published several theological and other works, and a "South-side View of Slavery" (1854), which was severely condemned by the opponents of slavery. He had a high reputation for scholarship and pulpit eloquence. D. Oct. 6, 1878.

Adams (Samuel), a celebrated American patriot and orator, born in Boston Sept. 27, 1722, was a second cousin of President John Adams. He graduated at Harvard College in 1740, and became a merchant, but was not successful in that business, which he soon abandoned. In 1765 he was chosen to represent Boston in the General Court of Massachusetts, in which he distinguished himself by his courage, energy, and oratorical talents, and acquired great influence. Before the Revolution he was an unflinching advocate of the popular cause, and took such an active part in political meetings that he was one of the two leading patriots who were excepted from a general pardon offered in 1775. He was a member of the first Continental Congress, which met in Sept., 1774, and he signed the Declaration of Independence in 1776. He remained in Congress about eight years, was afterwards elected to the senate of Massachusetts, and was a member of the State convention which ratified the Federal Constitution in 1788. His political affinities connected him with the Republican (or Jeffersonian) party. He was elected governor of Massachusetts in 1794, was re-elected twice, and retired to private life in 1797. Having survived his only son, he died Oct. 2, 1803. In religion he was a decided Calvinist. In the letters and other writings of John Adams occur several passages which express a high opinion of the talents and merits of Samuel Adams, in whose productions he says may be found "specimens of a nervous simplicity of reasoning and eloquence that have never been rivalled in America." (See W. V. Wells's "Life and Public Services of Samuel Adams," 3 vols. 8vo, 1865.)

Adams (Seth), a brother of Isaac Adams, the inventor, was born at Rochester, N. H., April 13, 1807, and was for many years associated with his brother in the manufacture of the Adams printing-press. He was extensively engaged in sugar-refining in Boston, Mass., was a member of the city council and board of public works, and has given considerable sums of money to Bowdoin College.

Adams (William), D.D., LL.D., a son of John Adams (principal of Phillips Academy, Andover), a distinguished Presbyterian divine, born in Colchester, Conn., Jan. 25, 1807, graduated at Yale College 1827, and at Andover Theological Seminary 1830. He was ordained at Brighton, Mass., Feb., 1831, settled over the Central Presbyterian church in New York City, Nov., 1834, and over the newly-formed Madison Square Presbyterian church, Feb., 1853. An acknowledged leader in the New School branch of the Presbyterian Church, he took a prominent part in the re-union of the two branches in 1870. He has published many sermons, addresses, and articles in reviews, besides the following volumes: "The Three Gardens—Eden, Gethsemane, and Paradise, or Man's Ruin, Redemption, and Restoration," 1856; "Thanksgiving: Memories of the Day, and Helps to the Habit," 1867; "Conversations of Jesus Christ with Representative Men," 1868. In 1873 he was chosen president and professor of sacred rhetoric in the Union Theological Seminary, N. Y. D. Aug. 31, 1880.

Adams (William T.), a popular American writer, known under the pseudonym of Oliver Optic, born in Medway, Mass., July 30, 1822, has published numerous works for children—viz. "The Riverdale Series" (1860), "Young America Abroad Series" (1866–69 and 1871–77), "Great Western Series" (1875–81), etc.; edited "Student and Schoolmate" (1858–66), "Our Boys and Girls" (1867–75), and is now (1886) editor of "Our Little Ones."

Ad'amson (John), an English author, born in 1787. He wrote a "Memoir of Camoens" (1820) and "The History, Antiquities, and Literature of Portugal" (2 vols., 1842–46). Died in 1855.

Adamson (Patrick), born at Perth, Scotland, in 1543, was licensed as a preacher; studied law, and went to France as tutor to a young gentleman; returned in 1573, took orders, and became minister of Paisley; was made archbishop of St. Andrews in 1576 by his patron, the earl of Morton, regent of Scotland. He had many contests with the Presbyterians respecting episcopacy. Died Feb. 19, 1592.

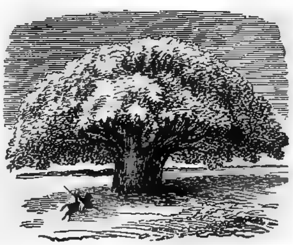
Adam's Peak, a mountain in Ceylon in lat. 6° 52′ N., lon. 80° 32′ E., which has a height of about 7000 feet. It is considered by the Booddhists as the holy centre of the world. A temple is situated on the highest portion of the peak, under which the footprints of Booddha and Sripadam (*i. e.* "luck") are said to be seen. Booddha is said to have left those traces upon his last visit to the earth. The Brahmans and Mohammedans also consider it a holy mountain—the former, because they consider Booddha as an avatar (incarnation) of Vishnoo; the latter, because they ascribe the footprints to Adam, who is said to have here mourned for 1000 years his expulsion from Paradise, standing on one foot.

Ad'amsthal, a village of Moravia, Austria, 9 miles N. of Brünn. In the neighborhood is the curious calcareous cavern Regeiskala, which belongs to the large system of caverns which is found to the N. of Brünn. Adamsthal is growing considerably, and is much visited by tourists.

Ada'na, a city of Asia Minor, on the river Sihoon, about 20 miles from the sea and 18 miles E. of Tarsus. It has some trade in grain, wine, cotton, etc. Here are interesting ancient remains. Pop. estimated at 25,000.

Adanson (Michel), a celebrated French naturalist, born at Aix April 7, 1727, was educated at the college of Plessis. He went to Senegal in 1748 to explore the natural history of that region, in which he passed five years in his arduous and dangerous enterprise, and collected an immense number of animals and plants. He published, after his return, a "Natural History of Senegal" (1757), and "The Families of Plants" (1763), in which he opposed the artificial system of Linnæus. In 1759 he was elected a member of the Academy of Sciences. He expended the labor of several years on an encyclopædia entitled "The Universal Order of Nature," which he left in manuscript, perhaps unfinished. A part of his mature life was passed in extreme poverty, but he afterwards received a pension from the state. He was a man of noble but eccentric character, and was regarded as a naturalist of the first order by Cuvier, who composed a eulogy on him. Died Aug. 3, 1806.

Adanso'nia, a genus of plants of the natural order Sterculiaceæ, was named in honor of the great naturalist, M. Adanson. The *Adanso'nia digita'ta,* or baobab, is found in tropical Africa, and is one of the largest trees in the world. It does not grow very high, but its trunk is often more than twenty feet in diameter. The fruit of the baobab is called monkey-bread. By a loose and vague over-estimate, some of these trees have been said to be 5000 years old.


Adansonia.

A'dar, the name of the sixth month in the civil year of the Jews, which included part of February and March.

Ad'da (anc. *Ad'dua*), a river of Northern Italy, rises in the Valtellina, among the Rhætian Alps, and enters Lake Como, which is an expansion of this river. After issuing from that lake it flows nearly southward through Lombardy, and empties itself into the Po 7 miles above Cremona. Length of river and lake, about 130 miles.

Ad′dax, the *O′ryx* (or *Ad′dax*) *nasomacula′tus* of the naturalists, is a large antelope found in Nubia, Kordofân, and other parts of Northern or North Central Africa. Its broad spreading hoofs enable the animal to obtain a firm foothold upon the dry and yielding sand. Its horns, which are from three to four feet long, are beautifully twisted into a spiral, having two turns and a half. The general color of the addax is a milk-white, but there is a black patch of hair on the forehead, and it has a dark brown mane, with more or less of reddish-brown mixed with gray on the head, shoulders, and part of the back.

Addax.

Addemeeree, or **Addemîrî** [ad-deh-mee′ree], sometimes written **Al-Damiri,** surnamed Kemâl-ed-Deen (or ed-Dîn) [ke-mal′ed-deen′] (“Perfection of the Faith”), a distinguished Arabian naturalist, was born in Egypt about 1350. He wrote also on biography and history. Among his works is “The Lives of Living Creatures.” Died about 1405.

Ad′der, a common name of the viper, or of any venomous serpent belonging to the family Viperidæ. The name is popularly applied to several non-venomous snakes.

Addington (Henry). See Sidmouth.

Addington (Isaac), born in Boston, Mass., Jan. 22, 1645; member of House of Representatives and speaker in 1685; opposed the administration of Sir Edmund Andros, and on its overthrow in 1689 became clerk of the Council of Safety, to whom the people committed the government; secretary from his appointment in 1690 till his death; judge of the court of common pleas 1693–1702; chief-justice of the Superior Court 1702–03. He was many years chosen to the council, and was judge of probate court 1702–15. Died Mar. 19, 1715.

Ad′discombe House, situated about a mile from Croydon, England, was formerly the residence of the earl of Liverpool, and was purchased in 1809 by the East India Company, and opened by them in 1825 as a collegiate institution for the education of cadets for the whole of their military service except the cavalry. It is now called the Royal India Military College.

Addison, on R. R., Steuben co., N. Y. (see map of New York, ref. 6–E, for location of county), contains many important manufacturing establishments. Pop. in 1880, 1596.

Addison (Alexander), born in 1759, was a noted lawyer of Pittsburg, Pa., and was judge of that circuit for twelve years; published “Observations on Gallatin's Speech,” “Penn. Reports,” etc. Died Nov. 24, 1807.

Ad′dison (Joseph), an English humorist, moralist, and author of great merit and celebrity, was born at Milston, near Amesbury, in Wiltshire, on the 1st of May, 1672. He was a son of Lancelot Addison. In 1687 he entered Queen's College, Oxford, from which he passed to Magdalen College in 1689. He became a good classical scholar, and as a writer of Latin verse probably excelled all his contemporaries. At an early age he enjoyed the friendship and patronage of Dryden, Lord Somers, and Montagu (Lord Halifax), the last of whom persuaded him to enlist as a Whig in the civil service of the state. Having in 1699 received a pension of £300, he visited France and Italy, and wrote a charming “Letter from Italy,” in verse, addressed to Lord Halifax (1701). He lost his pension on the death of William III. (1702), and returned home in 1703. His next work was “The Campaign,” a poem on the battle of Blenheim (1704), which was greatly admired, and was rewarded with the office of commissioner of appeals. He afterwards produced his interesting “Travels in Italy,” and “Rosamond,” an opera. He was appointed under-secretary of state in 1706, and was elected to Parliament in 1708. His diffidence disqualified him for public speaking, but this defect was compensated by his success as a political writer. He became in 1709 secretary to Lord Wharton, lord lieutenant of Ireland, and contributed to the “Tatler,” of which his friend Richard Steele was the editor.

On the 1st of Mar., 1711, Addison and Steele began to issue daily “The Spectator,” the most elegant and famous periodical and miscellany that ever appeared in England. Addison wrote the best of the essays, which form an epoch in literary history and have exerted a powerful and salutary moral influence. Among his literary merits are grace and propriety of diction, elegant taste, genial philosophy, and inimitable humor. “As an observer of life, of manners, of all the shades of human character,” says Macaulay, “he stands in the first class.”

“The Spectator” ceased to appear daily in Dec., 1712, but was revived as a tri-weekly paper in 1714. Among his other works are the tragedy of “Cato” (1713), which was received with great applause, an ingenious “Dialogue on Medals,” and a series of able political papers called “The Freeholder” (1715). In 1716 he married the proud and uncongenial countess-dowager of Warwick, and early in 1717 was appointed secretary of state. He resigned this office in 1718, and died June 17, 1719, leaving only one child, a daughter. His marriage appears not to have been happy. Addison was greatly distinguished for his wit and colloquial powers. Lady Mary Montagu, who had conversed with the most eminent wits, pronounced him “the best company in the world.” “His humanity,” says Macaulay, “is without a parallel in literary history. The highest proof of human virtue is to possess boundless power without abusing it. No kind of power is more formidable than the power of making men ridiculous; and that power Addison possessed in boundless measure. But it would be difficult, if not impossible, to find, in all the volumes which he has left us, a single taunt which can be called ungenerous or unkind.” “Whoever wishes,” says Dr. Johnson, “to attain an English style, familiar but not coarse, and elegant but not ostentatious, must give his days and nights to the volumes of Addison. . . . He not only made the proper use of wit himself, but taught it to others. He has restored virtue to its dignity, and taught innocence not to be ashamed. This is an elevation of literary character ‘above all Greek, above all Roman fame.’” (See Johnson's “Lives of the Poets;” Macaulay, “Critical and Historical Essays;” Aiken, “The Life of Addison,” 1843.) J. Thomas.

Addison (Lancelot), D. D., father of Joseph, was born in Westmoreland, England, in 1632; educated at Queen's College, Oxford; was seven years chaplain at Tangiers; became a royal chaplain about 1670, dean of Lichfield 1683, and archdeacon of Coventry in 1684. Died 1703.

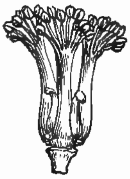
Addison's Disease [named from its discoverer, the late Dr. Addison of Guy's Hospital, London], or **Supra-renal Melasma,** a rather rare disease, the most obvious symptom of which is a gray-black or bronze color of the skin, gradually coming on. The chief lesion discovered after death is a cheesy degeneration of the supra-renal capsules, the result of a peculiar chronic inflammation. Patients usually suffer from extreme debility, depression of spirits, pain in the epigastrium and back, often accompanied by dyspepsia, vomiting, diarrhœa, and grave nervous symptoms. No remedy is known, and the disease, though careful nursing is extremely useful, is probably never cured.

A′del, on R. R., capital of Dallas co., Ia. (see map of Iowa, ref. 5–F, for location of county), has a fine water-privilege. P. in 1880, 989; in 1885, 1105.

A′delaer (Cort Sivertsen). See Appendix.

Ad′elaide, a city, the capital of South Australia, is situated on both sides of the river Torrens, 8 miles from its entrance into the Gulf of St. Vincent. It was founded in 1836, is the seat of an Anglican and a Roman Catholic bishop, and contains a government-house, an assay-office, a theatre, and extensive manufactures. Pop. in 1881, 38,479 (exclusive of suburbs). Port Adelaide, about 6 miles N. N. W. of the city, is the centre of the commerce of the colony. It has a heavy trade in copper, grain, and wool. Adelaide is connected by railways with Dry Creek, Victor Harbor, Gawlertown, Kapunda, and Kooringa.

Adel′phia [*i. e.* “brotherhood;” from the Gr. ἀδελφός, a “brother”], a collection of the stamens of a flower into a bundle. Linnæus employed this term for those plants in which the stamens, instead of growing singly, combine into one or more parcels or brotherhoods; thus, Monadelphia signified stamens all connected into one parcel; Diadelphia, into two parcels, and so on.


Adelphia.

A′delsberg, a market-town of Carniola, Austria. A short distance from the town is the Adelsberg Grotto, which is one of the most peculiar caverns of the world. It consists of five different parts, and is full of beautiful formations, which are partly suspended from the ceiling (stalactites), in part hang down upon the wall like draperies (incrustations), and part arise from the ground in the form of obelisks or columns (stalagmites). Pop. of Adelsburg in 1880, 3513.

A′delung (Friedrich), a German philologist, born at Stettin Feb. 25, 1768, became a resident of St. Petersburg, and preceptor to the grand duke, who was afterwards the emperor Nicholas. He wrote on the Sanscrit language and literature. Died Jan. 30, 1843.

Adelung (Johann Christoph), an eminent philologist, an uncle of the preceding, born in Pomerania Aug. 8, 1732. His reputation is founded chiefly on his "Attempt at a Complete Grammatico-Critical Dictionary of the German Language" ("Versuch eines vollständigen grammatisch-kritischen Wörterbuches der Hochdeutschen Mundart," 1774–86). Among his other works is one on language, entitled "Mithridates oder allgemeine Sprachen-Kunde," one of the most important of the early works on comparative philology. Died at Dresden Sept. 10, 1806.

A'den, a seaport of Arabia, in Yemen, is on the Gulf of Aden, at Cape Aden, in lat. 12° 46′ 15″ N., lon. 45° 10′ E. It was a magnificent emporium in the Middle Ages, and, being favorably situated near the entrance of the Red Sea, was the chief mart of the products of Asia. From these advantages, and its climate, rendered cool and delightful by the sea-breeze (although the rugged volcanic hills with which it is surrounded, without a particle of vegetation, make it anything but attractive in appearance), it was named, after the Oriental manner, Aden (*i. e.* "Eden"). The British obtained possession of it in 1839, since which time the population and trade of the place have rapidly increased. It has a good harbor, a dry and healthy climate, and one of the most important and advantageous positions on the route from Europe to India, whether by the railway from Alexandria to Suez, or by the Suez Canal and the Red Sea. Aden resembles Gibraltar in its position on a rocky promontory and in its military importance; it has been strongly fortified by the British, and is valuable as a coaling and supply dépôt between Europe and India. It has considerable trade. The total area is 70 square miles. The population was in 1881, including troops and followers, 35,165.

Aden, Cape, a rocky promontory at the S. extremity of Arabia, adjoining the town of Aden, rises to the height of 1776 feet. It is joined to the mainland by a low sandy isthmus less than a mile wide.

Aden, Gulf of, that part of the sea lying between Arabia and Adel, and extending from the Strait of Bab-el-Mandeb to the Indian Ocean or Arabian Sea. On some maps this is marked as the Arabian Gulf. Length, about 500 miles.

Adept' [Lat. *adeptus*, from *ad*, "for," and *aptus*, "fitted"], a term applied to a person who is skilful or well versed in any art or science; formerly applied especially to an alchemist who was supposed to have discovered the secret of turning base metal into gold, or to have found the philosopher's stone.

A'dernò, a town of Sicily, at the foot of Mount Etna, 17 miles N. W. of Catania. Pop. in 1881, 20,163.

A'dersbach Rocks, a remarkable group of high and detached sandstone rocks, near the village of Adersbach, in the N. E. part of Bohemia. They present fantastic forms, and occupy an area of several miles in extent. One of the pinnacles is over 200 feet high.

Adet (Pierre Auguste), a French chemist and politician, born at Nevers in 1763. He was sent by the French Directory as ambassador to the United States in 1795, but he suspended his functions in 1797, for the alleged reason that the American government had violated its neutrality. Died in 1832.

Adhe'sion [Lat. *adhe'sio*, from *ad*, "to," and *hæ'reo*, *hæ'sum*, to "stick"], the attractive force which causes the smooth surfaces of two substances to adhere together, or which causes a fluid and solid to unite. The amount of adhesion between solid surfaces is measured best by the adhesion balance of J. J. von Prechtl. Capillary attraction is an instance and particular manifestation of adhesion.

Adhesion, a term used in botany to denote the union of contiguous parts, as when the petals adhere and form a monopetalous corolla; the calyx often adheres to the ovary, and then seems as if it grew from the apex of it. This tendency causes great diversity of appearance in the organs of plants.

Adiaph'orites [from the Gr. ἀδιάφορος, "indifferent"], a name given to Melanchthon, and those who agreed with him in submitting, in things indifferent, to an imperial edict. When Charles V. in 1548 issued an edict called the Interim, relating to disputed religious doctrines, the Protestants became involved in a controversy in which this name originated.

Ad'ige [Lat. *Ath'esis*], a river in Italy, rises among the Alps in the Tyrol, where it is called the Etsch. Flowing southward, it passes by Trent, and enters Lombardy. After passing by Verona, it flows nearly south-eastward, and falls into the Gulf of Venice about 13 miles N. E. of Adria. It is a rapid stream, about 220 miles long. It is navigable from its mouth to Trent, but the velocity of the current impedes navigation.

Ad'ipocere [Lat. *adipoce'ra*, from *ad'eps* (gen. *ad'ipis*), "fat," and *ce'ra*, "wax"], a substance which results from the decomposition of animal bodies, and resembles spermaceti, or a mixture of wax and fat. Human bodies buried in wet ground are often reduced to this condition.

Ad'ipose [Lat. *adipo'sus*, from *ad'eps* (gen. *ad'ipis*), "fat"], of the nature of fat, fatty. Adipose tissue is an animal membrane which contains the fatty matter. It presents an aggregation of very small spherical pouches or vesicles filled with fat or oil. This tissue is organized and vital, but the fat is not.

Adiron'dac Mountains, a group of mountains, the highest in the State of New York, occupy parts of the counties of Hamilton, Essex, Franklin, and Clinton, and are in the N. E. part of the State. This range contains the highest summits in the State. Mount Marcy or Tahawas, whose height is 5370 feet, is the most elevated, and is situated in Essex county; Dix Peak, 5200 feet; Mount McIntyre, 5183 feet; Sandanoni and Mount McMartin, each about 5000 feet; Dial Mountain, about 4900 feet. The Adirondac range also forms the watershed between the tributaries of the St. Lawrence and those of the Hudson and Mohawk. These mountains being of primitive formation, are remarkable for grand and picturesque scenery. They are covered with forests of maple, ash, beech, pine, hemlock, cedar, and other trees, and abound in game. A number of lakes occur among the Adirondacs, which are also drained by the Saranac and Ausable rivers. The Adirondacs are a favorite resort for summer recreation. The waters abound in trout, and deer and other game is to be found in the forests. Iron ore and lumber are obtained here.

Ad'it [Lat. *ad'itus*, from *ad*, "to," and *e'o*, *i'tum*, to "go"], a horizontal passage and entrance into a mine, designed partly to drain water from it. Adits occur chiefly in mountainous regions, and are sometimes several miles long.

Adja'cent Angle, an angle contiguous to another, so that one side is common to both angles.

Ad'jective [Lat. *adjectivum*, from *ad*, "to," and *jacio*, *jactum*, to "cast," to "put"], in grammar, the name of a class of words which are joined to nouns, in order to qualify the general ideas expressed by the nouns.

Adjourn'ment, a term applied to the postponement of the proceedings of the U. S. Congress, or of either house of the British Parliament, from one time to another specified time. It differs from prorogation, which is an act of royal authority, whereas the power of adjournment is vested in each house respectively.

Ad'jutant [Lat. *adju'tans*, from *adju'to*, to "assist"], the title of a military officer who assists the superior officer of an army, regiment, etc. He carries orders from the chief to the subordinate officers, and collects the reports which are made by the latter to the former. He inspects escorts and guards, keeps the journal or account-book of the regiment or division, and acts as secretary to his chief. In the U. S. a regimental adjutant ranks as first lieutenant.

Ad'jutant (*Cico'nia ar'gala*), an East Indian bird, allied to the stork, is called argala by the natives. It is about five feet high, has long legs and an enormous bill, and can swallow a cat or a small leg of mutton with the greatest facility. It is very useful as a scavenger, cleansing the streets and public squares of various offal and dead animals. The famous marabou feathers are obtained from the adjutant and a kindred species, the marabou (marabout) of Africa.

Adjutant-General, the principal organ of the commander of an army in publishing orders. The same organ of the commander of a division, brigade, geographical division, or department is styled assistant adjutant-general. The laws of the U. S., however, provide for but one adjutant-general, with the rank of brigadier-general, made by regulations chief of a bureau of the war department, and charged, under the general, with details affecting army discipline, with the recruiting service, records, returns, etc., two assistant adjutants-general, with the rank of colonel; four with the rank of lieutenant-colonel; and ten with the rank of major. The bureau duties of adjutants-general and assistants are—publishing orders in writing; making up written instructions, and transmitting them; reception of reports and returns; disposing of them; forming tables showing the state and position of corps; regulating details of service; corresponding with the administrative departments relative to the wants of troops; corresponding with the corps, detachments, or individual officers serving under the orders of the same commander; and the methodical arrangement and care of the records and papers of his office. The active duties of adjutants-general consist in establishing camps; visiting guards and outposts; mustering and inspecting troops; inspecting guards and detachments; forming parades and lines of battle; the conduct and control of deserters and prisoners; making reconnaissances; and in general discharging such other active duties as may be assigned them.

ADJUTANT-GENERAL of a State. See MILITIA.

Adler (FELIX), born at Alzey, Germany, August 13, 1851; son of Samuel Adler, rabbi emeritus of the Temple Emanuel, New York; graduated from Columbia College, and subsequently studied at Berlin and at the University of Heidelberg, where he obtained the degree of Doctor of Philosophy. Returning to the United States, he was elected to the professorship of Hebrew and Oriental literature at the Cornell University in the spring of 1874. On May 15, 1876, he inaugurated the Society for Ethical Culture, a religious movement the principal tenets of which he briefly describes as follows: "There is a principle of unity in nature, all the laws of which are adumbrations of an underlying unity. The same principle of unity is obligatory in the sphere of action, and imposes its imperative mandate on the will." The society has founded a system of district nursing among the poor, a free Kindergarten, a workingman's school, where technical and art education are made integral parts of the course of instruction, and a family home for neglected children. He published in 1877 a series of discourses, "Creed and Deed," in addition to which he lectures weekly in Chickering Hall during the winter. The society has its centre in New York, and has a branch at Chicago. LOUIS BERG.

Ad'ler (GEORG J.), Ph. D., a German philologist, born at Leipsic in 1821, came to the U. S. in 1833. He was for some time professor of German in the University of New York. He wrote several German-and-Latin school manuals and an excellent German-and-English dictionary. D. in New York Aug. 24, 1868.

Ad'lercreutz (CARL JOHAN), COUNT, a Swedish general, born April 27, 1757, served against Russia in 1788, and in the Finnish war of 1808. On Mar. 13, 1809, in consequence of several unpopular actions of the king, Gustavus IV., he arrested the king in the name of the people, which act gained him great popularity. Died Aug. 21, 1815.

Ad'ler Sal'vius (JOHAN), a celebrated Swedish ambassador and diplomatist, was born in Strengnäs, Sweden, in 1590, and died at Stockholm in 1652. He was sent by Gustavus Adolphus on various missions of importance, and during the Thirty Years' war he enjoyed the fullest confidence of that monarch. After the conclusion of peace he was created a councillor and baron.

Ad'lersparre (GEORGE), COUNT, a Swedish officer and statesman, born Mar. 28, 1760, took part in the wars of 1788 and 1808 against Russia, and in the deposition of Gustavus IV. He received many indications of favor from the new king, but was dissatisfied with the result of the revolution, because he had not gained as much influence as he desired. He published from 1830–33 a number of secret documents, as well as his correspondence with Charles XIII. and others, in consequence of which he was sentenced to pay a fine. He nevertheless continued to publish these documents. Died Sept. 23, 1835.

Adme'tus [Gr. Ἄδμητος], son of Pheres, who was the mythical founder and first king of Pheræ in Thessaly. He was one of the Argonauts, and took a part in the Calydonian Hunt. He won the hand of Alcestis by coming to the suit in a chariot drawn by boars and lions, that being a condition imposed by the bride's father, Pelias. The god Apollo procured from the Fates a grant that Admetus might be exempt from death if his father, mother, or wife should die for him. The touching story of Alcestis and her devotion, death, and restoration to life is the subject of one of the most celebrated tragedies of Euripides.

Administra'tion [from the Lat. *ad*, "for," and *ministro, ministratum*, to "be a servant"]. This word literally signifies "management" or the conduct of business. It is often used to indicate the action of the executive department of government, as distinguished from the legislative and judicial. It sometimes is employed with reference to trust funds, but its technical meaning is the management or disposition, according to law, of the personal estate of an intestate or of a testator having no executor. The common-law distinction between heirs on the one hand and executors and administrators on the other, should be noted. When an owner of real estate died, his estate devolved upon his heirs, who were persons related to him by blood; when an owner of personal property died, leaving a testament or will, that branch of his estate devolved upon his executors, if such were named; if there were none, then upon administrators appointed by a court of justice. Administration in this sense was in England under the control of the ecclesiastical courts until 1857, when it devolved upon a newly-created court of probate. In the U. S. it is generally vested in special tribunals termed probate, or orphans', or surrogates' courts. By such a court administration is conferred on the person or persons entitled to it by the local rules of law. It is in general committed first to the widow or husband, then to the children, and then to the other next of kin, in a prescribed order. The court has power of selection among the next of kin in equal degree. These provisions are substantially copied from early English statutes. The person thus entrusted with the administration is called an administrator. The court grants him "letters of administration" as evidence of his authority. He represents the deceased. He must make an inventory of the personal estate, collect the assets, and convert the property into cash, pay the debts, render an account, and distribute the balance in his hands among the persons entitled to it. He is a trustee, and under the control of a court of equity as well as of the probate court.

When the deceased leaves a will, but there is no executor, the person to whom administration is granted is termed an administrator "with the will annexed" (*cum testamento annexo*). In this case the will is to guide the administrator in his duties. Should an administrator die before his duties are fulfilled, another is appointed to perform the residue of his functions, called "administrator *de bonis non*."

While an administrator exercises full control over the personal estate of the deceased, his authority is confined to it unless it is insufficient to pay debts; in which case the probate court generally has by statute the right to direct him to sell enough of the real estate to satisfy them.

Letters of administration confer no power to bring actions in foreign states. Where there are assets in another state or country, a subordinate or ancillary administrator is appointed, who acts under the direction of the foreign court, and remits according to its order any funds which he may receive to the principal administrator. T. W. DWIGHT.

Administrator. See ADMINISTRATION.

Ad'miral [Fr. *amiral*], the title of a naval officer of the highest rank, derived from the Arabic *amir* or *emir*, "commander." The English word was formerly *amiral*, as in Milton's "Paradise Lost." Vice-admiral is the title of the officer next in rank to the admiral; and a rear-admiral is the third in the scale.

The grades of rear-admiral and commodore in the U. S. navy were first established by act of July 16, 1862, which provided that the number of each grade shall not exceed 9 rear-admirals, 18 commodores, 36 captains, 72 commanders, 144 lieutenant-commanders, 144 lieutenants, 144 masters, and 144 ensigns. Squadrons would be commanded by rear-admirals, and the individual vessels thus: First rates by commodores; second rates by captains; third rates by commanders; fourth rates by lieutenant-commanders. By act of Congress of Dec. 21, 1864, the President was authorized to appoint from the rear-admirals one vice-admiral, who shall be the ranking officer in the navy of the U. S., and whose relative rank with officers of the army shall be that of lieutenant-general in the army. This grade was created for and bestowed upon Rear-Admiral Farragut. By act of July 25, 1866, it was provided that the number of officers of each grade on the active list should be 1 admiral, 1 vice-admiral, 10 rear-admirals, 25 commodores, 50 captains, 90 commanders, 180 lieutenant-commanders, 180 lieutenants, 160 masters, 160 ensigns, and in other grades the number now allowed by law. The rank of admiral thus created was bestowed upon Vice-Admiral David Farragut, succeeded by David D. Porter. A law was passed abolishing grades of admiral and vice-admiral when said grades became vacant. Congress, 1882, provided for a reduction of active list to 6 rear-admirals, 10 commodores, 45 captains, 85 commanders, 74 lieut.-commanders, 250 lieuts., 75 masters, 75 ensigns; medical corps, 170; pay corps, 96; engineer corps, 170.

Ad'miralty [from the word *admiral*], the tribunal which has cognizance of maritime causes. This court was established in England about the time of Edward III., and was at first held before the lord high admiral or his deputy. At present, admiralty jurisdiction is there exercised by the judge of the admiralty, who holds an instance or a prize court by means of separate commissions; the former being the ordinary admiralty court, and the latter being a special tribunal instituted in time of war to take cognizance of matters pertaining to prizes. In the U. S. exclusive admiralty and maritime jurisdiction is by the Constitution delegated to the Federal courts.

It was for a long time an unsettled question whether the word as there used had the limited sense employed in the early English statutes of 13 and 15 Rich. II., restricting admiralty jurisdiction, or whether it had a wider signification. The latter view has finally prevailed, principally owing to the arguments of Mr. Justice Story; and the word embraces not only cases occurring on tide-waters, but on navigable streams above tide-water, including the great lakes. It rests with Congress to determine upon what court the jurisdiction shall be conferred. It has accordingly vested it in the first instance in the district court. No distinction is taken here between the instance and the prize court.

Admiralty jurisdiction is either civil or criminal. Its civil jurisdiction embraces cases of maritime contracts (such as affreightment, repairs of ships, bottomry bonds, pilotage, seamen's wages, and salvage), general average, collisions, and maritime trespasses in general. The principles and course of practice of the court in civil cases are in the main derived from the Roman or civil law.

Admiralty, the office of lord high admiral of England; also the department of the navy or the commissioners who control the navy. The chief minister of marine in Great Britain is styled first lord of the admiralty.

Admiralty Islands, a cluster of islands in the Pacific, N. E. of Papua. The largest is nearly 60 miles long, and is in lat. 2° S., lon. 147° E.

Admis'sions [from the Lat. *admitto, admissum,* to "send to," to "suffer one to enter"], in the law of evidence, are acknowledgments or concessions by a person of the existence of certain facts. When they relate to the matter in dispute, they are admissible in evidence against the party making them. They may be made either by a party to an action or by some one identified with him, as by a partner. The admissions of an agent will affect his principal. Those made by a predecessor in interest will affect his successor. Thus, the admissions of an ancestor will charge an heir. In form, an admission may be either direct or implied from conduct, or in some instances even from silence. The effect of an admission is usually only to raise a presumption against the party, which he may rebut; but some admissions are regarded as of so high a character that the law will not allow them to be contradicted. (See ESTOPPEL, by PROF. T. W. DWIGHT, LL.D.)

Ado'be, the name of the sun-dried bricks of which houses are built in Mexico, Arizona, California, and Central America. The adobe brick is made of sandy loam, and the houses are usually only one story high.

Adol'phus (or **A'dolph**) OF NASSAU was elected emperor of Germany in 1292, as successor to Rudolph of Hapsburg. In 1298 the German princes transferred the imperial crown to Albert, but Adolphus refused to abdicate. A war ensued between these rivals, and Adolphus was killed in battle in July, 1298.

Adol'phus Fred'erick, duke of Holstein-Gottorp and king of Sweden, was born May 14, 1710. He was elected bishop of Lubeck in 1727, crown-prince of Sweden July 3, 1743, and became king on April 5, 1751. The Swedish nobles continued their arrogance under him to the utmost, so that at last he threatened to resign. In consequence of this the parliament revoked the restrictions of the royal prerogatives. Died Feb. 12, 1771.

Adol'phus (JOHN), an English historian and lawyer, born in 1768. He was noted for eloquence, and practised with great success in criminal causes. His defence of Thistlewood, accused of treason, in 1820, was highly commended. His principal work is a "History of England from the Accession of George III." (7 vols., 1802–45). Died July 16, 1845.

Ad'onai [an ancient plural of Heb. אָדוֹן, "Lord," with suffix denoting a pronoun of the first person; cf. Fr. *monsieur*], a term applied in the Hebrew Scriptures to God. Owing to the veneration of the Hebrews for the most sacred name of the Deity, Jehovah (or Yahveh) was not pronounced in reading the Scriptures; but Adonai was read instead of it wherever it occurred. When the Hebrew text came to be vocalized, the proper pointing of Adonai, אֲדֹנָי, was given to יהוה (? Jehovah), so that the true pronunciation of the latter name has been lost. (See JEHOVAH.)

Adon'ic Verse is composed of a dactyl and a spondee (or of a dactyl and a trochee). It is specially adapted to lively poetry, but is seldom used alone, being generally combined with other metres. The beautiful and well-known Latin hymn, however, commencing with

"Plaudite cœli,
Rideat æther," etc.,

affords an instance in which this metre runs through the whole piece.

Ado'nis [Gr. 'Αδωνις], a youth who was celebrated in ancient poetic legends as a model of youthful beauty and a favorite of Venus. Addicted to the pleasures of the chase, he was killed by a wild boar. An annual festival in honor of Adonis, called Adonia, was celebrated in Asia Minor and other countries bordering on the Mediterranean. He was called Thammuz by the Hebrew writers.—ADONIS was also the name of a river which rose in Mount Lebanon, and flowed through Phœnicia into the sea.

Adonis, a genus of herbaceous plants, of the natural order Ranunculaceæ, natives of Europe. Several species of this genus are cultivated for the beauty of their flowers.

Ad'onists, a name given to some biblical critics who maintain that the Hebrew points usually annexed to the consonants of the word Jehovah are not the proper points belonging to that word.

Adop'tian Con'troversy, The, originated in Spain near the end of the eighth century. Felix, bishop of Urgel, and Elipandus, archbishop of Toledo, advanced the doctrine that Christ was by nature and generation the Son of God only as regards his divine nature, but as to his human nature he was merely the Son of God by adoption. Those who espoused these views were called Adoptionists (in Lat. *Adoptiani*). They have been called the Nestorians of the West. No particular notice was taken of them so long as they confined the propagation of their opinions to Mohammedan territory, but when they undertook to spread the new doctrine in the Frankish empire, Charlemagne promptly put a stop to it by convening two synods, one at Ratisbon (792), another at Frankfort (794), both of which condemned Adoptianism as heresy. Elipandus, who still adhered to his views, died in 799. Felix recanted at the Council of Aix-la-Chapelle in 799, and died in 816.

Adop'tion [from the Lat. *ad,* "to," "for," and *optio,* a "choice"], in law, is the taking a child of other parents as one's own. The practice, which was common in ancient Rome, was recognized by the civil law, and is found in countries and states where that law and its modifications still prevail. In some other states the matter is regulated by statute. The parents, guardians, next of kin, or other legal representative of the child, must in general give consent after notification of the intent to adopt. Adopted children do not, in most countries, inherit property coming from collateral relatives of the adoptive parents. Adoption is usually authorized by a probate court or other established authority after due notice. The adoption of an adult person is known in the civil law as adrogation.

Ador'no (ANTONIO) a doge of Genoa, was driven out and re-established three times in succession. By his persuasion the Genoese agreed to the treaty, signed Oct. 26, 1396, which rendered them subjects of Charles VI. of France.

Adour, a river of South-western France, rises in the Pyrenees and enters the Bay of Biscay a few miles below Bayonne, which is on its bank. Length, about 200 miles. It is navigable to Dax.

Adowah, or **Adoa,** the capital of the Abyssinian province of Tigre, is situated in a well-cultivated and populous plain near the ruins of Axoom, the former capital of Abyssinia. It is the most important commercial town of Abyssinia. Pop. about 5000.

A'dra (anc. *Abde'ra*), a seaport of Spain, in Andalusia, 46 miles S. E. of Granada. Here are extensive lead-mines. Pop. about 7400.

Adrain' (HON. GARNETT B.), b. in New York City Dec. 20, 1816; graduated at Rutgers College, N. J., in 1833; admitted to the bar in 1837. He was a prominent lawyer of New Brunswick, N. J., and a Representative in the 35th and 36th Congresses. D. Aug. 17, 1878.

Adrain (ROBERT), LL.D., born at Carrickfergus, Ireland, Sept. 30, 1775, served as an officer in the rebellion of 1798, was badly wounded, escaped to the U. S., was professor of mathematics in Rutgers College (1810–13), Columbia College (1813–25), and the University of Pennsylvania (1827–34). Died at New Brunswick, N. J., Aug. 10, 1843.

Adramy'ti (the ancient *Adramyt'tium*), a seaport of Asia Minor, on the Gulf of Adramyti, 83 m. N. of Smyrna, exports olives, wool, and gall-nuts. Pop. about 8000.

Adraste'a [Gr. 'Αδράστεια, perhaps from α, negative, and διδράσκω, to "escape," because her punishments were certain], a Greek surname or epithet for the goddess Nemesis, who administered retribution for iniquity.—Also, a nymph of Crete, to whom, with Ida and the Curetes, Rhea entrusted the infant Zeus in the Dictæan grotto.

Adras'tus [Gr. 'Αδραστος], a king of Argos and a contemporary of Theseus, was the father-in-law of Polynices. He commanded the famous expedition called the war of the "Seven against Thebes," to restore Polynices to the throne of Thebes. This enterprise, which was not successful, was a favorite theme of ancient epic and tragic poets.

A'dria, or **Ha'dria,** an ancient town of Italy, situated between the Po and the Adige, in the province of Rovigo, 13 miles E. of Rovigo. It was in ancient times a seaport on the Adriatic, but it is now 14 miles from that sea. Pop. in 1881, 15,806.

A'drian, city and R. R. centre (see map of Michigan, ref. 8–J, for location of county), capital of Lenawee co., Mich., 30 miles W. of Toledo and 74 miles W. S. W. of Detroit, is intersected by the river Raisin, which furnishes water-power. The city has fine schools, the Central public-school building costing $100,000. It has also a mineral spring, a Masonic temple, costing $100,000, and an opera-house. Adrian College, a leading Methodist institution, is finely located on the western boundary of the city. Adrian has a variety of manufactures, among the principal of which is that of R. R. and street cars. Pop. in 1870, 8438; in 1880, 7849; in 1884, 9319.

Adrian, emperor of Rome. See HADRIAN.

A'drian [Lat. *Adrianus*] **I.,** a native of Rome, was elected pope in 772. His dominions were invaded by the king of the Longobards, against whom Adrian was defended by Charlemagne. Under this pontiff Rome enjoyed more than usual prosperity. Died in 795.

Adrian II., born at Rome in 791, succeeded Nicholas I. as pope Dec. 14, 867. Died in 872.

Adrian III. succeeded Marinus as pope in 884. Died May 9, 885.

Adrian IV. (NICHOLAS BREAKSPEAR), the only Englishman who ever attained the dignity of pope, was born near St. Albans. He became cardinal-bishop of Albano in 1146, and was chosen pope in 1154. He was a strenuous asserter of papal supremacy. Died in 1159.

Adrian V. became pope July 12, 1276. Died Aug. 18 in the same year.

Adrian VI., a native of Utrecht, and a preceptor of the emperor Charles V., succeeded Leo X. in 1522. He favored reform, and was honest and virtuous. Died in 1523.

A'drian de Castel'lo, or **Adriano di Castello,** a native of Tuscany, was agent for English affairs at the court of Rome; afterward bishop of Hereford, and was translated to the bishopric of Bath and Wells. He was made cardinal by Pope Alexander VI.; wrote Latin poems, etc. Died about 1520.

Adria'ni (JOHN BAPTIST, or GIOVANNI BATTISTA), born at Florence, Italy, in 1513. He became in 1549 professor of eloquence in the University of Florence, and held that office till his death; wrote "History of his own Times." Died in 1579.

Adriani (MARCELLO VIRGILIO), father of JOHN BAPTIST ADRIANI, was born at Florence, Italy, in 1464, and became professor of belles-lettres; in 1498 became chancellor of the republic. Died in 1521.

A'drianists, disciples of Simon Magus, who flourished about A. D. 34. They were probably a branch of the Simonians and named from some prominent disciple.

Adria'no (THE FRIAR) was born in Cordova, Spain. He was an historical painter, a pupil of Cespedes, and painted a Magdalen which was pronounced equal to Titian in style. Died in 1630.

Adriano'ple [anciently *Adrianopolis;* Turk. *Edreneh*], a large city of European Turkey, on the river Maritza (the ancient Hebrus), 130 miles W. N. W. of Constantinople. The name is derived from the Roman emperor Hadrian, who founded a city here. It was the capital of the Ottoman empire from 1361 until 1453. Here is the famous mosque of the sultan Selim, which is said to be the finest Moslem temple extant, and has four lofty minarets. Among the other public structures are a palace, the bazaar of Ali Pasha, and an aqueduct by which the city is supplied with water. Here are extensive manufactures of silk, cotton, and woollen stuffs. Among the exports are opium, leather, wool, and attar of roses. Adrianople is the residence of the governor-general of the vilayet Edreneh, and of a Greek bishop. Pop. in 1879, 62,000.

Adrian's Wall was built to prevent the irruptions of the Scots and Picts into the northern counties of England, which were then under the government of Rome. This wall extended from the Tyne to Solway Firth; it was 80 miles long, 12 feet high, and 8 feet thick, and was provided with watch-towers. It was named after the emperor Adrian, its second founder, and repaired by Severus in 208.

Adriat'ic Sea [Lat. *Mare Adriaticum*], a portion of the Mediterranean, lying between Italy on the one hand and Illyria and Albania on the other. The name was derived from the town of Adria. It is about 500 miles long from N. W. to S. E., and has a mean width of about 100 miles. The N. W. part of it is called the Gulf of Venice, and at the S. E. end it is connected by the Strait of Otranto with the Ionian Sea. The N. E. coast is rocky and begirt with a great number of islands. The depth and extent of the Adriatic have been greatly diminished by deposits of sand and mud and by the formation of alluvial tracts along the shore. The encroachment of the land is most remarkable on the W. and N. W. coasts of the Gulf of Venice.

Adul'lam, a city of Judah, was the seat of a Canaanite king, and evidently a very ancient place. Its site has recently been identified by Ganneau with 'Aid-el-Ma (the Arabic equivalent of Adullam), about 8 miles N. E. of Eleutheropolis (modern Beit-Jibrin). The famous cave of King David is in a hill about 500 feet high. The sides of the valley are full of caves.

Adul'tery [Lat. *adulterium*], criminal sexual intercourse between a married person and one of the opposite sex, whether married or single. This act has been punished by the laws of some nations with great rigor—among the ancients often with death. In the English law the act is not treated as a temporal crime, but left to the cognizance of the spiritual courts. A civil action for damages may by common law be brought by a husband against one who has committed adultery with his wife. This is called an action "for criminal conversation." It is also a ground of divorce—at first partial, but now, by statute, total. In some of the States of this country adultery has been made a crime, while in others the English law in its substance still prevails, and only the civil proceedings are allowed.

Advancement [Old Fr.], in law, is a provision of money or other property, made by a parent for a child in advance or anticipation of the estate or distributive share to which such child would be entitled on the parent's death. An expenditure for the education and maintenance of a child is not regarded as an advancement. It must be made with a view to a portion or settlement in life. The parent's intent is the main subject of inquiry. In the English law of real estate it only applies in case of several female heirs, who take the interest called coparcenary. In the American law of descent the subject is of general application. The effect of an advancement is to reduce the child's share to that extent, estimating the value as of the time of the receipt. An advancement differs from a debt in that the latter can be recovered by action, while the former can only be deducted from a distributive share. It is at the option of the person advanced to bring in to the general distribution the amount received or not. In the English law the act of bringing it in is termed hotchpot. The doctrine strictly applies only to cases of intestacy. There is a cognate doctrine termed "ademption," applicable to the case of property left by will. In this country the subject is often governed by statute, sometimes establishing distinct rules for real and personal estate. The word "advancement" is also used in the law of trusts to indicate that a purchase of land made in the name of a wife or child or other person as to whom the purchaser stands in the place of a parent shall actually belong to such person, and shall not, by the fiction of a resulting trust, revert beneficially to the purchaser. T. W. DWIGHT.

Advancement of Science. The British Association for the Advancement of Science was founded in 1831 by Sir David Brewster, Sir John Herschel, and others. The American Association for the Advancement of Science was formed in 1847.

Ad'vent [Lat. *adven'tus,* from *ad,* "to," and *ve'nio, ven'tum,* to "come," referring to the coming of Christ], a term applied by the Church to the period of four weeks preceding Christmas. The Catholics, and some Protestants, observe Advent by abstaining from public amusements and nuptial festivities. The Greek Church lengthens the period to six weeks.

Ad'ventists, a body of Christians found chiefly in the U. S., whose distinctive characteristic is a belief in the speedy advent or second coming of the Lord Jesus Christ. In 1833, William Miller of Massachusetts was led by the study of the prophecies of the Bible to the belief that the second advent and the final judgment would occur in 1843. He had at one time about 50,000 followers; and notwithstanding the failure of this and other predictions fixing a definite date, there are, it is believed, about 70,000 members of the Adventist churches, who at present do not presume to foretell the period of the second advent, but live in expectation of that event. They generally practice adult immersion, believe in the necessity of a change of heart and a godly life, in the ultimate annihilation of the wicked, and in the sleep of the dead until the final judgment.—There is a separate organization of Seventh-Day Adventists, which in 1880 had 144 ministers, 46 licentiates, 640 churches, and 15,570 members.

Ad'verb [Lat. *adverbium,* from *ad,* "to," and *verbum,* a "word"], one of the parts of speech in grammar. Adverbs are in all languages indeclinable (though sometimes subject to the change of form known as comparison), and are used to express modifications of verbs, adjectives, or other adverbs, as to place, time, cause, manner, intensity, certainty, conditionality, quality, quantity, etc. The function of an adverb is often performed by sentences or parts of sentences. Most English adverbs are formed by adding the suffix *ly* to an adjective or its root, though many are not thus formed.

Adverse Possession. See DISSEIZIN.

Ad′vocate [from the Lat. *ad*, "to," and *voco*, *vocatum*, to "call"], a word which in the ecclesiastical and civil law courts corresponds to counsellor or counsel in common law courts. The term by which the members of the bar in Scotland (following the civil law) is known is the Faculty of Advocates. In a popular sense, the word denotes a defender or protector generally, especially one who pleads for his client in open court.

Advocate, Lord, is in Scotland the title of an important public functionary, the public prosecutor of criminals and the senior counsel for the Crown in civil causes. He is sometimes styled king's (or queen's) advocate, and is the first law-officer of the Crown for Scotland.

Advocate of the Church [Lat. *advocatus ecclesiæ*], in the Middle Ages a canon or a layman, often a prince or baron, who assumed the protection of a bishop's see, a monastery, or a particular church. Sometimes the office was hereditary, when it appears to have implied the duty of defending the Church's rights by force of arms. Oftener, perhaps, it was held by an *advocatus causarum*, a person appointed by a prince to defend the Church temporalities in secular courts of law. They often administered justice in the name of the Church. They collected tithes and other revenues, and were frequently priests who enjoyed lucrative benefices. The people suffered so severely from their oppressions that Pope Urban III., in 1186, undertook to reform the abuse; but so great was the opposition of the Church and nobles that it was not for many years that the evil was modified.

Advocates, Faculty of, is the title of the associated members of the legal profession in Scotland. This society was formed in 1532.

Advocates' Library, the largest library of Scotland, belongs to the Faculty of Advocates, and is located in Edinburgh. It was founded in 1682 by Sir George Mackenzie, and contains about 260,000 volumes. It ranks as the third library in the number of volumes in Great Britain.

Advoca′tus Diab′oli (*i. e.* the "devil's advocate"), a phrase applied in the Roman Catholic Church to a person whose business is to magnify the faults or detract from the merit of those who are proposed to be canonized as saints. He is opposed by an *advocatus Dei*, or "God's advocate." An *advocatus diaboli* nearly prevented the canonization of Saint Charles Borromeo in 1610.

Advow′son, in English law, the right of presentation to an ecclesiastical benefice or a vacant living in the Church. The lord of a manor by building a church acquired the right of nominating the minister, and as long as this right continues annexed to a manor it is called an advowson appendant. Most of the benefices of the English Church are presentative advowsons, which are regarded as property, and are bought and sold. Of nearly 12,000 church benefices, about one-half belong to the Crown, the bishops and other higher clergy, the universities, etc.; the remainder are in the gift of private persons. In most cases, however, the bishop has a right to reject the appointee if he chooses.

Ad′ytum [Gr. *ἄδυτον*, "inaccessible"], the innermost shrine of a temple or sacred building, accessible only to certain priests and others duly initiated. Of a similar character was the "holy of holies" in the Temple of Jerusalem. The adytum, or cella, was the place where the deity worshipped was believed to be especially present. Some writers have called the innermost recesses of the human spirit the "adytum."

Æchmal′otarch [from the Gr. *αἰχμάλωτος* (from *αἰχμή*, the "point of a spear," and *ἁλισκομαι*, to "be taken"), "taken with the spear," and *ἄρχω*, to "rule"], the title of the governor of the captive Jews residing in Chaldæa, Assyria, and the adjacent countries. He was called by the Jews themselves *roschgaluth*, "chief of the captivity."

Æ′dile [Lat. *ædi′lis*, from *æ′des*, a "temple" or "building"], a Roman magistrate who superintended the temples and other public buildings, the public games and spectacles, and performed various other duties. Two curule ædiles were annually elected. There were also "plebeian ædiles." Colonies and other towns had ædiles. This office was one of dignity and honor, though reckoned as a minor magistracy. (See SCHUBERT, "De Romanorum Ædilibus," 1828.)

Aë′don [Gr. Ἀηδών], in Greek mythology, a daughter of Pandareus of Ephesus. According to the Odyssey, she was the wife of Zethus, king of Thebes. Envious of Niobe, her brother Amphion's wife, she attempted to slay the eldest son of the latter, but by mistake killed her own child, Itylus. Zeus changed her into a nightingale, whose sad notes are the expression of Aëdon's woe. There are other and different traditions as to Aëdon's crime and suffering, but in all she is transformed into the nightingale.

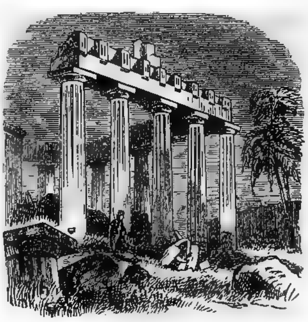
Æge′an Sea [Lat. *Ægæ′um Ma′re;* Gr. Αἰγαῖον πέλαγος, perhaps from *αἰγίς*, a "squall," though other etymologies have been given], or **Grecian Archipelago,** the name given by the ancients to that part of the Mediterranean between Asia Minor and Greece. Its length from N. to S. is about 400 miles, and its breadth about 200. It is very deep, and encloses numerous islands, several of which are of volcanic origin, while others are composed of white marble. Many of them rise to the height of 1600 feet.

Ægid′ius Colon′na, an eminent schoolman, born at Rome in 1247 of an illustrious stock. He was the pupil of Aquinas and Bonaventura, and became an Augustinian hermit. In 1292 he became prior-general of his order. He went to France, where Philip the Bold made him tutor for his son, afterwards Philip the Fair. In 1296 he became archbishop of Bourges. For many years he taught with applause in the University of Paris, and was called *Doctor Fundatissimus* and *princeps theologorum.* Died Dec. 22, 1316. He left a great number of writings, most of which are now in MS.

Ægi′na [Gr. Αἴγινα], **Egina,** or **Engia,** an island of Greece, in the Gulf of Ægina (*Saron′icus Si′nus*), 16 miles S. S. W. of Athens. It is 8 miles long, and nearly the same in width. It is of an irregularly triangular shape. Area, 41 square miles. The western half is a fertile plain; the remainder is diversified by mountains, hills, and valleys, which produce almonds, wine, olive oil, etc. This island is celebrated for its architectural remains. (See ÆGINETAN SCULPTURES.) Pop. 6000. At the N. W. end of the island is the modern town of Egina. Mount St. Elias, the highest point of the island, is in lat. 37° 42′ N., lon. 23° 30′ E. The island is difficult to approach.

Ægina, Gulf of (the ancient *Saron′icus Si′nus*), is a portion of the Ægean Sea lying between Attica and the Morea. It contains the islands of Ægina and Salamis.

Ægine′tan Sculptures. The small island of Ægina contains very interesting remains of ancient sculpture. On an eminence in the eastern part of the island stand the ruins of a temple, usually called the temple of Jupiter Panhellenius, but now believed to have been a temple of Athena. Among these ruins a series of statues, sixteen in number, were excavated by a company of Germans, Danes, and Englishmen in 1811, and are now in the Glyptothek at Munich. The various figures that have been discovered seem true to nature, as in the old Greek style, with the structure of bones, muscles, and even veins, distinctly marked; but the faces have that unpleasant, forced smile characteristic of all sculpture before the time of Phidias.



Ruins in Ægina.

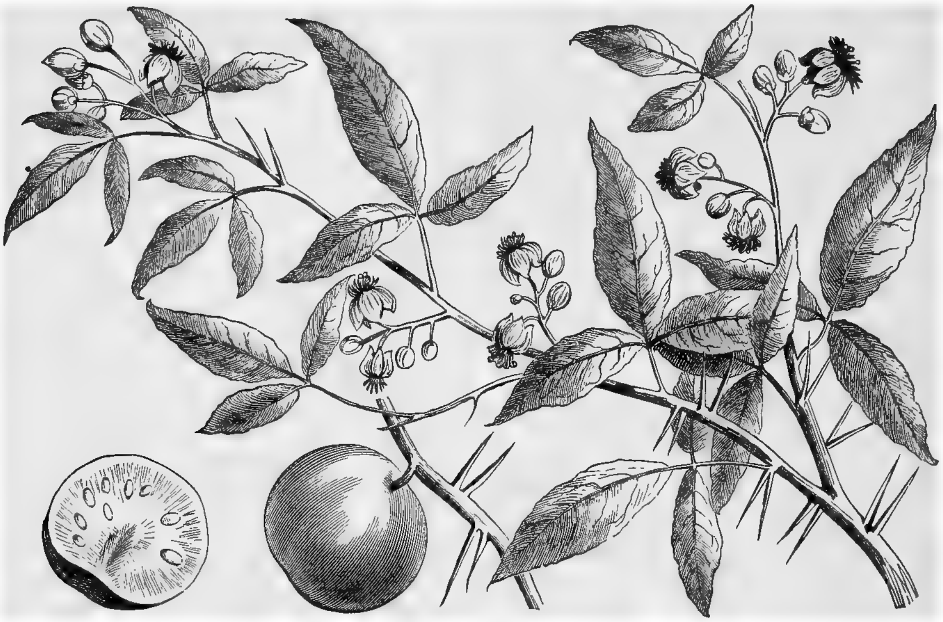
Ægi′ra [Gr. Αἴγειρα], one of the twelve cities of the ancient Achæan confederation in Greece. It probably stood near the sea and on the river Crius, though its site is not well known at present. It was famous chiefly for its temples of Zeus, Apollo, Artemis, and Aphrodite Urania (the "heavenly Venus," a goddess who was especially worshipped here), as well as of other divinities. This town is called *Hyperesia* by Homer.

Æ′gis. See APPENDIX.

Ægis′thus [Gr. Αἴγισθος], in classic mythology, a son of Thyestes, and an adopted son of Atreus. He seduced Clytemnestra while Agamemnon was absent, and was her accomplice in the murder of that king. He was killed by Orestes.

Æ′gium [Gr. Αἴγιον; now *Vostitza*], a city of ancient Greece, belonged to the Achæan League, and after 373 was the chief city in that confederation, of which it was long the capital. It had a good harbor. Remains of its ancient buildings are yet to be seen. The modern town is a place of some importance. It is surrounded by gardens. On Aug. 23, 1817, it was visited by an earthquake which destroyed two-thirds of the houses. Pop. in 1879, 5311.

Æ′gle* Mar′melos, the scientific name of a remarkable fruit tree growing in the central and southern parts of India, and belonging to the natural order Aurantiaceæ. It sometimes attains the size of a large apple tree, which in shape it may be said to resemble, being broad and spreading, rather than high. The fruit is always of a somewhat irregular form, and when mature varies in size from five to eight or nine inches in diameter. At the season when it is fully ripe there are no leaves on the trees, which, with their naked branches supporting here and there a fruit of such magnitude, present a singular and striking appearance. It is popularly known in India as the bêl or bael (sometimes incorrectly written *bhel*) fruit. It has a hard but rather thin shell or rind, resembling in consistency the shell of a squash, and contains a soft, yellowish pulp of a peculiar flavor, esteemed delicious by many, and abounding in a bland, transparent mucilage (with which the seed-cavities in particular are filled), which, it is said, renders this fruit singularly beneficial in dysentery and other complaints attended with irritation of the bowels. The seeds are situated in a small cavity which they do not nearly fill, the remaining space being occupied by the transparent mucilage already described. The half-ripe fruit, dried, has recently been introduced into the British pharmacopœia under the name of *Bela;* it is mildly astringent, and is said to be very efficacious in cases of diarrhœa and dysentery. The ripe fruit is an excellent aperient, being very gentle and for the most part effectual in its operation. If the culture of this valuable fruit could be successfully introduced into the West India Islands and the southern parts of North America, it might richly repay the expense and labor incurred in making the experiment.



Ægle Marmelos.

Ægospot′ami [Gr. Αἰγὸς ποταμοί], a small river and a town in the Thracian Chersonese, where the Spartan Lysander defeated the Athenian fleet in 405 B. C. This victory ended the Peloponnesian war. A large aërolite fell near this place about 465 B. C.

Ægyp′tus [Gr. Αἴγυπτος], a son of Belus and a brother of Danaus, became king of Arabia, and conquered the country which derived from him the name of Egypt. According to a legend, he had fifty sons, who were murdered (except one) by the daughters of Danaus. (See DANAIDES.)

Æ′lia Capitoli′na, a name given to the colony which was planted by the emperor Hadrian at Jerusalem; this title it retained until the time of the Christian emperors.

Ælianus (CLAUDIUS). See APPENDIX.

Aelst, or **Aalst, van** (EVERT), a skilful Dutch painter, born at Delft in 1602. His subjects were dead game, golden and silver vessels, etc. Died in 1658.—His nephew WILLIAM, born in 1620, painted flowers, fruits, and still-life with wonderful success. Died in 1679.

Aeltre, or **Aaltere,**, a large trading village in the Belgian province of E. Flanders, 13 m. W. of Ghent. Pop. 6520.

Æne′as [Gr. Αἰνείας], the hero of Vergil's "Æneid," was, according to tradition, the son of Anchises and the goddess Venus. He was one of the most valiant defenders of Troy against the Greeks. According to Vergil, he, after many adventures and disasters, settled in Italy, and married Lavinia, the daughter of King Latinus. The origin of the Roman state is traditionally ascribed to him and his heirs.

Æne′id [Lat. *Æne′is*] is the title of Vergil's great epic, the most celebrated and beautiful poem in the Latin language. It is regarded as an imitation of Homer's "Iliad" and "Odyssey," and, in the opinion of most critics, is inferior to them in originality and sublimity.

Æo′lia [Gr. Αἰολία], or **Æ′olis** [Gr. Αἰολίς], a region of Asia Minor, so called from the Æolians, who settled there and founded several cities on different parts of the coast. It was more especially in Lesbos, and along the neighboring shores of the Gulf of Elea, that they finally concentrated their principal colonies, and formed a federal union, called the Æolian League, consisting of twelve states and several inferior towns. The soil of this country is very fertile.

Æo′lian Harp, a simple musical instrument, the sounds of which are produced by the vibration of strings moved by wind. It is formed by stretching strings of catgut, tuned in unison, across a wooden box, which is placed in an open window. Athanasius Kircher (1602–80) was the inventor.

Æo′lians [so named from *Æ′olus*, a son of Hellen], one of the primitive tribes of the ancient Greeks. They were the dominant race of Thessaly and Bœotia. They founded on the western coast of Asia Minor many states or cities, among which were Smyrna and Mitylene. The Æolic dialect was harsh, and approached the character of the Doric. It preserved the digamma for a long time. The fragments of Alcæus and Sappho present the typical Æolic language. (See ÆOLIA.)

Æol′ipile, or **Æol′ipyle** [from the Lat. *Æ′olus*, the "god of the winds," and *pi′la*, a "ball"], a hollow metallic ball, having a small orifice with which a curved tube is connected. When filled with water and heated, steam passes out violently. It was thought by the ancients to illustrate the origin of the winds; hence the name.

Æ′olus [Gr. Αἴολος], in Greek mythology, the god who controlled the winds and reigned in the Æolian Islands. (See VERGIL'S "Æneid," book i., 51–63.)

Æ′on [Gr. αἰών], a Greek word signifying an age, a period of time; also eternity. The Gnostics used the word æons in a peculiar sense, as distinct entities or virtues that emanated from God before time began.

Æpinus (FRANZ ULRICH THEODOR). See APPENDIX.

Æra′rians [Lat. *ærarii*], a class of inhabitants of ancient Rome who did not belong to any of the tribes or centuries, and who had no civic rights except the protection of the state. Any citizen, no matter how high his rank, for bad conduct might be degraded to the rank of an ærarian by the censors, but the punishment was not in all cases a lifelong one. The Cærites seem to have been ærarians; at any rate, the disfranchisement of a citizen was sometimes called "*in Cæritum tabulas referri*," or "being placed in the list of Cærites." Persons declared infamous became ærarians. This class is also believed to have included a large number of small retail merchants, who came to Rome from the provinces without authority, and were received into no tribe. Ærarians paid a heavy tax, but were exempt from military duty.

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* *Æ′gle* [Gr. Αἴγλη, "splendor" or "glorious beauty"], the name of one of the Hesperides, was probably applied to this tree as meriting a place in the fabled garden which, according to the poets, was assigned to the care of those celebrated nymphs.

Æra′rium, the public treasury in the temple of Saturn at Rome, in which money and the public accounts and archives were kept. Besides the regular treasure, there was an *ærarium sacrum*, or reserve, and later a military treasury. The funds belonging to the *populus*, or patricians, was called *publicum*, and kept in a separate treasury, though in the same building.

A′ërated Bread [from the Lat. *aër*, "air"], an unfermented bread, the ingredients of which are wheat flour, salt, carbonic acid, and water. The carbonic acid is thoroughly mixed with the flour and water in air-tight vessels by means of machinery especially adapted to this purpose, so that it is as light as the best fermented bread.

A′ërated Waters are extensively used to allay thirst in feverish conditions. The most common is *carbonic acid water*, incorrectly called soda water, for it seldom contains soda. It is made by placing chalk or marble in a vessel with water and sulphuric acid, when the carbonic acid is evolved in the form of gas. The latter is afterward forced into water under pressure, so that the water dissolves about five times its own volume of the gas. It forms a brisk, sparkling liquid, with a pungent but pleasant taste. The first soda fountain in America was put up by Prof. B. Silliman, Sr., in New Haven, Conn. Leaden reservoirs for aërated water are dangerous. When copper lined with silver or tin is used, safety requires the lining renewed at least once in two years. Carbonic acid water is, when iced, a most refreshing drink in sea-sickness and in many cases of disease. The effervescing draughts called *soda powders* and *seidlitz powders* are other forms of aërated beverages. In the former, bicarbonate of soda and tartaric acid are added to water in a tumbler, and a refreshing draught instantaneously prepared. *Seidlitz powders* contain tartrate of soda and potassa and bicarbonate of soda in one paper, and tartaric acid in the other; and when both are added to water, effervescence ensues, and the liquid is then taken. A more agreeable and useful *purgative* aërated water is the effervescing solution of citrate of magnesia in carbonic acid water, the invention of an American pharmacist. Aërated waters are also produced naturally. Water, as it comes from a spring, tastes differently from the same water after being boiled; and this is due to the unboiled water containing the gases oxygen, nitrogen, and carbonic acid—especially the latter—dissolved in it. Rain water has a mawkish taste, chiefly because of the impurities dissolved in it; but when that rain water trickles down through the earth, it is filtered and purified, and absorbs more or less air and gas. When it is dashed from ledge to ledge of rock, it becomes still more thoroughly aërated. Many spring waters are aërated in a peculiar way, which confers upon them important medicinal properties; these will be noticed under the head of MINERAL WATERS, by C. F. CHANDLER.

Aë′rial Perspec′tive, in painting, is the art of giving due gradation to the strength of light and shade and the colors of objects, according to their distances; or the laws which regulate the apparent distances of bodies, as modified by the variations in the transparency of the air or in the brightness of the light.

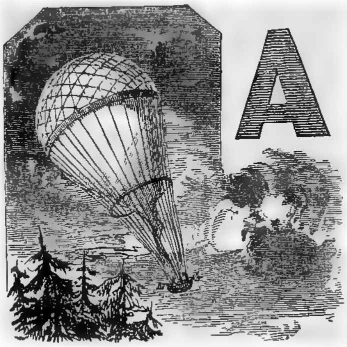
Æ′rians, an heretical sect founded in the fourth century by Ærius, a native of Pontus. They were Homoiousians (*i. e.* they maintained that the Son was similar to the Father in essence, but not identical with him).

Aërodynam′ics [Lat. *aërodinam′ica*, from the Gr. ἀήρ, "air," and δύναμις, "power"], the dynamics of the air, and of gaseous bodies generally; the phenomena exhibited by gaseous bodies, whether at rest or in motion under the action of *forces*. These phenomena are seldom treated independently; but are in part common to all fluids, gaseous or liquid. As peculiar to *gases*, they present themselves in innumerable special forms; *e.g.* the transmission of sound; the movements of projectiles; of the pendulum; of railway trains, etc. Also in pneumatics, in aëronautics, in the application of the force of the wind as a mechanical power, and to navigation, etc.

Aeröe, ā′rö′ęh, or **Arroe,** a Danish island in the Baltic, 10 miles S. of Funen, is 14 miles long and about 5 miles wide. It is fertile and well cultivated. Pop. about 12,400.

Aërolites. See METEORITE, by PROF. J. L. SMITH.

Aërom′eter [from the Gr. ἀήρ, "air," and μέτρον, "a measure"], an instrument formerly used to make the necessary corrections in pneumatic experiments to ascertain the mean bulk of gases.



Aëronau′tics [from the Gr. ἀήρ, "air," and ναυτής, a "sailor"]. The credit of the invention of the balloon (1783) is conceded to Stephen and Joseph Montgolfier, sons of a paper-maker at Annonay, near Lyons, France; but the principles on which a balloon could be constructed were already pretty generally known to scientific men. The Jesuit Francis Lana of Brescia in 1670 projected a balloon which, though impracticable of construction, was founded upon the fundamental principle established by Archimedes that a body will float upon or be suspended in a fluid denser than itself. Curiously, the Jesuit anticipated recent visionary schemes of application to offensive warlike purposes, in the prediction that "no walls or fortifications could then protect cities, which might be completely subdued or destroyed, without having the power to make any sort of resistance, by a mere handful of daring assailants, who should rain down fire and conflagration from the region of the clouds."

The Montgolfier balloon by which, June 5, 1783, the first public ascent was made, was a spherical bag consisting of pieces of linen, merely buttoned together, suspended from cross poles; two men kindled a fire under it, and kept feeding the flames with small bundles of chopped straw; the loose bag gradually swelled, assuming a graceful form, and in the space of five minutes it was completely distended, and made such an effort to escape, that eight men were required to hold it down. On a signal being given, the stays were slipped, and the balloon instantly rose with an accelerating motion till it reached some height, when its velocity continued uniform, and carried it to an elevation of more than a mile; but its buoyant force being soon spent, it remained suspended only ten minutes, and fell gently in a vineyard, at the distance of about a mile and a half from the place of its ascension.

The substitution of hydrogen (the lightest of all gases, generated by the application of dilute sulphuric acid to iron filings) for smoke (or the heated products of combustion) was soon after tried by M. Charles of Paris with ultimate success. But hydrogen is troublesome to make, and, moreover, expensive. Coal gas (carburetted hydrogen), easily obtained from gas-works, has almost superseded it in modern times, though much heavier (about two-fifths the density of air). The balloon itself is made of varnished silk or calico or rubber cloth, and enveloped in a netting to which the suspending cords of the car are attached.

The balloon offered to scientific men a ready method of exploring, for scientific purposes, the higher regions of the atmosphere. Of the earlier ascents perhaps the most noteworthy are those made by Biot and Gay-Lussac. The latter (Sept. 15, 1804), ascended to the height of 23,040 feet or nearly four and a half miles above the level of the sea. But this feat was surpassed by Messrs. Glaisher and Coxwell in an ascent from Wolverhampton in 1862. The precise elevation they reached could only be guessed, but it could scarcely be less than 35,000 feet, and might possibly extend to 37,000 feet, or seven miles, a height much exceeding that of any mountain on our globe.

Mr. Glaisher, who is the greatest authority on the phenomena of balloon ascension, having ascended higher than any other and always for scientific purposes, has given the following table for the diminution of density of the air:

At the height of	1 mile	the barometer	reading is	24.7 in.
"	2 miles	"	"	20.3 "
"	3 "	"	"	16.7 "
"	4 "	"	"	13.7 "
"	5 "	"	"	11.3 "
"	10 "	"	"	4.2 "
"	15 "	"	"	1.6 "
"	20 "	"	"	1.0 " less.

Concerning temperature the result of all his mid-day experiments is thus expressed:

"The change from the ground to 1000 feet high was 4° 5′ with a cloudy sky, and 6° 2′ with a clear sky. At 10,000 feet high it was 2° 2′ with a cloudy sky, and 2° with a clear sky. At 20,000 feet high the decline of temperature was

1° 1′ with a cloudy sky, and 1° 2′ with a clear sky. At 30,000 feet the whole decline of temperature was found to be 62°. Within the first 1000 feet the average space passed through for 1° was 223 feet with a cloudy sky, and 162 feet with a clear sky. At 10,000 feet the space passed through for a like decline was 455 feet for the former, and 417 feet for the latter; and above 20,000 feet high the space with both states of the sky was 1000 feet nearly for a decline of 1°. As regards the law just indicated, it is far more natural and far more consistent than that of a uniform rate of decrease."

One of the most important determinations to be made, especially in connection with aërial *navigation*, is that of the atmospheric currents. So long as, without power of self-propulsion, the balloon is committed to the air to be borne as it lists, it is scarcely correct to talk of navigation. That there is some degree of certainty in air-currents may be indicated by a curious fact mentioned by M. Flammarion (a distinguished French aëronaut)—namely, that the traces of his various voyages are all represented by lines which had a tendency to curve in one and the same general direction. "Thus," says he, "on the 23d of June, 1867, the balloon started with a north wind directly towards the south-south-west, and, after a while, due south-west, when we descended. A similar result was observed in every excursion, and the fact led me to believe that above the soil of France the currents of the atmosphere are constantly deviated circularly, and in a south-west-north-east-south direction."

On the 12th of Jan., 1864, Mr. Glaisher left the earth, where a south-east wind was prevailing. At a height of 1300 feet, he was surprised to enter a warm current, 3000 feet in thickness, which was flowing from the south-west, that is, in the direction of the Gulf Stream itself. At the elevation in question the temperature, according to the usual calculation, should have been 4° or 5° lower than that at the ground, whereas it was 3½° higher. In the region above, cold reigned, for finely-powdered snow was falling into this atmospheric river. Here, therefore, was a stream of heated air previously unsuspected, which, if its course is steady, as it appears to be during winter, constitutes a prodigious accession to our resources, and adds another to the many meteorological blessings the world enjoys.

"The meeting with this south-west current" (writes Mr. Glaisher) "is of the highest importance, for it goes far to explain why England possesses a winter temperature so much higher than our northern latitudes. Our high winter temperature has hitherto been mostly referred to the influence of the Gulf Stream. Without doubting the influence of this natural agent, it is necessary to add the effect of a parallel atmospheric current to the oceanic current coming from the same regions—a true aërial Gulf Stream."

It is the result of meteorological observations made at the Smithsonian Institute and elsewhere that in the temperate zones of our continent the resultant direction of all the winds is from the west. During the time of sailing vessels the average length of a voyage from America to England was scarcely more than one-half of that in the opposite direction. All thunder-storms come to us from the west. The higher clouds are perpetually seen moving eastward.

From the published letters of Prof. Henry to Mr. Wise, the aëronaut, concerning his proposed aërial voyage across the Atlantic, the following extracts are made:

"All the observations that have been made on the motion of the atmosphere, as well as the deductions from theoretical considerations, lead to the conclusion that the resultant motion of the air around the whole earth, within the temperate zones, especially about the middle of them, is from west to east, and therefore, provided a balloon can be sustained at a sufficient height and for a sufficient length of time, it would, under ordinary circumstances, be wafted across the Atlantic. But the question is, Can the balloon be sustained at a sufficient height and for a sufficient length of time to make the journey? This is a question that can be determined only by actual experiment. . . . I had no doubt of the fact that, if your balloon can be sustained in the air sufficiently long, a voyage might be made across the Atlantic; but this is the point which, it would appear to me, from my partial knowledge of what has been accomplished in the art of ballooning, is yet to be satisfactorily established. No one, however, has had more experience in the art than yourself, and you ought not to venture on the hazardous journey without the fullest assurance that the balloon can be sustained at the requisite elevation for, say, ten days." (*New York Times*, July 11, 1873.)

In the above (as is believed) is found the sole basis for the notion of reaching by balloon the European continent from ours. Some attempts have been made to apply mathematical analysis to the determination of the general direction of the winds, but the imperfect knowledge of the recondite data and the difficulty of defining them analytically are insuperable obstacles.

A determinate current—a "gulf stream"—might afford *some* slight basis of calculation for an aërial voyage, but scarcely enough to form the basis of balloon *navigation*. Self-propulsion has been aimed at by hundreds of inventors, few of whom have possessed knowledge of the real data or difficulties of the problem. (See FLYING, ARTIFICIAL.)

An exhaustive mathematical investigation of M. Gustave Lambert ("De la Locomotion Mécanique dans l'air et dans l'eau," Paris, 1864) is presumed to be an exponent of the scientific basis upon which M. de Lôme founds his project. A pamphlet of nearly 100 large and closely-printed octavo pages cannot here be summarized. We must content ourselves with a statement of a practical result, premising that the idea of a *flying* machine is pronounced impracticable; that while the aërial ship must be *self-sustaining*, spherical or spheroidal forms (such as now in ordinary use) are inapplicable. Self-sustenation being attained, the problem is asserted to be *identical with the naval problem;* hence the balloons should have forms analogous to those of very sharp-built ships. Their length should be ten to twelve times their greatest transverse dimensions. The feebleness of *tonnage* compared with the volume of air displaced, imposes enormous dimensions. Thus for the driving screw (or helix) 15, 20, or even 25 mètres of radius may be necessary. The figures suggested for the very smallest type are as follows: Cross-section, 200 square mètres (about 46 feet diameter); length, 120 mètres (400 feet); tonnage, about 15 tons; speed, 40 mètres per second (88 miles per hour); engine, 360 horse-power, driving a screw of 4 arms of 15 mètres radius at a rate of 45 revolutions per minute. The carcass of the balloon, or rigid framework, "is arranged upon the tubular principle of Stevenson." The covering to consist of an exterior gummed envelope, made very smooth, and an interior envelope (containing hydrogen) divided into air-tight compartments. As the total weight diminishes by the consumption of the fuel, air is admitted into these compartments in place of the hydrogen. The screw shaft extends from end to end, traversing, through packing boxes, the partitions; by which mutual points of support are obtained. It is believed that such a structure need not weigh more than 5 tons; and hence 10 tons will be allowed for the navigators, the engine, the water, and the fuel. The author admits that if ordinary marine engines are taken as types the allowance is greatly inadequate; but he thinks a high-pressure cylinder engine of 60 horse-power *can be* made to weigh only 6 tons, by which a speed of 20 to 25 mètres per second (44 to 55 miles per hour, equal to that of a "gale of wind") may be had. There will remain 4 tons (of tonnage) to spare, of which one ton is assigned to navigators and water and three tons to fuel, by which a run of 50 hours' duration may be made. The author supposes that, for ordinary voyages, 55 miles per hour will (except in cases of strong head-winds) allow supply stations to be reached in much less than 50 hours; generally in 10 hours. Furthermore, with the apparatus as just described, it would be *possible* to go, *with fair wind*, from Paris to New York. This assertion (in the author's language) "is neither hazardous, utopian, nor rash; it is a solution which the reader may verify with the figures before him." The author anticipates that ultimately engines of very high pressure, of 400 horse-power, and weighing but 5 or 6 tons, may be counted upon, and even that a "steam-turbine" can be realized, by which the weight of cylinders, cranks, and connecting rods will be dispensed with; and finally that if gun (or explosive) powders can be substituted for steam, a speed of 100 mètres per second (220 miles per hour) may be realized, and 24 hours' fuel-supply carried. A more recent investigation has been communicated to the French Academy by M. Duroy de Bruignac, in view of the results of which, he asks, "Is it not permitted to affirm that aërial navigation is possible with motors already known?" but it is doubtful whether he has placed the matter on any more certain basis than M. Lambert, whose results have just been quoted. The nearest approach to a *practical* solution has been made by the celebrated French naval constructor, M. Dupuy de Lome, of whose "Aërostat Dirigeable" an end view is given p. 48, and a brief description under head FLYING-MACHINE.

Mr. Glaisher, whose aëronautic experience has been already alluded to, expresses no such hopes. He tells us that he has attempted no improvement in the management of the balloon, that he found it was wholly at the mercy of the winds, and that he saw no probability of any method of steering it ever being discovered. (*British Quarterly Rev.*) But Mr. Glaisher's field of thought and observation has been, as regards aërial navigation, quite diverse from our author's, and the problem is not to be decided by an *ipse dixit* of this kind.

At the commencement of the French Revolutionary war, about ten years after the production of the Montgolfier balloons, an Aërostatic Institute was formed by command of the French Directory (at the suggestion of Guyton de Morveau) in the École Polytechnique, and under its superintendence reconnoitring war balloons were constructed by a M. Couté, and supplied to each republican army in the field. The army of the Rhine and Moselle was provided with two—viz., the "Hercule" and "Intrépide;" another named the "Céleste" was prepared for the use of the army of the Sambre and Meuse; the "Entreprenant" for the army of the North; and a fifth was destined for the army of Italy. That attached to the army of the Sambre and Meuse, under Gen. Jourdan, was first used May, 1794, by Col. Coutelle, at Maubeuge, before Mayence, in reconnoitring the enemy's works. This balloon, which was 27 feet in diameter, and took at first fifty hours to inflate, was retained to the earth by two ropes, and the aëronauts communicated their observations by throwing out weighted letters to the general beneath. After this method of reconnoitring had been successfully practised four or five days, a seventeen-pounder gun was brought down to a neighboring ravine, and (being thus masked) suddenly opened fire upon the balloon. Several shots were fired without effect, and the machine was then hauled down; but the next day the gun was forced to retire and the reconnoissances were then carried on as before. After two or three weeks, the balloon was removed to Charleroi, distant from Maubeuge about 36 miles. To save the expense and trouble of another inflation, it accompanied the troops at a sufficient height to allow the cavalry and baggage wagons to pass beneath, ten men marching on either side of the road, and each man holding a separate rope attached to the balloon, which was thus retained at its proper elevation. After making one observation on the way, the balloon arrived before Charleroi at sunset, and the captain had time before close of day, to reconnoitre the place with a general officer. Next day they made a second observation in the plain of Tumet, and at the battle of Fleurus, which took place on the following day, June 17, 1794, the balloon was employed for about eight hours, hovering in rear of the army at an altitude of 1300 feet. (*Prof. Paper, R. E.*, vol. xii.)

This notable instance of the successful employment of a reconnoitring balloon is thus commented upon in the French history, "La Guerre de la Révolution de France:" "Ce fut à cette bataille (Fleurus), que l'on fit, pour la première fois, l'essai d'un arëostat, avec le secours duquel le Général Jourdan put être parfaitement instruit des dispositions et des mouvemens d'ennemi; ainsi, cette découverte regardée jusqu' alors comme un objet de pure curiosité, dut être, dès cet instant, rangé parmi les inventions utiles." (*Idem.*)

We hear too of balloons at a battle near Liege and in the sieges of Mayence and Ehrenbreitstein in 1799. That we hear no longer of them during the Napoleonic wars is evidence that no adequate results were obtained from them.

An attempt was, however, made to revive them in the African campaign of 1830, but there was no opportunity for making use of them. The Austrians are said to have employed reconnoitring balloons before Venice in 1849, and the Russians in observing from Sebastopol. The French again made use of them in the late Italian campaign of 1859, but this time the service was in charge of civilian aëronauts, the MM. Godard. Ascents were made from Milan, Gargonzola, Castenedolo, and the Castiglione Hills; and, according to the *Times* Paris correspondent (in the letter dated 11th of Jan., 1862), they proved great failures, as judged from a military point of view. (*Idem.*)

The balloon was tried for our service in the recent civil war. Ascents were made from our lines on the north of the Potomac, during the fall of 1861, with no material results. It formed a part of our equipage and *impedimenta* during the Virginia peninsula campaign, including the siege of Yorktown and the operations before Richmond. The writer is not aware of a single official report recording any material service rendered by the balloon, but numerous newspaper paragraphs concerning it have been quoted, like the following referring to the battle of the "Seven Pines," or "Fair Oaks," of June 1, 1862: "During the whole of the engagement on Sunday morning, Prof. Lowe's balloon hovered over the Federal lines at an altitude of about 2000 feet, and maintained successful communication with Gen. McClellan at his head-quarters. It is asserted that every movement of the Confederates armies was distinctly visible, and instantaneously reported." (*Times*, June 17, 1862.)

The balloons in use were of two sizes—the smaller of about 30 feet diameter containing 1300 cubic feet, and the larger of double this capacity. The latter size I believe are found preferable. While encamped before Richmond, Capt. F. Beaumont, R. E., spent some time in our camp (part of which as a guest of the writer) and paid particular attention to our balloons. I avail myself of his labors (*vide Prof. Papers R. E.*, vol. xii.) for a description:

"The balloons were made of the best and finest description of silk, double sewn and prepared with the greatest care; the summit of the balloon containing the gas valve being made of either three or four folds of cloth, to ensure sufficient strength in that part subject to the greatest strain. The varnish, on which the success of the apparatus much depends, was a secret of Mr. Lowe's, the chief aëronaut, his balloons kept in their gas a fortnight or more, and their doing so he laid to the fact of the varnish being particularly good; there was always a small amount of leakage, still at the end of a fortnight sufficient gas remained in the balloon to enable him to make an ascent without its being replenished. In balloons for military purposes this is an important point, as they must be kept ready to ascend at any moment. I have little doubt, however, that many well prepared varnishes could be found to answer the purpose as well; the network covering the bag was gathered in, in the usual manner, and ended in a series of cords attached to a ring, hanging about level with the tail of the balloon, and from this hung the wickerwork car, the ring being about level with a person's chest when standing upright in the car. The string for working the valve passed through the centre of the balloon, and coming out at the tail was loosely tied to the ring, to which were fastened the guys, three in number; thus the car, though swayed about by the motion of the balloon, hung always nearly vertically beneath it.

"The gas generators, two in number, were nothing more than large tanks of wood, acid proof inside, and of sufficient strength to resist the expansive action of the gas; they were provided with suitable stop-cocks for regulating the admission of the gas, and with man-hole covers for introducing the necessary materials. The gas used was hydrogen, and indeed for practical purposes, all things considered, there is none other that is nearly so suitable; its low specific gravity makes it a *sine qua non* for a military aëronaut, as independently of the ease with which it is produced, when a balloon is attached to the earth it is of the first importance that it should offer as little resistance to the air as possible, as its stability depends upon this point. The hydrogen was generated by using dilute sulphuric acid and iron; any old iron, such as bits of the tires of wheels, old shot broken up, etc., was used; so that it was necessary to provide only the sulphuric acid, which in large quantities is cheap, and with proper precautions very easy to carry.

"The gas generated passed through a leathern tube into a lime purifier, and thence in a similar manner into a second, the action of the lime simply absorbing the carbonic acid and other extraneous gases, and sending the hydrogen quite, or very nearly pure, into the balloon. On leaving the generator its temperature was high, even the leathern pipe being so hot that the hand could hardly bear to touch it, but after passing the second purifier it was delivered, barely warm, into the balloon. The whole of the apparatus was so simple that nothing more remains to be said about it.

"In using it the balloon is unpacked and laid in well-ordered folds on a carpet spread on the ground to receive it; the tail is then placed ready for connection with the last purifier, properly charged with lime and water, and the connection by leather pipes between the purifier and the generator having been established, the latter is charged; care must be taken not to complete the communication between the last purifier and the tail of the balloon until a clear stream of hydrogen is obtained, so as to avoid getting foul air into the machine. Under ordinary circumstances, in three hours from the time of the machine being halted, it can be prepared for an ascent; but this, should circumstances require it, might be shortened by employing two generators and making a suitable alteration in the purifying arrangement. Such alteration, however, would rarely be necessary, as the balloon, when inflated, can, unless in very windy weather, be very readily carried; twenty-five or thirty men lay hold of cords attached to the ring and march along, allowing the machine to rise only sufficiently to clear any obstacle that there may be in the way.

"Each generator required four horses to draw it, and each balloon, with the tools, etc., four horses. The sulphuric acid it is essential to keep in a carriage to itself, but two horses will draw a sufficient quantity of concentrated acid to last for a long time. The undermentioned is a *resumé* of the balloon corps and apparatus with General McClellan's army:

"*Balloon Corps.*

1 chief aëronaut,
1 captain, assistant do.,
50 non-commissioned officers and privates, } requiring 2 instructed men.

"*Apparatus.*

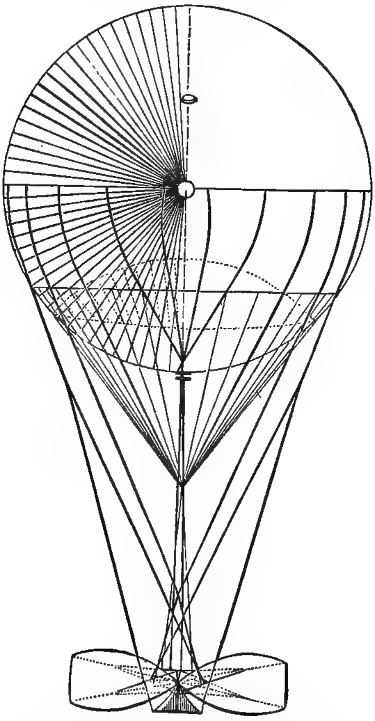
2 generators, drawn by 4 horses each.
2 balloons, " " 4 horses each (including tools, spare ropes, etc.).
1 acid cart, " " 2 horses.

"When the machine is inflated it is kept to the ground by a series of sand-bags which are hooked on to the network, so that they can be disengaged at a moment's notice; thus confined, with the sentry to guard it, the machine remains unhurt in any weather short of a very violent wind storm, in which case it should be hauled down altogether.

"When it is required for an ascent, the captain and some thirty of his men get round the balloon and carry it to the appointed place; the weight to be lifted having been put into the car, the ballast is so adapted, that including a couple of bags of sand, which it is not safe to go up without, there should be a buoyancy of, say, 20 or 30 pounds; the three guy ropes having been attached the men leave go of the car together and seize the ropes, one of which is led through a snatch-block attached to a tree, or some securely fixed object; the ropes are then paid out, and the machine rises to the required height; the motion of the guy ropes is regulated by the aëronaut through the captain on the ground. Of course, on the proper manipulation of the ropes the convenience and safety of the aëronaut depend."

The following extract gives an idea of what *could be seen.*

"During the battle of Hanover Court-house, which was the first engagement of importance before Richmond, I happened to be close to the balloon when the firing began. The wind was rather high, but I was anxious to see, if possible, what was going on, and I went up with the father of the aëronaut. The balloon was, however, short of gas, and as the wind was high, we were obliged to come down. I then went up by myself, the diminished weight giving increased steadiness, but it was not considered safe to go higher than 500 feet on account of the unsettled state of the weather. The balloon was very unsteady, so much so that it was difficult to fix my sight on any particular object; at that altitude I could see nothing of the fight. It turned out afterwards that the distance was, I think, over twelve miles, which, from 1000 feet, and on a clear day, would in a country of that nature have rendered the action invisible."



Aërostat of De Lome. (See p. 46 and FLYING-MACHINE.)

With some considerable experience at Yorktown and before Richmond, the writer can only say that, while no means of obtaining information in war should be neglected, the slight amount obtained by the balloon did not compensate for the enormous expense and incumbrance which it involved. An ascent of 1000 feet was the *maximum* aimed at—probably the maximum *practicable;* for the weight of the rope becomes a limiting element to higher ascensions by captive balloons. In reality I doubt whether more than 600 or 700 feet were ever attained; a very slight wind sufficing to carry the balloon off at a large angle with the vertical through the point of attachment. With modern firearms three miles' distance from the enemy is about a minimum for so large an object, for though the hitting *of the balloon* may involve no great risk to the observer (since it would descend slowly) its injury should be guarded against. The view at three miles' distance from 600 feet height is anything but a "bird's eye" one; but at least it surmounts all *adjacent* obstacles. But suppose the enemy's position lies in a wooded country and extends for several miles. How much of it will be exposed by such a view? If a fortification or a line of battle, with a *clear front,* is the object, there will be improved vision; but to make out anything really specific and useful, a telescope (not a mere binocular) of high power and (hence) small field is indispensable. Now the motion of the balloon renders the use even of the opera-glass difficult; of the telescope absolutely impracticable. Only *once* in all his ascents (before Yorktown) did the use of a telescope appear practicable, and of so little service had it always proved it had been left behind. Descending to obtain one and reascending, a breeze had disturbed the dead calm in which *only* it can be used. *Some* information was obtained from it before Yorktown—much more from the trenches. Before Richmond it rendered no service worthy of record. The count of Paris confirms, in his "History of the Civil War," these views of the writer. (See, for military uses of the balloon, articles by Capt. BEAUMONT and Lieut. GROVER, "Prof. Papers R. E.," vol. xii.)

We hear of no use of the balloon for reconnoitring purposes during the recent Franco-German war; but it at least proved itself to have *a* use. During the German siege upwards of fifty of these aërial packets sailed from the beleaguered metropolis with despatches for the outer world. They conveyed about two and a half millions of letters, representing a total weight of about ten tons. Most of them took out a number of pigeons, which were intended to act as postmen from the provinces. One called *Le Général Faidherbe* was furnished with four shepherd's dogs, which it was hoped would break through the Prussian lines, carrying with them precious communications concealed under their collars. The greater number of these balloons were under the management of seamen, sometimes solitary ones, whose nautical training, it was naturally supposed, would qualify them more especially for the duties of aërial navigation. More than one fell into the hands of the enemy, having dropped down right amongst the Prussians. In some of these cases the crews were generally made prisoners, but in others they effected their escape; and more than once their despatches were preserved in a very remarkable way—in one instance being secreted in a dung-cart, and in another being rescued by a forester, and conveyed to Buffet, the aëronaut of the "Archimède," who had been sent out in search of them, and had traversed the hostile lines on his errand. Many of these postal vessels were carried to a considerable distance, some landing in Belgium, Holland, or Bavaria; whilst one, "La Ville d'Orléans," was swept into Norway, and came to anchor about 600 miles north of Christiania. A few, unhappily, never landed at all. *Le Jacquard,* which left the Orléans railway station on the 28th November, with a bold sailor for its sole occupant, disappeared like many a gallant ship. It was last observed above Rochelle, and probably foundered at sea, as some of its papers were picked up in the Channel. "Le Jules Favre" (the second of that name), which set out two days subsequently, has arrived nowhere as yet; and one of the last of these mail-balloons, the "Richard Wallace," is missing, as much as if it had sailed off the planet into infinite space. So long as these machines continued to be launched by day, they were exposed to a fusillade whilst traversing the girdle of the Prussian guns, the bullets whistling round them even at an elevation of 900 or 1000 mètres. To avoid this peril it became necessary to start them by night, although the disadvantages of nocturnal expeditions, in which no light could be carried, and consequently the barometer could not be duly read, were held by many to outweigh all the dangers attaching to German projectiles. (*British Quarterly,* Oct., 1871.)

Another event so exceptional as the siege of Paris may again justify the use of balloons for similar services, and in open countries they *may* perhaps occasionally serve usefully for military reconnoissances. To science they do not appear (as now constructed) capable of adding much to the little (*something* indeed), they have already given, even though Sir John Leslie ("Encyc. Brit.") directs us to "a skilful and judicious application of balloons for a more essential improvement of the infant science of meteorology." When the "balloon of the future"—that in short which M. Lambert confidently predicts, shall have appeared, then, indeed, science, commerce, social and business intercourse, and the art of war, may all hail it as an important adjunct; till then we must *wait.*

J. G. BARNARD.

A′ërophytes, or **Aë′rial Plants** [from the Gr. ἀήρ, the "atmosphere," and φυτόν, a "plant"], are plants which grow in air only, as distinguished from *terrestrial* plants, or those which grow in earth, and *hydrophytes*, or those which live under water. The epiphytal orchids and many lichens are aërial plants, deriving sustenance from the air and its vapors. They are to be distinguished from parasites, like mistletoe, which feed on, and not merely grow on, trees, etc.

Aërostat′ic Press, a machine used to extract the coloring-matter from dyewoods and other substances by atmospheric pressure. For this purpose a vessel is divided by a horizontal partition pierced with small holes. Upon this the substance containing the coloring-matter is laid, and a cover, also perforated, is placed upon it. The liquid which is to dissolve the coloring-matter is then poured on the top, and the air being drawn from the under part of the vessel by an air-pump, the liquid is forced through the substance by the pressure of the atmosphere.

Aërostat′ics. See AËRODYNAMICS.

Æs′chines [Αἰσχίνης], a celebrated Greek orator, born at Athens 389 B. C., was the greatest rival of Demosthenes. He served with distinction at the battle of Mantinea (362 B. C.), and was in early life an opponent of Philip of Macedon. Having been sent with other negotiators on an embassy to the Macedonian court in 347 B. C., he afterwards became a friend of Philip and an adversary of Demosthenes, who accused Æschines of receiving a bribe from the king of Macedon. He made a famous oration against Ctesiphon, because the latter proposed to reward Demosthenes with a golden crown, but he was defeated in his contest by the matchless eloquence of his rival, and was exiled in 330 B. C. He then retired to Rhodes, where he taught rhetoric with applause. Three of his orations are still extant; they have been edited by Franke (1860) and others. Died in 314 B. C.

Æs′chylus [Gr. Αἰσχύλος], an excellent Athenian tragic poet, born at Eleusis, in Attica, in 525 B. C. He was the most ancient of the three great tragic poets of Greece. He fought with distinction at the battle of Marathon (490 B. C.), and again at the battle of Salamis. In 484 he gained his first prize in tragedy. He composed, it is said, about seventy tragedies, and gained thirteen prizes, but he was defeated by Sophocles in 468 B. C., soon after which he went to Syracuse, where he was honored by King Hiero. He died at Gela, in Sicily, in 456 B. C. According to a commonly received tradition, he was killed by a falling tortoise which an eagle dropped. Only seven of his tragedies are extant—viz., "Prometheus Bound," "The Seven against Thebes," "The Persians," "Agamemnon," "The Female Suppliants," "Choëphori," and "Eumenides." His "Oresteia," which is certainly one of the most powerful works of art which the human mind ever created, is the only complete trilogy which has been left to us. It consists of the three tragedies, "Agamemnon," "Choëphori," and "Eumenides," and shows in the most striking manner how the Greek tragedies which we possess must be considered only as parts of greater compositions—as acts of dramas rather than as dramas. Its idea is to show the redeeming influence of the state in the life of mankind.

Æscula′pius [Gr. Ἀσκληπιός], in classic mythology, the god of medicine, was a son of Apollo. The poets feigned that he raised the dead to life—that he thus offended Pluto, who complained to Jupiter, who killed Æsculapius with a thunderbolt. He was afterwards worshipped as a god, and a temple was erected to him at Epidaurus. According to Homer, he had two sons, Machaon and Podalirius. His descendants were called Asclepiadæ.

Æs′culin, or **Esculin** ($C_{21}H_{24}O_{13}$), a crystalline fluorescent glucoside obtained from the bark of the horse-chestnut and other trees of the genera *Æsculus* and *Pavia*. It possesses a bitter taste, and is converted by boiling hydrochloric or dilute sulphuric acid into glucose and a bitter crystalline substance called æsculetin, $C_9H_6O_4C_{21}H_{24}O_{13} + 3H_2O = 2C_6H_{12}O_6 + C_9H_6O_4$.

Æsir, ā′sir (the Norse plural of *As* or *Asa*, a word of uncertain derivation, but probably allied to the Sanscrit *as*, to "be," and applied as a name to the gods as "beings," *par excellence*), the general name of the beneficent deities of the Norsemen. The principal Æsir are Balder, Frey, Freyia, Frigga, Heimdall, Odin, Thor, Tyr, Vali, and Vidar, which will be noticed under their respective heads.

Æ′sop [Lat. *Æso′pus;* Gr. Αἴσωπος], a celebrated fabulist, born about 620 B. C., is supposed to have been a native of Phrygia. He was a slave in his youth at Athens, but afterwards obtained his freedom in consideration of his wit. A statue executed by Lysippus was erected to Æsop by the Athenians. Many of the fables which in popular collections are ascribed to Æsop are spurious.

Æso′pus (CLODIUS), a famous Roman tragic actor, was a friend of Cicero, and flourished about 75 B. C. His action was grave, dignified, and impassioned. He retired from the stage in 55 B. C.

Æsthet′ics [Gr. αἰσθητικός, "fitted for perception"]. The word and its cognates were applied by the Greeks in relation to the philosophy of perception. In modern philosophy the term is used to denote the scientific classification of the faculties through which we apprehend the beautiful and the sublime, and which give us the experience of the resulting emotions. It involves also the statement and discussion of the laws which should preside over and condition all forms of artistic production, the application of these general laws to the special branches of the fine arts in respect to criticism, and the history of the development of these laws in practice. The principles of æsthetics were in ancient times discussed by Plato, Plotinus, and St. Augustine; and in their application to poetry by Aristotle and Horace; and in relation to eloquence by Quintilian, and to style by Longinus. The term was first used in its modern sense in the eighteenth century by Alexander Gottlieb Baumgarten, professor of philosophy at Frankfort-on-the-Oder. He taught that there is in the mind a power or faculty for the appreciation of the beautiful—a power whose existence is not dependent on that of the intellect, though the latter may be necessary in order properly to direct and develop the æsthetic faculty. Psychologists have classed the operations of the mind under three general heads—namely, the Intellect, the Sensibilities, and the Will. The proper object of the first is Truth; of the second, Beauty in its various forms, including harmony; and of the third, Good or Virtue. Æsthetics would consequently come under the second division, relating as it does to objects or qualities which appeal at once to the sensibilities, without any direct reference to the intellectual power.

There may be said to be two distinct schools, which differ radically respecting the true principles of æsthetic development and culture. The one, starting with the standard works of art, or with the most perfect models which nature offers us, and selecting from each what appears most pleasing or graceful, seeks, by means of these, either by direct imitation or indirect suggestion, to create a new work, which shall combine as many as possible of the elements of the original models. It is obvious that the merits of such a work cannot in any case rise above the aggregate of the merits of the productions after which it has been copied. The other school, recognizing the fact that it is possible for transcendent genius to create forms of beauty which shall not only excel in their combined effect, but in their individual elements, everything that has ever been seen in nature or in art, seeks to cultivate the faculty of ideal conception, using the works of nature or the models of the great masters simply to improve the art of expression; or, in other words, the power to translate, as it were, our ideal conceptions into forms which can be understood and appreciated by the common mind. Those of this school would say that such works as the Apollo Belvedere, or Dannecker's celebrated statue of Christ, could never, in the first instance, be formed from actual nature—that, in fact, the very power of selecting the most beautiful forms, or the most beautiful elements of any particular form, implies the existence of an ideal faculty; for if the mind has not some standard in itself, but is wholly dependent on what it sees for its conception of beauty, why should it not copy the faulty as well as the beautiful? It is, in fact, by trying what it sees by the ideal standard in itself, that it knows how to select the one and reject the other.

Æsthetics cannot yet be considered a complete and systematically developed science, though several of the best minds of the last and present century have done much to investigate and explain its principles. Among the most important works on this subject are the following: FRIEDRICH THEODOR VISCHER'S "Aesthetik, oder die Wissenschaft des Schönen" ("Æsthetics, or the Science of the Beautiful"), which is perhaps the best and most complete work on æsthetics that has yet appeared; HEGEL'S "Aesthetik," contained in his complete works, published after his death; COUSIN'S "Le Vrai, le Beau et le Bon" ("The True, the Beautiful, and the Good"); WEISSE'S "System der Aesthetik," 2 vols., Leipsic, 1830; JOUFFROY'S "Cours d'Esthétique," Paris, 1842; RUGE'S "Neue Vorschule der Aesthetik," 1837; ZIMMERMANN, "Geschichte der Aesthetik," Vienna, 1858; and DIPPEL, "Handbuch der Aesthetik," 1873. (See ALISON, "On Taste," 1784; BURKE, "The Sublime and Beautiful," 1756; BASCOM, "Æsthetics," 1862; H. N. DAY, "The Science of Æsthetics;" and especially KANT, "Kritik der Urtheilskraft.")

REVISED BY M. B. ANDERSON.

Æstiva′tion [from the Lat. *æs′tivo, æstiva′tum,* to "spend the summer," to "retire for the summer season"], a botanical term used to denote the manner in which the parts of a flower are folded in the bud before it has opened. The various forms of æstivation are called *valvate, imbricated, contorted, induplicate, reduplicate,* etc.

Æthiops. See ETHIOPS MINERAL.

Aë′tians, the followers of Aëtius, who was in the fourth century a deacon, and afterwards a bishop. He was an Arian, but was considered a heretic by both orthodox and Arians. His doctrine and followers were condemned in 359 A. D.

Aë′tius, sometimes incorrectly written ÆTIUS, an eminent Roman general, born in Mœsia before 400 A. D. As commander of the Roman army in Gaul, he gained important victories over the Visigoths, Huns, and other barbarians about 425–430 A. D. Aëtius and Theodoric commanded the army which in 451 checked the victorious hordes of Attila the Hun, and defeated him in a great battle at Châlons. He was suspected of treachery by the emperor Valentinian III., who killed him with his own hand in 454 A. D.

Ætna, Mount. See ETNA.

Æto′lia [Gr. Αἰτωλία], a state or country of ancient Greece, was bounded on the N. by Thessaly, on the E. by Locris and Doris, on the S. by the Gulf of Corinth, and on the W. by the river Achelous. It was intersected by the river Evenus, the modern Phidaris or Fidaris. The surface is partly mountainous, the scenery magnificent, and the climate delightful. The range of Mount Pindus extends along the northern part. The ancient Ætolians were a warlike, barbarous, and rude people in the age of Pericles. Ætolia now forms, conjointly with Acarnania, a nomarchy of the kingdom of Greece. (See ACARNANIA.)

Afanasieff (ALEXANDER N.). See APPENDIX.

Affida′vit [Late Lat. from *ad*, "to," *fides*, "faith," *dedit*, "he gave" (*i. e.* "he made oath")], an oath in writing made before some person who has authority to administer an oath; a statement in writing signed by the party making it, and sworn to before some authorized officer, who appends and signs an official statement to that effect, termed a "jurat." By an extension of its original meaning it is made to include also cases where an affirmation, authorized by law, is taken instead of an oath. An affidavit is made *ex parte* and without cross-examination. It is much used in making various motions in court, and in proving conveyances executed before subscribing witnesses, so as to have them recorded. An affidavit is called *extra-judicial* when, though taken before an officer authorized to administer oaths, it is not itself required or authorized by law.

Affin′ity [from the Lat. *ad*, "to," "on," and *fi′nis*, "boundary"], in law, is the relationship contracted by marriage between a man and his wife's kindred, and between a wife and her husband's kindred.

Affinity, Chemical, the attractive force which unites two or more chemical substances so as to form a compound which differs from either of them; or the mutual propensity which certain kinds of matter have to combine with each other exclusively or in preference to any other connection.

Affirma′tion [Lat. *affirma′tio*, from *ad*, "to," and *fir′mo*, *firma′tum*, to "make firm," to "bind"], in law, a declaration made by a witness as a substitute for an oath in a court of justice. This formula is used by Quakers and others who have conscientious scruples against oaths. In the U. S. the use of affirmations instead of oaths has become very common, experience seeming to have shown that the value of evidence and the force of obligations are not diminished thereby.

Affre (DENIS AUGUSTE), archbishop of Paris, was born at St.-Rome-de-Tarn in 1793. He became vicar-general at Paris in 1834, and archbishop in 1840. During the insurrection of June, 1848, he made a generous effort to end the carnage by a personal appeal to the insurgents, but while he was speaking to them hostilities were renewed between the insurgents and the military, and he was mortally wounded by a ball. He left an "Essay on the Egyptian Hieroglyphics" (1834), and other works.

Afghanistan [Af-gan-is-tahn′], a country in Asia adjoining Persia on the W., Beloochistan on the S., India on the E., and Independant Turkestan (now a part of Russia) on the N. Area, about 275,000 square miles; is nearly square. Pop. about 5,000,000, and, as a rule, they are nomadic and warlike, with but little inclination to adopt the habits of civilized life. They are of Caucasian origin.

Description.—The country is very mountainous, only about one-half being fit for agriculture. It is very cold in the mountains, but warm and pleasant in the valleys.

Government.—A limited monarchy.

Cities.—The principal towns are Herat, the key to India, a walled city of 45,000 inhabitants; Candahar, a fortified city, 260 miles S. E. of Herat, pop. 50,000; Cabool, the capital and centre of trade with the East, nearly all nationalities being represented here. It has a pop. of 60,000 and is fortified, as is also Ghuznee.

Rivers and Lakes.—The principal are the Heri Rud, Helmund, Cabool, Urgandab, and Murghab. It has but two lakes of any size.

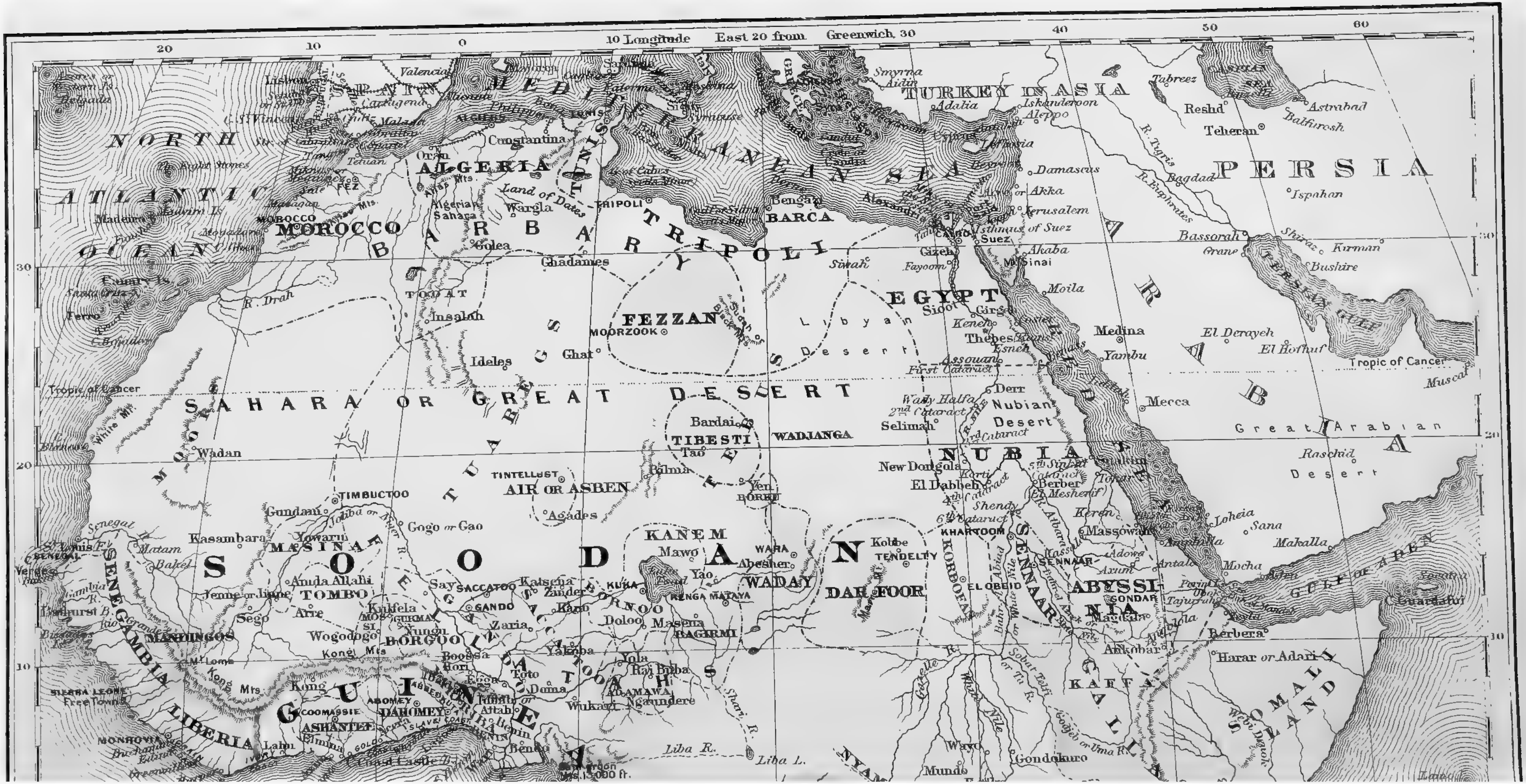
Mountains.—The chief mountains are the Hindu Koosh, Ghanat, Koh-i-baba, Suliman, and Parapamisus. These ranges contain the passes by which the country is entered —Bamaan, on the N.; Zulficar and Robat, on the W.; Kyback and Bolan, on the S; and the famous Khyber, on the E.

History.—In 1749, Ahmed Khan freed his country from Persia, and his descendants ruled until 1829, when the dynasty ended. Dost Mahomet became ruler, and continued to rule until his death, in 1863, when he was succeeded by his son, Shere Ali. During this long reign the Persians and English in their many invasions were successfully resisted; for England has ever been anxious to possess the chief influence in Afghanistan and shut Russia out from the mountain-passes into India. In this effort she has met many reverses. In Jan., 1842, her army, consisting in all of 16,500 men, on its retreat to India, was destroyed, only one man escaping. In March, 1842, another English army entered the Khyber Pass and relieved English garrisons at Jellalabad and Cabool, partly destroyed Cabool, and retired. In 1873 the Russians captured Khiva, and in 1878 a Russian embassy was met with honor at Cabool, while the English delegation was turned back at the Khyber Pass. On Nov. 21, Gen. Roberts again entered Afghanistan, and Shere Ali retired to Turkestan after releasing Yakoob, whom he had imprisoned at Cabool. Feb. 21, Shere Ali died, and Yakoob made peace with the British. Sept. 30, 1879, the Afghans mutinied, and the English residents were murdered. Yakoob surrendered and was sent to India. Abdurrahman Khan now returned, and was proclaimed ameer July 22, 1880. In 1883, Merve surrendered to Russia, whofortified Ravakhs, 200 miles from Herat. In 1884 the British accepted a proposition from Russia to establish a northern boundary for Afghanistan. It was, in general, that the Oxus should form the boundary-line between Afghanistan and Balsken, should deflect at Khoja Sala, pass along the edge of the desert, and end at Pulikhatim, on the Heri Rud. Sir Peter Lumsden headed the British and Gen. Lessar the Russians. The men never met, and, after the skirmish at Pendjeh, Sir Peter was recalled, and the Russians advanced to Zulficar Pass, 100 miles N. W. of Herat. At this date a satisfactory settlement has been made, and the Russian forces have been withdrawn. R. W. WHITNEY.

Afghan Language and Literature (*Pushtu*, *Pashtô*, or *Puχtu*). The Afghan language is, like all mountain languages, a harsh, guttural tongue—so much so that Mohammed is reported to have said that the "Pushtu is the language of hell." It has until recently been classed by all the leading authorities, as Dorn, Lassen, and F. Müller, under the Iranian group of languages of the Indo-European family. But Dr. Ernst Trumpp ("Grammar of the Pashtô Language, or Language of the Afghans, compared with the Iranian and North-Indian Vernaculars," 1873), who is at present considered the highest authority on the Pashtô language, and Prof. M. Haug of Munich, entirely disagree with those who hold this opinion. While Dr. Trumpp wishes to give it an intermediate position between the Iranian and Indian groups, Dr. Haug makes it a separate branch of the great Indo-European family.

The Afghan language has thirty-nine sounds, ten of which are confined to words which have been introduced from the Arabic; it is written with Arabic characters. It is not until very lately that we meet with any literary attempts, and then only imitations of Persian models, partly of a romantic-epical and partly of a lyrical form. One of the earliest, and at the same time most learned, poets is Abdurrahman, from the district of Peshawer, a learned Suffee. Others are—Mirza Khan Anssari, a poet of the first half of the seventeenth century; Khushhal Khan Khattak, his contemporary, who took up his abode in India; but especially Ahmed Shah Abdali, the founder of the Durani dynasty. Historical and religious documents are also not wanting, but none are older than the fifteenth century. The former works on the Afghan language, as the "Grammar" (1840) and the "Chrestomathy" (1847) by Dorn, a "Grammar of the Pukhtu," "Dictionary of the Pukhtu," and the anthology, "Gulshan-i-rôh" ("Selections from the Poetry of the Afghans," 3 vols., 1860–61), by Raverty, and Müller's "Die Conjugation des Afghanverbums" (1867), have been entirely superseded by the new work of Prof. Trumpp, which has already been referred to. A. J. SCHEM.

Afium′, or **Afium-Kara-Hissar** ("black castle of opium"), a city of Asia Minor, in Anatolia, 53 miles S. E. of Kutaieh. It is on a mountain-side, is the residence of a pasha, and has a large trade in opium, whence its name.


10 Longitude East 20 from Greenwich 30
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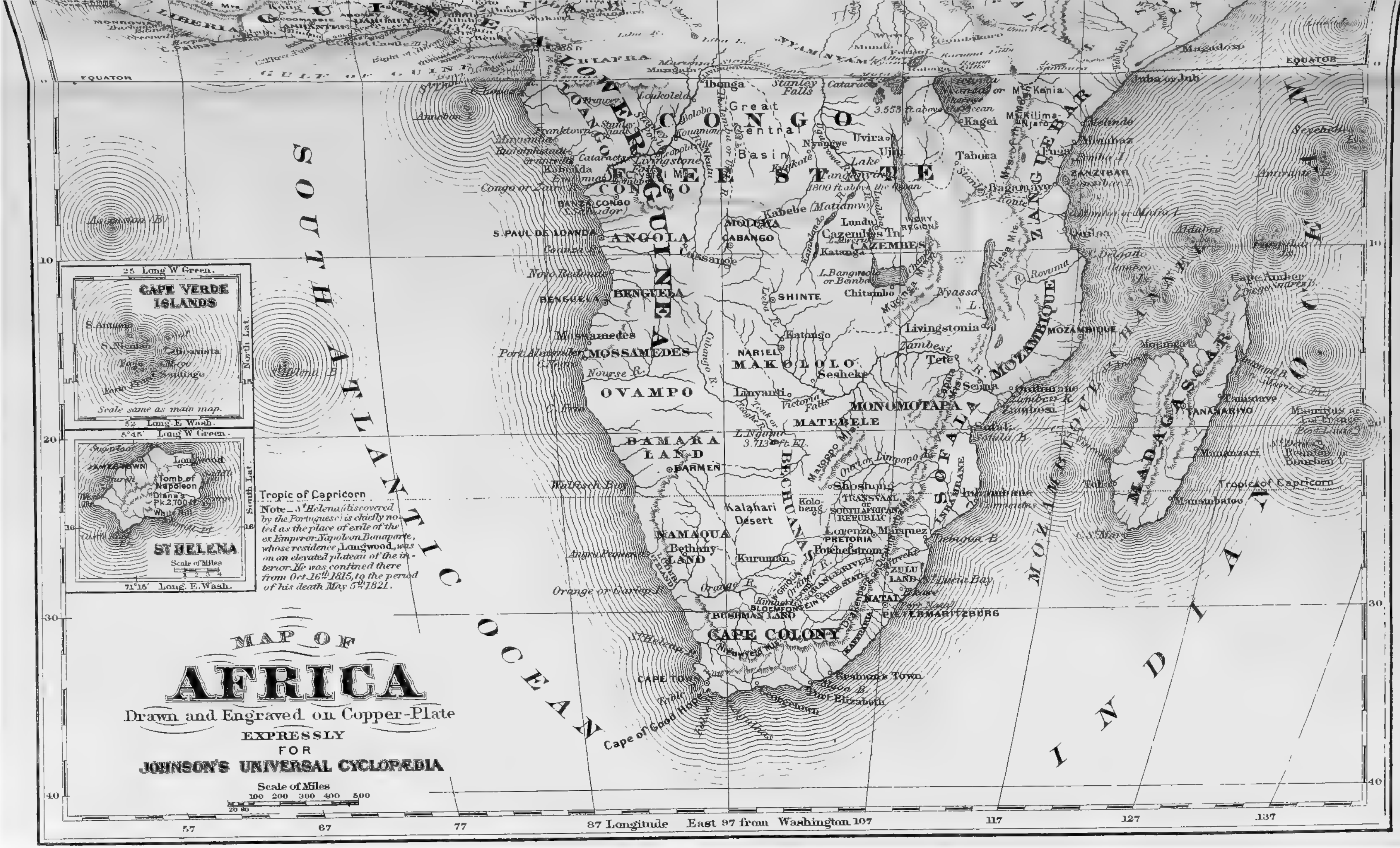
NORTH ATLANTIC OCEAN
Madeira Is.
Canary Is.
Ferro
Tropic of Cancer
Lisbon
Valencia
Cartagena
SPAIN
MEDITERRANEAN SEA
Tunis
Algiers
Oran
Constantina
ALGERIA
Land of Dates
Wargla
Algerian Sahara
Golea
Tetuan
Fez
MOROCCO
Mogadore
R. Drah
BARBARY
TRIPOLI
Tripoli
Bengazi
BARCA
Ghadames
TOUAT
Insalah
Ideles
Ghat
FEZZAN
MOORZOOK
Black Mts.
Sudah
Siwah
Libyan Desert
SAHARA OR GREAT DESERT
TUAREGS
TEBU
MOORS
White Mt.
Wadan
Bardai
TIBESTI
Tao
WADJANGA
Bilma
Yen
BORKU
TINTELLUST
AIR OR ASBEN
Agades
TIMBUCTOO
Gundam
Gogo or Gao
Kasambara
Matam
Senegal R.
St. Louis
SENEGAL
Verde
Bakel
MASINA
Yowaru
Anda Allahi
TOMBO
Jenne
Sego
Arre
MANDINGOS
SENEGAMBIA
Bathurst
SIERRA LEONE
Free Town
LIBERIA
MONROVIA
Kong Mts.
Kong
Wogodogo
Kong
Kulfela
MOSSI
GURMA
Yungu
BORGOO
Say
SACCATOO
GANDO
Katsena
Zinder
Kano
Zaria
Boossa
Bori
Yakoba
Toto
Doma
Wukari
ADAMAWA
Ngaundere
Yola
Rai Buba
KUKA
BORNOO
Doloo
Masena
BAGIRMI
Shari R.
Liba R.
Liba L.
KANEM
Mawo
Yao
WARA
Abesher
WADAY
RENGA MATAYA
SOODAN
GUINEA
COOMASSIE
ASHANTEE
ABOMEY
DAHOMEY
SLAVE COAST
Benin
Attah
Elmina
Lahu
Cape Coast Castle
Kolbe
TENDELTY
DAR FOOR
KORDOFAN
EL OBEID
KHARTOOM
Shendy
SENNAAR
White Nile
Bahr el Abiad
Sobat Telfi or Ta R.
Gazelle R.
Wayo
Mundo
Gondokuro
NYAM
Cairo
Alexandria
Gizeh
Fayoom
Suez
Isthmus of Suez
Mt. Sinai
Akaba
EGYPT
Siout
Girga
Keneh
Thebes
Esneh
Assouan
First Cataract
Derr
Wady Halfa
2nd Cataract
Selimah
Nubian Desert
NUBIA
New Dongola
El Dabbeh
Berber
El Mesherif
R. Atbara
Keren
Massowah
Adowa
Axum
ABYSSINIA
GONDAR
Magdala
Ankobar
KAFFA
GALLA
Godjeb or Uma R.
Tajurrah
Zeyla
Berbera
Harar or Adari
SOMALI LAND
Webi Dusok
GULF OF ADEN
Guardafui
Mocha
Loheia
Sana
Makalla
Mecca
Medina
Yambu
Moila
El Derayeh
El Hofhuf
Raschid
Great Arabian Desert
ARABIA
Muscat
Tropic of Cancer
PERSIAN GULF
Bassorah
Grane
Shiraz
Bushire
Kirman
Ispahan
PERSIA
Teheran
Reshd
Astrabad
Balfurosh
CASPIAN SEA
Tabreez
R. Tigris
Bagdad
R. Euphrates
Damascus
Akka
Jerusalem
Beyroot
Aleppo
Iskanderoon
Adalia
Smyrna
Aidin
TURKEY IN ASIA
GREECE
Cyprus
Candia
Malta
Sicily
Syracuse
Palermo
Sardinia
Gulf of Sidra



Tropic of Capricorn

Note_ S^t Helena (discovered by the Portuguese) is chiefly noted as the place of exile of the ex Emperor Napoleon Bonaparte, whose residence, Longwood, was on an elevated plateau of the interior. He was confined there from Oct. 16^th 1815, to the period of his death May 5^th 1821.

MAP OF
AFRICA
Drawn and Engraved on Copper-Plate
EXPRESSLY
FOR
JOHNSON'S UNIVERSAL CYCLOPÆDIA

Here are numerous mosques, a citadel, and manufactures of carpets, arms, saddlery, etc. Pop. estimated at 50,000.

Afrago′la, an Italian town, in the province of Naples, noted for its manufactures of straw bonnets. Pop. 16,129.

Afrancesa′dos, a name given to those Spaniards who supported the French cause, or recognized Joseph Bonaparte as king, in 1808–13. They were proscribed or treated with severity by Ferdinand VII. after he was restored to the throne.

Af′rica [from the Carthaginian *Afrygah,* "a colony"] was the Libya of the ancients, and is one of the four continents or great divisions of the globe. Until very modern times Africa was a synonym for the unknown; while a narrow fringe around its borders had been explored, its vast and mysterious interior was untrodden by the foot of civilized man. Lying almost wholly in or near the equatorial regions, its torrid climate and enormous deserts render exploration perilous to Europeans; yet a long line of travellers, from Mungo Park in the last century to Stanley in the last decade, have persisted in pushing their explorations, until the great geographical features of Africa are mapped out with some approach to accuracy.

Situation, Area, etc.—Africa extends from 38° N. to 35° S. lat., and reaches from 17° W. to 51° E. lon., its greatest breadth (about 4600 miles) being nearly equal to its extreme length (5100 miles). The Mediterranean Sea is its northern boundary, its whole W. coast is washed by the Atlantic, while on the E. it is bounded by the Red Sea and the Indian Ocean. Its entire area is roughly estimated at 11,500,000 square miles. The Isthmus of Suez connects it with Asia on the N. E. Its coast-line, more regular than that of other continents, is broken by few bays, the Gulf of Guinea, on the W., being the principal. The physical features are marked by the great plains and low plateaus in the tropical part of North Africa and the high plateau of Central and South Africa, varied with mountain-groups.

Deserts, Mountains, Rivers, etc.—The great Desert of Sahara stretches almost across Northern Africa, between 15° and 35° N. lat., with an area of 2,385,644 square miles. It is not an unbroken sandy expanse, but full of variety, broken by great oases or green stretches of land, lying sometimes 100 feet below sea-level and marking areas of great depression. The plateaus of Southern Africa, from 3000 to 5000 feet high, are fertile and thickly populated. Near the equator in the E. are volcanic peaks with snow-clad summits, 14,000 to 18,000 feet high. The Atlas Mountains in North-western Africa, between Barbary and Morocco, reach 12,800 feet, while the Camaroon Mountains (volcanic), in the Congo region, reach 13,700 feet. Few geological changes and almost no earthquakes have occurred in this most conservative of all the continents. The useful metals are nowhere abundant; gold, copper, and diamonds are found in Southern Africa in considerable quantity. Dense forests with the rankest vegetation, teeming with animal and insect life, pervade the equatorial regions. The rainfall is here excessive, while to the N. and S. of it thousands of miles are parched with perpetual drought. The climate is more equable in the distribution of heat than that of America or Asia. The rivers of Africa, though vast and navigable in the interior, are obstructed near their mouths by bars or rapids. The Nile, a geographical enigma for centuries, drains over one million square miles, its first appearance as a river being 4200 feet above the sea, at the lake of Victoria Nyanza. The White Nile and the Blue Nile are great affluents of the Nile in Eastern Africa; it fertilizes immense regions by its annual overflow. The next largest rivers are the Senegal, the Niger, and the Congo, in Western Africa; in South-eastern Africa, the recently explored Zambesi, the fourth river, in point of size, on the continent, emptying into Mozambique Channel. The great lakes form a marked feature of this continent. The lately discovered Victoria Nyanza and Albert Nyanza, in the Upper Nile basin, are fresh-water seas of immense but unknown extent. Lake Chad, near the equator, measures 220 miles by 140. Lake Dembea lies in Abyssinia; Lake Nyassa, 9000 square miles, Lake Tanganyika, 10,000 square miles in area, and Lake Ngami, 2900 feet above sea-level, are in South-eastern Africa. The African climate is tempered at the equator by the thick forests and heavy rains. Extreme heat pervades the Sahara, as well as the regions S. of the equator, and most of the African territory is free from snow except on mountain-tops. The mean temperature of the year varies, in regions where observed, from 57° to 98°, but the thermometer frequently shows 125° F. in the shade. Almost exempt from hurricanes, there are steadily-prevailing monsoons laden with heat. The most valuable productions of the vegetable kingdom are dates, oranges, olives, rice, cotton, indigo, bananas, and grains. The wild animals include the elephant, lion, tiger, zebra, hyena, rhinoceros, leopard, quagga, antelope, giraffe, crocodile, hippopotamus, monkey, ostrich, etc. The camel is used throughout Northern Africa as the principal beast of burden. Edible fish abound; the locust is the scourge of the continent, and flies and white ants are perpetual plagues.

Inhabitants.—The people of Africa are chiefly of the Ethiopian, or darkest negro, race; but the Caucasians, both dark and light, people Egypt and Abyssinia. The Copts, Nubians, and Berbers have little in common with the black race, and cultivate commerce, manufactures, and agriculture. The Kabyles of the Barbary States are miners and agriculturists. The Moors are a handsome race, mixed with the Arabs, and pursue trade and mechanics successfully. The negro nations of Middle and Southern Africa, all uncivilized with slight exceptions, are divided into great kingdoms and smaller tribes. Some of them are warlike, others mild and social. The Hottentot race differs wholly from the rest, resembling the Mongols in their yellow complexion. The Soudan and the valleys of the great rivers are the most densely populated regions. The occupations of the natives in most parts of Africa do not reach beyond satisfying the daily wants of life. The rudest agriculture, hunting, and cruel wars waged to capture slaves, divide the energies of these savages, millions of whom have no knowledge of the outer world. European colonies have done little to reclaim or civilize; industry and intelligence are at the lowest ebb, and education is unknown.

Religion and Language.—Northern Africa, having been conquered by the successors of Mohammed, is largely Arabian to this day, and the Mohammedan religion prevails, numbering, perhaps, one-third of the entire African population. The Jews, who early made settlements in Africa, are numerous in the cities; their number is estimated at 700,000. Christianity prevails in Madagascar, Liberia, the British possessions of Southern Africa, Algeria, and parts of Abyssinia and Egypt. The mass of Africans are heathen idolaters. In language, the dialects are so mixed with one another that no accurate classification is possible, though Prof. Müller distinguishes five great classes: 1. The African negro languages; 2. Those of the Central Africans; 3. The Hottentot dialects; 4. The Caffre languages; 5. The Caucasian, comprising the Semitic and Hamitic groups, the former including Arabic and Ethiopic.

Commerce.—The commerce of Africa is much the smallest of any territory of equal extent or population on the earth's surface. In 1880 the whole sea-going tonnage of African nations comprised 22 vessels; the exports of the whole continent amounted to less than $150,000,000, and these were chiefly from British and French colonies, and in foreign vessels. The slave-trade used to be the principal commerce of the W. coast, but it is now nearly broken up by the concerted efforts of civilized nations, European and American. The chief exports are ivory, timber, palm-oil, feathers, gold, etc. The inland trade is more extended, the circulating medium being chiefly cowries or small shells.

The African continent, with so much rich and fertile soil lying uncultivated for centuries, may fitly be termed a land of vast undeveloped resources. Besides its enormous agricultural capabilities, there are found lead, copper, salt, and iron. As yet, however, the hand of enterprise has touched only a narrow fringe of this vast continent.

History and Discovery.—The only African history worthy of note is the history of discovery. This began, according to curious antiquaries, in Roman voyages as far south as Abyssinia; the Arabs penetrated with the camel to the centre of the great desert. Africa was first circumnavigated by the Portuguese Vasco da Gama in 1498, the Cape of Good Hope having been discovered by Diaz in 1486. The English began expeditions for exploring Africa in 1788, but for years the travels of Mungo Park, Hornemann, Tuckey, Bruce, Clapperton, etc. afford but a melancholy record of failure, disaster, and death. More recently Dr. Barth successfully explored Northern Soudan, and Dr. Livingstone, whose discoveries mark an era in African exploration, began in 1849 by finding Lake Ngami in Southern Africa, passing through the continent to the mouth of the Zambesi. Later he explored Lake Nyassa, and in 1865 set out to find the source of the Nile. Lost and unheard from for years, the Stanley expedition was equipped by the New York *Herald*, and Livingstone was found in 1872, sending his journal home by his adventurous discoverer. Livingstone died the next year. In 1857 Du Chaillu began his journeys on the W. coast, afterward exploring Ashango, and Capts. Burton and Speke, sent by the Royal Geographical Society, discovered Lake Tanganyika. In 1860–63, Speke and Grant penetrated to the White Nile, and named the great lake previously discovered the Victoria Nyanza. In 1864, Capt. Baker discovered Lake Albert Nyanza, which is, like the Victoria, another great reservoir of the Nile. In 1869–71, Dr. Schweinfurth explored the tributaries of the White Nile, and Sir Samuel

Baker, with an Egyptian military expedition to suppress the slave-trade, penetrated the upper Nile region, returning in 1873. The German explorer Dr. Krapf in 1849 discovered new mountains in Central Africa, and in 1851 Galton explored and mapped out a large region in the south-west. In 1856, Moffat surveyed the Orange River; in 1857, Dr. Bastian explored interior Congo and Angola; in 1858, Petherick penetrated from Egypt to the upper waters of the White Nile, and the French savant Duveyrier explored Algerian Sahara. Very important journeys in Morocco were begun by G. Rohlfs in 1861, who traversed in 1865–67 the whole northern continent, reaching Lake Chad through the interior, and thence penetrating by a new route S. to the Bight of Benin. The German Mauch found new gold-fields in the mountains near the Zambesi in 1866–67, and discovered in 1872, in South-eastern Africa, the ruins of a city. The same year a German society for exploring Africa was formed, which sent out Dr. Güssfeldt to explore the Congo. In 1869 Winwood Reade added to our knowledge of Africa by a journey of observation from Sierra Leone to the head of the Niger. The Royal Geographical Society sent out Lieut. Cameron in 1872 from Zanzibar to follow the footsteps of Livingstone, and another expedition from the W. to the interior, known as the Livingstone Congo expedition, both of which made valuable additions to the chartography of Africa. Stanley's second expedition to explore the lake-region of Central Africa started Nov., 1874, with 300 men, reaching Victoria Nyanza Feb., 1875, with the loss of 194 by death and desertion. They circumnavigated the lake, then marched across to the Albert Nyanza, from whence he explored the whole course of the Lualaba, literally fighting his way through hostile tribes, and emerged at the mouth of the Congo in Aug., 1877. This expedition of 1800 miles cleared up many doubtful points in African topography, notably proving the Lualaba to be the same as the Congo, of which it forms the great E. branch, instead of being, as Dr. Livingstone supposed, an affluent of the Nile. In 1874 Lieut. Cameron undertook to penetrate the continent from Lake Tanganyika to the W. coast nearly under the equator, travelling on foot from Zanzibar to Benguela, nearly 3000 miles, one-third of which was through a region utterly unknown before. His object was to explore the Congo for its sources, but this he was obliged to abandon from want of means. In 1878 Lieut. de Brazza explored the river Ogowa, running the gauntlet of savage tribes, and marching barefooted for 800 miles; like Du Chaillu, he describes cannibals and their revolting habits, and the existence of the gorilla, long stoutly denied, has been established. Major Pinto, a Portuguese geographer, in 1877–79 explored the whole region from Benguela to the Zambesi, thence east to the Transvaal republic. He established the course of several rivers, flowing through unknown regions, and underwent great hardships and privations. Dr. Holub in 1879 explored the interior of the Zambesi country, making the chart of the river and discovering a new people, the Marutse, differing materially from the other tribes. Like Livingstone, Dr. Holub went unprotected and alone. (See the articles SOUDAN and CONGO.)

[Compiled and rearranged from BEHM and WAGNER, "Bevolkerung der Erde," 6th issue, Gotha, 1880.]

	Square miles.	Population.		Square miles.	Population.
NORTH AFRICA.			Transvaal Rep.	113,708	315,000
Algeria	257,487	2,867,626	Port. pos.		
Egypt	394,242	5,586,280	E. Coast	382,584	350,000
Egyptian dependencies.	758,706	11,833,700	W. Coast	30,289	2,000,000
Morocco	313,560	6,370,000	Native pos.	1,979,042	23,050,168
Sahara	2,385,644	2,850,000	EQUATORIAL REGIONS	1,533,531	47,000,000
Tripoli (with Barca and Fezzan)	398,873	1,010,000	ISLANDS IN THE ATLANTIC.		
Tunis	44,910	2,100,000	Ascension	[illegible]	27
MOHAMMEDAN STATES OF CENTRAL SOUDAN	661,984	31,770,000	Canaries	2,943	280,388
WEST AFRICA.			Cape Verde Is.	1,486	90,704
Liberia	18,944	718,000	Fernando Po, Annobon, etc.	[illegible]	35,000
Senegambia (Fr.)	96,530	138,182	Madeira	314	132,221
Soudan, W., inc. Upp. Guinea	769,316	43,600,000	St. Helena	47	6,241
EAST AFRICA.			St. Thomas and Principe	417	20,931
Abyssinia	128,646	3,000,000	Tristan da Cunha	45	85
Galla and Somali Land	732,256	15,500,000	ISLANDS IN IND. OCEAN.		
SOUTH AFRICA.			Comoro Islands with Mayotta	761	62,600
Basuto, etc.	25,898	172,978	Madagascar	228,498	2,500,000
Caffraria	15,569	400,500	Mauritius and dependencies	1,025	368,014
Cape Colony	199,890	720,981	Réunion	764	182,130
Natal	18,744	356,517	Socotra	1,381	4,100
Orange Free State	43,038	75,000	Zanzibar	614	200,000
			Other islands	2,513	10,000
				11,545,045	205,679,000

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African Methodist Episcopal Church, The, was organized in 1816 by colored Methodists, who had been down to that date under the care of the Methodist Episcopal Church. They elected Rev. Richard Allen their first bishop in 1816. Their doctrines are substantially the same as those of the parent Church. They report (1881) 1498 ministers and 215,000 members. They have four high academies, one university, and two weekly journals. (See METHODISM, by REV. ABEL STEVENS, A. M., LL.D.)

African Methodist Episcopal Zion Church, The, was formed in 1820 by a secession of African Methodists from a congregation of the Methodist Episcopal Church in New York City. They held their first annual conference in 1821; it was composed of 22 preachers, and reported 1426 church members. In 1838 the conference elected Rev. Christopher Rush its first bishop, with the title of superintendent. Its superintendents are elected quadrennially by the general conference. They report (1881) 1500 ministers and 191,000 church members. Their doctrines and ecclesiastical system are mostly copied from those of the Methodist Episcopal Church. (See METHODISM, by REV. ABEL STEVENS, A. M., LL.D.)

Africa'nus (SEXTUS JULIUS), a Christian writer eminent for his learning, died about 232 A. D. He wrote a general chronology of the world from the creation to 221 A. D., in which he fixes the date of the creation at 5499 B. C.

Afton, capital of Union co., Ia. (see map of Iowa, ref. 7-F, for location of county), on R. R., 180 miles W. of Burlington and 50 miles S. W. of Des Moines. It has a fine court-house. Pop. in 1880, 1231; in 1885, 1112.

Ag'ades, Ag'adez, or **Ag'dez,** a city of Central Africa, capital of the kingdom of Asben, is in an oasis of the Sahara; lat. 16° 30′ N., lon. 8° 12′ E. It formerly had a population of about 50,000, which is now greatly reduced. It is visited by merchants from Soudan, and others from Northern Africa. Pop. about 7000.

Agamem'non [Gr. Ἀγαμέμνων], the son of Atreus, king of Mycenæ, was a brother of Menelaus. He had the chief command of the Greeks at the siege of Troy, where he quarrelled with Achilles. He, as well as his brother, was often called ATRI'DES (*i. e.* "son or descendant of Atreus"). After his return from Troy to his own kingdom he was murdered by his wife Clytemnestra and Ægisthus. He was the father of Orestes, Electra, and Iphigenia.

Agamen'ticus, Mount, in York co., Me., is about 4 miles from the ocean, above the level of which it rises 673 feet. It is an important landmark for seamen; lat. 43° 13.4′ N., lon. 70° 41.2′ W. It is in York township.

Ag'ami (the *Pso'phia* of the naturalists), a genus of South American birds, called trumpeters from a peculiar sound which they utter. The *Pso'phia crep'itans* is equal in size to a large pheasant, but has longer legs and neck. It can be perfectly domesticated.

Ag'apæ [from the Gr. ἀγάπη, "brotherly love"], love-feasts, or feasts of charity, in use among the early Christians. After the celebration of the communion, the oblations which had been made in the church, consisting of meat and bread, which the rich had brought from their houses, were consumed at a common feast.

Agapem'one [from the Gr. ἀγάπη, "love," and μονή, "abode"], a community of fanatics and free-lovers formed in 1846 at Charlynch, in Somersetshire, England, by Henry J. Prince, who was previously a clergyman of the Anglican Church. His disciples, known as "Lampeter Brethren," or "Family of Love," hold their property in common, live in splendid style, and pass their time in voluptuous ease. Mr. Prince makes extravagant pretensions as an apostle or reformer in religion, and it is said that he is styled "God incarnate" by his followers, who are sometimes called Princeites.

Agape'tæ [from the Gr. ἀγαπητός, "beloved"], the title given to the virgins and widows who among the primitive

Christians devoted their time to the service of bishops and ministers.

Agape'tus I. was elected pope of Rome in 535. Died in 536 A. D.

Agapetus II. became pope in 946, died in 955 or 956

A'gardh (Karl Adolph), a Swedish naturalist, born in Scania Jan. 23, 1785, was ordained a priest in 1816. He wrote, besides other works, "Species of Sea-weeds" ("Species Algarum," 1820–28) and "Systematic Arrangement of Sea-weeds" ("Systema Algarum," 1824). He became bishop of Karlstad in 1834. Died Jan. 28, 1859, and was succeeded by his son, T. G. Agardh, an equally distinguished algologist.

Ag'aric [Lat. *Agar'icus,* from the Gr. ἀγαρικόν], a genus of fungi, the species of which are very numerous. True agarics have radiant gills, while *Boleti* have tubes beneath the cap or pileus. The *Agaricus campestris* or common mushroom and some others are delicate articles of food; the *Agaricus muscarius* and other species are dangerous poisons; many of the deliquescent species are called toadstools; numerous small ephemeral species appear to be harmless. The *Agaricus olearius* is remarkable for being phosphorescent. The common mushroom is frequently cultivated, both in the open garden and in sheds. The term *agaric* is also applied to various *Polypori* and other fungi which grow on the trunks of trees. From some of these "punk," "touchwood," or "amadou" is prepared.

Aga'sias of Eph'esus, a Greek sculptor, who is supposed to have lived about 400 B. C. Among his works is a fine statue called "The Gladiator" or "Borghese Fighter."

Ag'assiz (Alexander), LL.D. See Appendix.

Ag'assiz (Louis John Rudolf), M. D., Ph. D., LL.D., an eminent Swiss naturalist and geologist, born in the parish of Motier, near Lake Neuchâtel, May 28, 1807, was the son of a Protestant minister. He studied the medical sciences at Zurich, Heidelberg, and Munich, where he graduated. His first work was a Latin description of the fishes which Martius and Spix brought from Brazil, published in 1829–31. He devoted much time to the study of fossil fishes, and was appointed professor of natural history at Neuchâtel in 1832. During a visit to Paris he formed friendships with Cuvier and Humboldt. His reputation was increased by a great work in French, entitled "Researches on Fossil Fishes" (5 vols., 1832–42, with more than 300 plates), in which he made important improvements in the classification of fishes. Having passed many summers among the Alps in researches on glaciers, he propounded some new and interesting ideas on geology and the agency of glaciers in his "Études sur les Glaciers" (1840) and his "Système Glaciaire" (1847), which are among his principal works.

In 1846 he crossed the Atlantic on a scientific excursion to the U. S., in which he soon resolved to fix his permanent residence. He accepted, about the beginning of 1848, a chair of zoology and geology at Harvard; he explored the natural history of the U. S. at different times, and gave a new impulse to the study of nature in this country. He rejected the Darwinian theory of organic development. In 1865 he conducted an expedition to Brazil, and explored the lower Amazon and its tributaries, in which it is stated that he discovered more than 1800 new species of fishes. He became in 1868 a non-resident professor of natural history at Cornell University, Ithaca, N. Y. Early in Dec., 1871, he accompanied the Hassler expedition, under Prof. Pierce, to the South Atlantic and Pacific oceans and the western coast of America. Among his important works are "Outlines of Comparative Physiology" (1848); a "Journey to Brazil" (chiefly written by his wife, 1868); and "Contributions to the Natural History of the United States," an expensive work which was to extend to ten vols. 4to, of which the first four volumes appeared 1857–62. Probably no one except Hugh Miller did more to popularize science in our time than Agassiz, and no other teacher trained so many young and rising naturalists. Yet it may be observed that some of his favorite opinions (*e. g.* of the absolute immutability of species) are not now held by many living naturalists. More, however, than almost any other leader in modern science, Agassiz insisted upon a theistic view of creation, as opposed to the idea of the self-evolution of uncreated nature. "He is not merely," says Mr. Whipple, "a scientific thinker; he is a scientific force; and no small portion of the immense influence he exerts is due to the energy, intensity, and geniality which distinguish the nature of the man. In personal intercourse he inspires as well as performs, communicates not only knowledge, but the love of knowledge." He died at Cambridge, Mass., Dec. 14, 1873.

Agassiz, Mount, a remarkable mountain-peak of Arizona, is an extinct volcano, about 70 miles N. E. of Prescott. It is 10,000 feet or more above the level of the sea, and belongs to the range or group of San Francisco Mountains. As a place of summer resort it has every attraction—scenery, water, climate, elevation, and proximity to one of the greatest natural curiosities in North America, the Great Cañon of the Colorado.

Ag'ate [from *Acha'tes,* a river of Sicily, where they were first found], a mineral much used for ornamental purposes, is a variety of quartz marked with veins or layers, which are different in color and often concentric. This structure is due to the mode of formation, in successive layers on the walls of cavities, usually in volcanic rocks. Agates are found in all countries, and are much used for ornaments and utensils, such as seals, ring and pin stones, vases, cups, mortars, etc. Many of the polished agates are very beautiful, and their preparation has created an important industry at Oberstein in Germany. Here great skill is displayed in cutting and polishing agates, and still more in *coloring* them. A large part of the Oberstein agates come originally from South America.

Ag'atha, Saint, a Sicilian virgin and martyr, who was put to death in 251 A. D.

Agathar'chus ['Αγάθαρχος], a Greek painter who lived about 480 B. C., is regarded as the inventor of scene-painting, or the first who applied the laws of perspective to the art of painting.—Another painter of this name lived about sixty years later, and was patronized by Alcibiades.

Aga'thias, surnamed Asianus, a Greek historian and poet, born at Myrina, in Asia Minor; became a resident of Constantinople about 554 A. D.; wrote a history of contemporary events, which is extant. Died about 580.

Agath'ocles [Gr. 'Αγαθοκλῆς], a tyrant of Syracuse, born in Sicily, was originally a potter. He raised himself by his talents to a high military rank, and also distinguished himself as an orator. Having massacred a large number of the prominent and respectable men of Syracuse, he obtained the supreme power in 317 B. C. He afterwards waged war against the Carthaginians, over whom he gained several victories in Africa, but was subsequently defeated by them. In 306 B. C. a peace was made, which secured to both parties their former possessions. Died in 289 B. C. His death is ascribed to a poisoned toothpick, given to him at the instigation of his grandson Archagathus.

Ag'athon, or **Ag'atho** ['Αγάθων], a tragic poet, born at Athens about 450 B. C., was a friend of Plato and Euripides. He gained a prize for one of his tragedies in 416 or 417 B. C. Plato expressed a high opinion of his works, of which only small fragments are extant. D. about 400 B. C.

Aga've [from the Gr. ἀγαυός, "illustrious," "noble"], a genus of plants of the order Amaryllidaceæ; mostly natives of tropical America. The most remarkable species of this genus is the *Agave Americana,* the maguey of the Mexicans, etc., commonly called American aloe, or century plant. The latter name originated in an incorrect opinion that it bears no flowers until it has attained the age of one hundred years. This age, or near it, is sometimes attained in temperate climates, but in hotter regions it often blossoms when less than ten years old. When this takes place, a bud rises from the crown of thick and fleshy spiny-toothed leaves, which lengthens at first at the rate of a foot or two a day into a scape from 20 to 30 feet high, bearing a panicle of greenish-yellow flowers, sometimes as many as 4000 in number. After flowering and maturing seed, the plant dies. Just when the flower-stalk is ready to appear, the Mexicans cut away the bud and scoop out the centre; into this a sweet sap, which would have supported the rapid growth, is abundantly poured. This is evaporated into syrup or sugar, or fermented into a kind of beer or cider, called *pulque,* the favorite beverage in Mexico. From the pulque a strong ardent spirit (mescal) is obtained by distillation. The leaves yield strong and useful fibres (pita thread, sisal hemp). Other species are cultivated among tender succulent plants. A small one is a native of Virginia, Illinois, etc.

Agde (anc. *Ag'atha*), a town of France, department of Hérault, on the river Hérault and Canal du Midi, or Languedoc Canal, 2 miles from the Mediterranean, and 18 miles by rail E. of Bézières, In the vicinity is an extinct volcano. The town is mostly built of black basalt, and is popularly called the Black Town. Here is a fine old Gothic cathedral and college, also a school of navigation. Soap and verdigris are manufactured, and the town has an active trade in wine, oil, silk, grain, etc. Its harbor is in lat. 43° 17′ N., lon. 3° 28′ E., at the mouth of the Hérault River, is accessible to ships of 200 tons, and is defended by a fort. Pop. in 1881, 8170.

Age [Lat. *æ'tas*], a word used in various significations: 1, it denotes the whole duration of the life of a man or other creature; 2, a certain portion or period of human life, which, according to Shakspeare, is divided into seven ages; 3, the time when a person is authorized by law to act for himself, and is released from the control of his parents or guardians. According to the laws of England and the U. S., a person becomes of age when he or she is twenty-one years old. Before this age one cannot vote or make a valid will. A citizen of the U. S. cannot be a Senator before the age of thirty, nor President before the age of thirty-five. In Great Britain men are eligible to Parliament at twenty-one. The natural divisions of human life are infancy, childhood, boyhood (or girlhood), adolescence, manhood (or womanhood), and old age. The age of puberty is fourteen or fifteen. The sixty-third year is called the grand climacteric. Some trees are believed to live to an age of 4000 years or more. The average life of a horse is from twenty-five to thirty years; of an elephant, probably about two hundred; of a dog, from twelve to fifteen. Fishes are remarkable for longevity, and a carp (it is said) has been known to live two hundred years.

Age, in chronology and history, is sometimes used as synonymous with century, and sometimes also with a generation. Writers differ in respect to the period included under what is called the *Middle Ages*, but they are commonly understood to begin about the time of Charlemagne, and to extend to the fifteenth century.

Age, in literature, is a period usually bearing the name of some powerful person who flourished during that time. Among the most memorable of these are the age of Pericles, the Augustan age, the age of Leo X., and the age of Elizabeth (or Elizabethan age).

In geology, an Age is the second great division of time—*e. g.* the *Devonian Age*, the time in which the Devonian system of rocks was deposited—or intervals in the life-history of the globe marked by the prevalence of certain forms of animal or vegetable life; *e. g.* the *Age of Mammals* = the Tertiary; the *Age of Reptiles* = the combined Triassic, Jurassic, and Cretaceous Ages of geological time.

Age is a term used to designate the successive epochs or stages of civilization in universal history or mythology. The Greek and Roman poets imagined a series of four ages—the Golden, the Silver, the Brazen, and the Iron. An ancient and widespread tradition commemorates the pristine innocence, peace, and happiness of the primeval Golden Age, under the reign of Saturn. The other three were regarded as successive degrees of declension from that primitive state. The *pre-historic* ages in modern anthropology are usually called the older and newer stone ages (palæolithic and neolithic ages) and the age of bronze.

Agen, å'zhâɴ' (anc. *Agin'num*), a town of France, capital of the department of Lot-et-Garonne, on the right bank of the Garonne, 85 miles by rail S. E. of Bordeaux. It is pleasantly situated in a fertile country, and has an active trade in brandy, prunes, leather, wine, madder, and other articles. Here is a college and a public library; also manufactures of serge, cotton prints, and linen goods. It is the seat of a bishop and a high court of justice. Joseph Scaliger was born in the vicinity of Agen. Pop. in 1881, 20,485.

Agen'da [from *a'go*, *ac'tum*, to "act" or "do"], a Latin word signifying "to be done," or "what ought to be done," has been applied by theologians to practical duties as distinguished from the *credenda* ("to be believed"), or doctrines that must be accepted as articles of faith. In the ancient Church it signified, first, divine service in general; and second, the mass in particular. It is also applied to church-books giving the order of church-services.

Agénois, å'zhå'nwå', a former district of France, in Guienne, had an area of about 1080 square miles. It is now comprised in the department of Lot-et-Garonne.

Age'nor [Gr. 'Αγήνωρ], in classic mythology, a king of Phœnicia and a son of Neptune, was the father of Cadmus, Phœnix, and Europa.

A'gent [from the Lat. *ago*, to "act"], in law, one who acts for another. This is an extensive topic, and must be treated with a brevity scarcely admitting even a sketch of its rules. Many of its principles closely resemble the corresponding topic in the Roman law (*mandat*), so that they are of quite general application in the jurisprudence of civilized countries. Agency may be created by express words or by implication. There are cases in which an express authority in writing is necessary by statutory law. It is a general rule that when an act is to be done under seal the agent's authority must be of the same grade. Should a person act as agent without authority, the subsequent ratification of the act will make it valid and binding on the person for whom it was done, in the same manner as if he had originally directed it. An agency is often implied from the course of business. A wife who sells goods in her husband's shop, or receives payment of a debt due him with his knowledge and without objection, may be deemed to be his agent, and may bind him in subsequent transactions of a similar kind. An agency is in general revocable either by the principal's own act, executed with sufficient notoriety, or by some event which renders the performance of the act impracticable. Thus, the death of the principal, in general, causes an instantaneous revocation. There is a class of powers, termed "powers coupled with an interest," which in their nature are irrevocable. There must be in this case an interest on the part of the agent in the property over which the power is to be exercised. An illustration is the pledge of goods for a debt, with a power to sell in default of payment. The leading points in agency are the relations of principals to third persons, those of the agent to third persons, and the mutual relations between the principal and agent.

I. *The Relations of the Principal to Third Persons.*—It is a rule that when an agent acts within the scope of his employment he may bind his principal. This is on the principle of identity. There is another class of cases where the agent is not acting within the scope of his employment, but the principal has given him the *appearance* of authority, and the third person with whom he deals has no adequate means of distinguishing between his apparent and actual authority. In this case the principal is liable under a rule that where one of two innocent persons must suffer, that one should sustain the loss who has put it in the power of the wrong-doer to commit the wrong. It is in substance the doctrine of Estoppel in pais (which see). Under this doctrine usage has great effect upon the power of agents to bind their principals. There is a large number of agents who have known and recognized functions, such as factors, brokers, and cashiers of banks. It is the well-settled rule that these persons, acting within the usage of their business, may bind their principals, notwithstanding instructions to the contrary, unless these restrictions are brought to the knowledge of the persons with whom they deal. It is a general rule that when a power is conferred upon an agent, he has by implication such incidental authority as is necessary to carry his power into effect. An authority created by writing must be followed, and an act in excess of it is unauthorized and not binding on the principal. The mode of execution deserves notice. The agent should purport to bind his principal. This rule is particularly applicable to sealed instruments. Should an agent have a so-called power of attorney to execute a conveyance of land, the deed should purport to be the act of the principal by the agent, and should be subscribed in that manner; otherwise it would be at most the agent's deed, and not that of the principal. Where there is no technical rule in the way, a principal may be liable even though undiscovered, as he must be deemed to be identified with the agent. On the general principles of the law of contracts, the principal can take advantage of a contract made in his behalf with a third person, and enforce it by action in his own name, even though he were not at the time disclosed, subject to the qualification that the rights of the other party to the contract are not prejudiced. A principal is liable for the fraudulent or wrongful acts of his agent acting within his employment. He cannot take the benefit of the agent's acts and avoid their burdens. So complete is the identification of these parties that notice to an agent on the subject of his employment is legally notice to the principal, although it be not in fact communicated. This rule often operates with great severity upon innocent principals, imputing legal fraud when none has been in fact committed.

II. *The Relations of the Agent to Third Persons.*—If the agent having power to bind his principal does so expressly, he is not liable. But if he exceeds his authority, or, acting within it, fails to disclose his principal, he becomes personally responsible. In the case first supposed he is deemed to have entered into an implied contract that he has the necessary authority, and is liable accordingly. In the other case, the third person, on discovering the principal, has an election either to charge the agent or the principal. This doctrine may perhaps be qualified if the agent contracts in writing, on account of the rule that parol evidence is inadmissible to alter a written instrument. The agent, in turn, may have a right of action upon a contract made in his own name with a third person, though in fact made for the benefit of his principal. It is a general rule that an action does not lie against an agent to test the right of the principal to a fund, but the action should be brought against the principal himself. But in the case of duress of goods (see Duress), if payment is made to an agent under protest, an action may be brought against him to recover back the money. This doctrine assumes much importance in its application to duties collected upon imports; so that a law of Congress regulates the mode in which the protest should be made.

III. *The Relation of Principal and Agent as between Themselves.*—The rules governing this relation are quite different. The agent is bound to obey the instructions of the principal. If in violating them he binds the principal to third persons, he is personally liable to make compensation for his breach of duty. His relation is a fiduciary one. He is subject to the rule that he cannot deal in his principal's affairs for his own benefit. When directed to sell, he cannot become a purchaser; when ordered to buy, he cannot become a seller. This rule springs from the relation, and is applied with as much rigor to agents who act gratuitously as to those who receive compensation. An agent having discretion to exercise cannot delegate his authority; he cannot substitute another in his place. Where the business requires it, he may employ subordinates in the execution of his duties. It is not uncommon to insert a clause in a written delegation of agency (power of attorney) allowing substitution; this is valid. An agent should keep separate accounts, and distinguish his principal's money from his own; otherwise he might become personally responsible for its loss. The measure of his liability ordinarily is reasonable care, which is determined by that diligence which prudent men usually exercise in the conduct of their own affairs. For his services he is in general entitled to a reasonable compensation. He is sometimes paid by commissions; this is usual in the case of a broker. He has earned his commissions when he has brought the purchaser and seller together. He cannot be deprived of them by a failure on the part of his employer, through wantonness or caprice, to enter into the contract which he has succeeded in negotiating for him.

The law of agency underlies, to a considerable extent, the law of partnership. The rules whereby one partner can bind his associates by contracts within the scope of their business are but applications of the doctrines of agency to this special branch of the law. (For information of a more special nature concerning particular cases of agency, consult ATTORNEY, BROKER, FACTOR, PARTNERSHIP, etc.)

T. W. DWIGHT.

Agesila'us [Ἀγησίλαος] **II.,** a celebrated Spartan general and king, was a son of King Archidamus II. He began to reign at the death of his brother Agis in 398 B. C., two years after which war was renewed between the Spartans and the king of Persia. Agesilaus commanded the army which invaded Asia Minor, and gained several victories, but in the mean time the Athenians, Thebans, and other Greek peoples had formed a coalition against Sparta, to defend which the king was recalled by the ephori in 394 or 395 B. C. He maintained his reputation in this war, which was ended by a treaty of peace in 378. Sparta was again involved in a war with the Thebans, who under Epaminondas gained a decisive victory at the great battle of Leuctra, 371 B. C., at which, however, Agesilaus was not present. He afterwards defended the city of Sparta with success when it was besieged by Epaminondas. He died about 360 B. C., aged 84 years.

Agglu'tinate [from the Lat. *ad*, "to," and *glu'tino*, *glutina'tum*, to "glue" or "cement"] **Languages,** a term applied, in comparative philology, to languages which are in a certain state of development intermediate between those which are strictly monosyllabic like the Chinese, and those which are inflectional like the Greek or Latin. Examples of languages in the agglutinated state are found among the Indian languages of America and the Turanian languages of Asia. In the Aryan languages conjugation and declension are doubtless the result of *glueing on* pronouns to verbs and nouns; but in them these terminations have coalesced, so as to form practically a single word, and the primitive parts have therefore, in a greater or less degree, lost their original and independent force. In the Turanian languages, however, the declension and conjugation can still be taken to pieces, and the affixes are seen to be distinct from the roots to which they are appended, as in Turkish, etc. (See MAX MÜLLER'S "Lectures on the Science of Language," first series, lect. viii.)

Agh'mat, a fortified town of Morocco, on the N. declivity of Mount Atlas, 24 miles S. of Morocco. Pop. about 6000.

Aghrim, or **Aughrim,** awg'rim or AWH'rim, a parish of Galway, Ireland, 13 miles N. E. of Loughrea. Here the army of William III. gained a decisive victory over that of James II., July 12, 1691.

Agincourt, å'zhâN'KOOR', or **Azincourt,** å'zâN'koor', a village of France, in the department of Pas de Calais, 18 miles E. of Montreuil, and 10 miles N. W. of St.-Pol. Near this place the English king, Henry V., who had about 15,000 men, gained a complete victory over the French army of about 60,000 on the 25th of Oct., 1415.

A'gio [in Italian, *aggio*, a word originally signifying "ease," "convenience," "accommodation"] was used in Italy to denote the difference between the real and nominal values of money, or the percentage difference between the values of the current and standard money of a place. The premium or discount on foreign bills of exchange is sometimes called *agio*.

Agis IV., of Sparta, born about 264 B. C., was a wise and meritorious ruler. He began to reign conjointly with Leonidas in 244 B. C., when Sparta was in a degenerate condition. He attempted to restore the old Spartan institutions and to reform the corrupted morals of the people. He also proposed to improve the condition of the poorer citizens by an agrarian law. Condemned by the ephori on a charge of subverting the laws, he was strangled in 240 B. C.

Agnadello, ån-yå-del'lo, a village of Northern Italy, 10 miles E. of Lodi. Here the French duke of Vendôme defeated Prince Eugène Aug. 16, 1705, and Louis XII. of France the Venetians May 14, 1509. Pop. about 1600.

Agnano, ån-yå'no, a lake of Italy, 3 miles W. of Naples, is about half a mile in diameter. It occupies the crater of an extinct volcano.

Ag'nate [from the Lat. *ad*, "to," and *nas'cor*, *natus*, to "be born"]. In Roman law, *agnates* are those who descend through males from a common ancestor, in opposition to *cognates*—*i. e.* all the descendants of a common ancestor, whether through males or females.

Ag'nes, SAINT, a Roman virgin, who is said to have suffered martyrdom under Diocletian, in 303 A. D.

Agne'si (MARIA GAETANA), an Italian woman of extraordinary learning and intellect, was born at Milan Mar. 16, 1718. About the age of twelve she could converse in Greek, Latin, and other languages on abstruse subjects of philosophy and mathematics. During the illness of her father, who was a professor of mathematics at Bologna, she lectured in his place. She published a work called "Analytical Institutions" (1748), which displays mathematical genius of a high order. Died Jan. 9, 1799.

Agnes Sorel, mistress of King Charles VII. of France, was born 1409, became in 1431 lady of honor to the duchess of Anjou, and so fascinated the king by her beauty that he appointed her lady of honor to the queen. She exercised in some respects a most beneficial influence over the king, whom she stimulated to action against the English, who then invaded France. She died Feb. 9, 1450—as it is supposed, by poison administered by the dauphin.

Ag'ni, or **Ag'nis** [etymologically related to the Latin *ig'nis*], in Hindoo mythology, the god of fire. He was a deity of great importance among the early Aryans, but after the rise of the gods of the Hindoo triad he sank into a very subordinate position. He is sometimes represented with two faces, three legs, and seven arms, with his head surrounded by flames, and is generally painted of a deep-red color. By some he has been made to correspond to the Vulcan of classic mythology, but he does not anywhere appear as an artificer, like that deity. His principal characters are those of a purifier and bearer of incense to heaven, thus being made a mediator between man and the gods. His two faces are supposed to be a type of fire in its two characters—beneficent (or creative) and destructive—and his seven arms to indicate the seven prismatic colors.

Agnoë'tæ [from the Gr. ἀγνοέω, to "be ignorant"], in ecclesiastical history, the name of a sect in the sixth century who maintained that Christ in his human nature was ignorant of many things, particularly of the day of judgment. An earlier sect of this name denied God's omniscience.

Agno'men [from the Lat. *ad*, "to," and *no'men*, a "name"]. Besides the prænomen, nomen, and cognomen, the ancient Romans sometimes had a fourth name (*agnomen*), which was derived from some illustrious action or remarkable event. Thus, two Scipios had the name Africanus given them on account of their victories over the Carthaginians in Africa. The younger of these celebrated generals had a second agnomen—viz. Æmilianus—because he was the son of L. Paulus Æmilius, and adopted into the family of the Scipios. Fabius *Cunctator* (*i. e.* "Fabius the delayer") was so called because by his prudent delays he alone, of all the Roman generals, could oppose Hannibal successfully at the height of the latter's career.

Agnosti'cism, in its most exact form, denies the possibility of any knowledge of God. It is of recent growth, and is traceable to Kant's theory of knowledge. *Philosophically*, it is an exposition of the bounds of human thought and knowledge, and upholds the impossibility of knowledge of the Infinite, in opposition to the theory of restricted but true knowledge of the First Cause as infinite and absolute. *Theologically*, it is by inference an exposition of limits of the Infinite and restrictions on the Absolute, implying that God cannot reveal himself to created intelligence. The term agnostic, taken from Paul's mention of the altar to the "Unknown God," was first suggested by Prof. Huxley in 1869.

Ag'nus De'i, the name applied to the fifth and last section of the Roman Catholic mass, beginning with the words "Agnus Dei, qui tollis peccata mundi" (*i. e.* "Lamb of God, who takest away the sins of the world"). It is also applied to the figure of a lamb bearing a cross, which is often worn by Roman Catholics.

Agobard. See APPENDIX.

Agon'ic [from the Gr. α, "without," γωνία, an "angle"] **Line** is the name applied to the line which joins all the places at which the magnetic needle points due north and south. The plane of the *magnetic meridian* of a place, which is the vertical plane passing through the two poles of a magnetic needle freely suspended at that place, does not, generally speaking, coincide with that of the geographical meridian, a vertical plane passing through the place and the north and south terrestrial poles. The angle formed by these planes is termed the *magnetic declination.* At certain places these planes coincide, and such places are called places of *no declination.* The line which joins all these places is termed the *line of no declination*, or the *agonic line.* A line of this kind passes through the eastern part of South America to Hudson's Bay, thence towards the North Pole to the White Sea; passing southward, it cuts Arabia, and, after traversing the Indian Ocean and the eastern portion of Australia, goes through or near the South Pole to join itself again. It is not fixed in position, but is at present moving slowly westward on our continent. There is a second agonic line which has been observed near China and Japan.

Agonis'tici, an ascetic sect of Christians who lived in Northern Africa in the fourth century. They renounced labor and matrimony. Their name, derived from the Greek ἀγωνιστής (*agonis'tes*), a "wrestler," appears to have been given in allusion to their wrestling with "the world, the flesh, and the devil."

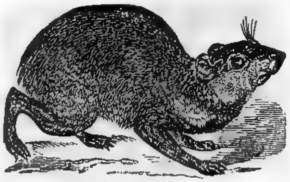
Agos'ta, or **Augus'ta,** a seaport of Sicily, in province of Catania, on the Mediterranean, 14 miles N. of Syracuse. It has a good harbor, defended by two forts. In 1693 it was nearly destroyed by an earthquake. Pop. 9735.

Agou'ra (*Procyon cancrivorus*), the crab-eating raccoon of South America, is larger than the common raccoon, has a shorter tail, and more variable colors. It is commonly of a blackish-gray, with six rings around the tail. In habits it resembles the common raccoon.

Agoult, d' (MARIE C. S.), COUNTESS. See APPENDIX.

Agouti, ȧ-goo'tee (*Dasyproc'ta*), a genus of rodent mammals related to the porcupines. The common agouti (*Dasyprocta agouti*) is a native of Brazil, Paraguay, Guiana, and the neighboring countries. Formerly, in these districts it existed in great numbers, but from its frequent ravages on the sugar-cane, potatoes, and yams, it has in many parts been hunted out and almost exterminated. It is between the size of a hare and a rabbit, has long hind legs, round ears, bright black eyes, and a short, stumpy tail, which, as well as the rump and thighs, is covered with long, coarse, bristly hair, whence the name *Dasyprocta* (from the Gr. δασύς, "rough," and πρωκτός, "tail" or "hinder parts"). The agouti is an omnivorous animal, eating almost all kinds of vegetables, fruits, roots, meats, etc. Its habits are all quick and active, and even while eating it continually turns its head from side to side, in order to guard against danger. The animal is easily domesticated, but as it is specially fond of using its teeth on all kinds of furniture, it is but little valued as a pet. It gnaws with great rapidity, taking but a few minutes to cut its way through an ordinary door. Add to this that its playfulness and all its amusing qualities seem to be lost in its domestic state. In some countries its flesh is eaten, but a prejudice generally prevails against it.

There are several other species, such as the black agouti (*Dasyprocta cristata*), whose range is nearly the same with that of the common agouti, but is perhaps more limited. The agoutis are said to have been the largest mammals inhabiting the West India Islands at the time of their discovery.


Black Agouti.

A'gra, or **Akbarâbâd',** a city of Hindostan, in the North-west Provinces, and capital of the division of the same name, is on the right bank of the river Jumna, 134 miles by rail S. S. E. of Delhi, and 754 miles by rail N. N. E. of Bombay; lat. 27° 11′ N., lon. 78° E. It was the capital of the Mogul and Mohammedan emperors of India from 1504 to 1647, and was once a large and splendid city, but a great part of it is now in a ruinous state. The houses are mostly built of red sandstone. Here are several magnificent edifices, the most celebrated of which is the Tâj Mahal, a mausoleum erected by the emperor Shah Jehan (1627–66) in honor of his favorite queen. This edifice, the finest in India, and perhaps in the world, is built of white marble, surmounted with a dome seventy feet in diameter, and adorned internally with exquisite mosaics of cornelian, lapis lazuli, and jasper. It cost above £3,000,000. Among the articles exported from Agra are cotton, sugar, salt, and indigo. Many houses in Agra were destroyed by the Sepoys during the mutiny of 1857. Pop. in 1881, 137,908.

Ag'ram, or **Zag'rab,** a royal free city of Croatia, and the capital of that country, on the left bank of the Save, 172 miles S. of Vienna. It is the seat of a Roman Catholic archbishop, and has two gymnasia, two Realschulen, two normal schools, two theological seminaries, besides many other institutions of learning. Six annual fairs are held here. Pop. in 1880, 28,360.

Agra'rian Law [Lat. *lex agra'ria*, from *a'ger*, a "field"]. This term originated in the ancient republic of Rome, and signified a law enacted to distribute or regulate the public land, *ager publicus.* Such laws were opposed by the patricians, who had appropriated to their own use the lands acquired by conquest, and who had long enjoyed the privilege of occupying them as tenants, on the condition of paying to the state a tithe of the produce. The consul Spurius Cassius first proposed to divide a portion of public land among the poor citizens, but the measure was defeated by the aristocrats. In 367 B. C. an agrarian law was originated by Licinius Stolo, ordaining that no man should possess more than 500 *jugera* (330 acres) of the public domain, and that such public land as any man occupied in excess of 500 *jugera* should be distributed among the poor citizens. Tiberius Gracchus was the author of an important agrarian law. These and later agrarian laws were never executed. In Sparta the attempt of King Agis IV. to enforce an agrarian law led to his murder by the ephori (240 B. C.).

Agreement. See CONTRACT, by PROF. T. W. DWIGHT.

Agric'ola (CNEIUS JULIUS), a Roman general and statesman, born at Forum Julii (Fréjus), in Gaul, June 13, 37 A. D. He was appointed governor of Aquitania by Vespasian in 73, and became consul in 77. About a year later he was sent as governor to Britain, which he conquered, and governed with much ability and moderation. By a wise and humane policy he promoted the civilization and prosperity of the natives. He erected a chain of forts from the Clyde to the Frith of Forth. He was recalled about 85 A. D. by Domitian, who was jealous of him. Died Aug. 23, 93 A. D. He was the father-in-law of the historian Tacitus, who wrote a Life of Agricola.

Agricola (JOHANN), originally SCHNEIDER or SCHNITTER, a German theologian, born at Eisleben April 10, 1492, studied at Wittenberg, and became a friend of Luther, with whom he was afterwards involved in a doctrinal controversy. He obtained a chair at Wittenberg in 1536. Agricola and his followers were called Antinomians (opposers of the law), because they maintained that a Christian is not bound to obey the Mosaic law. He wrote many theological works, and published a valuable collection of German proverbs. Died in Berlin Sept. 22, 1566.

Agricultural Chemistry is the study of the chemical relations of those substances which compose the products of the farm. Since the chemistry of these substances is most intimately connected with their physical, geological, and physiological aspects, the term agricultural chemistry, as commonly understood, embraces a wide range of natural science in its applications to vegetable and animal production. The object of agriculture is to develop from seed and soil the largest possible value of useful plants and useful animals at the smallest cost. Nothing is plainer than that the farmer should accurately understand the nature of those materials and agencies which build up his crops and increase his herds. He should know whence the materials of his crops may be drawn, what ones are placed at his disposal naturally in surplus, and what must be provided by his own care. He should know how to control or work in harmony with the energies whose action is essential to his success. Agricultural chemistry inquires, first of all, what the plant and animal are made of. It finds that both, when living, consist largely of water, to the extent of forty to ninety per cent., which is indispensable to their existence as a vehicle for the process of circulation or transfer of nutriment. The dry plant or animal may be divided into matter volatile by heat, ninety to ninety-nine per cent., and one to ten per cent. of ash. The volatile or combustible matter is either organized—*i. e.* possesses a structure, or is a tissue of organs, inimitable by the art of man, through whose mechanism the principle of vitality operates—or else it consists of substances which are the direct results of chemical changes in the organized matter. Muscle-fibre and wood-fibre are of the former, sugar and urea are of the latter kind. The volatile matters are thence termed organic; they consist of carbon compounds, most of which are highly complex in their atomic constitution.

The most important organic matters of our staple field-crops are few in number—being, 1. The amyloids, compounds of carbon with hydrogen and oxygen, the last two being in the proportions in which they exist in water—viz., cellulose or wood-fibre, starch, the sugars and the gums; 2. The pectoids, also compounds of carbon, hydrogen, and oxygen, comprising pectose—the hard pulp of fruits and roots—and pectine, pectosic and pectic acids—the gummy or gelatinous matters of ripe and cooked fruits; 3. The fats and fixed oils; 4. The organic acids, oxalic, malic, citric, and tartaric; 5. The albuminoids, albumen, casein, fibrin, and their analogues, which, besides carbon, hydrogen, and oxygen, contain fifteen to eighteen per cent. of nitrogen, with one-half to one per cent. of sulphur. The ash of the plant consists of phosphates, sulphates, chlorides, silicates, and carbonates of potassium, sodium, calcium, magnesium, and iron.

The growth of a plant is the development of a germ or seed when acted upon by the solar ray, with access of water, air, and soil. The organic matters above enumerated as constituents of crops are exclusively generated and organized by the plant. Carbonic acid gas supplies carbon, water furnishes hydrogen and oxygen, while nitrogen is derived partially from minute quantities of ammonia mingled with the air. Nitrogen is, however, chiefly obtained from the nitrates of the soil. All the ash-elements come exclusively from the soil. The agriculturist cannot aid the nourishment of his crops except through the soil, and there he can only influence the supplies of water, of nitrogen, and of ash-elements. Carbon, the most abundant ingredient of all crops, making up forty-four to forty-eight per cent. of the dry matter, is furnished so fully by the atmospheric carbonic acid that additional supplies from the soil are not directly advantageous. The atmosphere contains, it is true, but a very small proportion of this gas—one-twenty-five hundredth of its bulk—but this is considerably in excess of the wants of the most luxuriant growth.

The fertility of the soil depends, chemically—1, upon the presence in it of all the ash-elements and of nitrates in proper quantity; and 2, on their occurrence there in such states of combination as give a constant and regulated supply. Numerous experiments have demonstrated that a soil destitute of any one of the following substances—viz., phosphoric acid, sulphuric acid, potash, lime, magnesia, oxide of iron—is absolutely barren by virtue of such deficiency. It is also certain that a soil which contains the usual amount of potash, but only in the form of feldspar, or of phosphoric acid, but only as apatite, or of magnesia, but only as serpentine, is infertile, because these substances do not yield their elements to the solvent agencies of the soil or plant rapidly enough to serve as plant-food. Alumina is an abundant element of soils, but it is always absent from agricultural plants; and recent investigations also appear to show that silica, which is present in many plants, is an accidental ingredient, and in no manner essential to their growth or perfection. Soda likewise appears to be unessential to most of the vegetative processes; for, although it is perhaps never entirely absent from cultivated plants, it often occurs in them in extremely minute quantity, so that the soda which is indispensable to the blood and milk of animals must be obtained, in part at least, directly from mineral sources.

Nitrates and ammonia-salts—which are the natural supplies of nitrogen to crops—rarely are, and never need be, present in the soil in more than the minutest proportion. It is only requisite that they be generated or gathered there as rapidly as crops remove them. The process of nitrification, whereby inert or inassimilable nitrogen existing in the soil or in the air is converted into nitric acid, is one of the utmost agricultural importance, though still largely involved in mystery.

The great bulk of any soil is chemically indifferent in the nourishment of the present crop. The weight of an average loamy soil is about 4,000,000 pounds per acre for each foot of depth. A crop of grain of thirty-three bushels removes but 140 pounds of ash-elements—viz., forty pounds in the seed and 100 pounds in the straw. A hay-crop of two tons carries off but 260 pounds of ash-ingredients. These quantities, if assumed to come from two feet of depth, are respectively but 1-30,000th and 1-57,000th of the entire mass of soil. Hellriegel's experiments give results which warrant us in concluding that 55 pounds of potash, 17 of soda, 17 of magnesia, 23 of lime, 55 of phosphoric acid, 11 of sulphuric acid, 8 of chlorine, and 54 of nitrogen (in the form of nitrates), are all that need be present, in soluble condition, in 1,000,000 pounds of soil, in order to establish there a fertility equal to the production of 33 bushels of barley-grain and 2000 pounds of straw per acre. In other words, the 140 pounds of ash-elements may be taken from 1,000,000 pounds of a soil in which but 186 pounds exist in soluble condition, and in which, therefore, the proportion of real plant-food—nitrogen, but not water, included—is but 1-4000th. Good soil, in the practical sense, however, yields, and may contain, a larger proportion of immediately available plant-food than one part in 4000, but rarely more perhaps than ten times that amount.

As cropping removes these substances from the soil, they are replaced more or less rapidly and completely by weathering, whereby, under the influence of moisture, carbonic acid and oxygen, aided by heat and by the alternations of heat and cold, the rock-dust of the soil is gradually fluxed into soluble pabulum, and charged with nitrates.

The soil is endowed with absorptive qualities which enable it to retain in a state of comparative insolubility certain ash-elements, especially those which are in general the least abundant—viz., phosphoric acid and potash—even when applied to it from external sources in the most soluble form and in large quantity. This absorption of plant-food by the soil is accompanied by a corresponding liberation of other substances, especially of lime and sulphuric acid. The impalpable matter of the soil, consisting largely of aluminous and ferruginous silicates, is mainly the seat of these absorptions; sand, silica, carbonate of lime, humus, and even pure clay (kaolinite), being destitute of the power in question.

Soils may be fully supplied with all the nutritive elements in proper quantity and form, and yet be infertile. This may happen on account of faults in physical condition, whereby they are rendered uncongenial to plants. A certain medium porosity, admitting of access and efflux of water, and a quality of being suitably warmed by the sun and of carrying heat through the cool of the night, are no less indispensable to high productive power than an appropriate chemical condition.

Manures improve the soil by supplying one or several of those ingredients required by plants which are deficient either by reason of yearly removal of crops or from original poverty of composition. Practice has taught that phosphates and nitrogen in assimilable form are most commonly the substances which strikingly benefit land, and chemical analysis shows that of these the former is ordinarily the least abundant ingredient of soils, and the latter is one which is not only not abundant, but one which rapidly wastes by solution in rain-water, being daily carried off in immense quantities, through springs and rivers, into the sea.

The action of fertilizers is not, however, fully explained by their affording a direct supply of lacking nutritive elements; manures operate indirectly to feed crops, by their chemical effects upon the soil. It has been abundantly demonstrated that common salt, gypsum, and other saline matters may react on the soil to convert potash and magnesia, for instance, into soluble forms, and thus to give the same result as would follow an immediate application of the last-named substances.

Certain manures which are used in large doses, such as stable-dung, peat, marl, and lime, also influence the fertility of the soil, by amending its texture or otherwise modifying its physical characters.

It is theoretically possible to produce a maximum crop of any given kind, continuously and perpetually, upon the same plat of land. In practice, however, it is far easier, and therefore far cheaper, to alternate or rotate crops. A hoed crop implies surface-tillage, several times repeated during the growing season, thus effectually exposing the upper soil to the oxidizing influence of the air. A field put into grass or clover is to some extent under opposite conditions. In the one case, organic matters waste rapidly; in the other, they accumulate in the soil. In the first instance, the surface-soil tends to lose that porosity and attractiveness for moisture due to the presence of humus, which is a quality of the utmost significance in climates subject to drouth. In the second instance, the soil gains in these respects. On the other hand, the lower soil, which under hoed crops is yearly broken up by repeated ploughing, may settle down to injurious compactness in a pasture or meadow. Deep-rooted crops affect the soil very differently from those whose radication is confined to near the surface. The reasons for rotation thus become, to some extent, apparent. Agricultural chemistry is competent to show, further, that some plants, while occupying the soil, enrich it, and, though yielding the farmer a large and valuable harvest, yet actually manure the land for a subsequent crop. Clover has long been known as a plant of this kind. A good clover-crop, when made into hay, removes from the soil twice or thrice the ash-elements and nitrogen that are contained in a good wheat-crop, and yet the good clover-crop will develop in a soil where the good wheat-crop can only be raised by help of manure. More than this, the good clover-crop not only grows on the unaided soil, but likewise fertilizes that soil, so that it can subsequently make the good wheat-crop. The enriching effects of clover are absolute in respect of nitrogen. The clover plant is able, in a given time and on a given surface, to assimilate nitrogen much more rapidly, or to a much greater amount, than the wheat plant can. It therefore flourishes better on a limited supply, or gives a full crop where wheat would make perhaps but half a crop; and, besides, leaves in the soil where it has grown more nitrogen in its roots and stubble than an entire wheat-crop contains. In respect of ash-elements, the clover plant can add nothing to the soil in the way of quantity, but it strongly influences their quality. It transmutes the insoluble matters into soluble, and collects largely, by its deep-penetrating roots, from stores of food which the wheat plant can scarcely reach. When its roots decay, these substances remain where a succeeding wheat-crop can at once utilize them. This enriching process has again its narrow limits. If we keep land in clover, it becomes "clover-sick," probably from exhaustion of the deep-lying plant-food, and this disease is hard to cure, because of the inaccessibility of the subsoil to fertilizing applications.

By judicious rotation of crops a soil of moderate quality may be made to yield fair harvests without loss of productive power. In order thus to economize in the fullest degree the resources of soil and crop, the farmer needs an accurate knowledge of their nature, such as can only be obtained by encouraging the study of agricultural chemistry.

In studying the utilization of vegetable products for obtaining the various animal matters which are employed as food, etc., agricultural chemistry enters into a higher and more difficult field. Here it has been obliged, by numerous experiments, to test much of the empirical knowledge which agricultural practice had too vaguely supplied, and also finds itself under the necessity of investigating the most purely scientific questions of physiology. Although many useful practical results have been obtained, this department of our knowledge is extremely incomplete, and, save in technical details, is too closely allied to the general subject of animal nutrition to require notice in these pages.

Of useful books on agricultural chemistry, those of Liebig and Boussingault take pre-eminence; the former by their brilliant suggestiveness, the latter by their accurate experimental study of many points of the highest practical interest. In Germany, Wolff, Heiden, Knop, and Mayer have recently published excellent systematic treatises. Great Britain has produced no extended work since J. F. W. Johnston's "Lectures," which are still valuable, though far behind the time. In the United States, two books by S. W. Johnson have been received with favor. (See Liebig, "Agricultural Chemistry," 1841; "Modern Agriculture," 1859; "Natural Laws of Husbandry," 1863, etc.; Boussingault, "Economie Rurale," 1851; "Mémoires de Chimie Agricole," 1854; "Agronomie, Chimie Agricole," etc., 1860–68; Wolff, "Naturgesetzliche Grundlagen des Ackerbaues," 1856; "Landwirthschaftliche Fütterungslehre," 1861; Heiden, "Düngerlehre," 1868; Knop, "Lehrbuch der Agricultur Chemie," 1868; Mayer, "Agricultur Chemie," 1871; Johnston, "Lectures on Agricultural Chemistry and Geology," 1847; Johnson, "How Crops Grow," 1868; "How Crops Feed," 1870.)

S. W. Johnson.

Agricultural Geology—geology applied to agriculture—embraces whatever can be learned in regard to the nature of the substructure of any district with reference to drainage and water-supply, the origin, physical structure, and mineral constituents of soils, the distribution and properties of mineral fertilizers, etc. It is chiefly valuable as teaching the probable resources of a district in soil, subsoil, mineral manures, etc. To the farmer it is often desirable that he should know the results likely to be obtained from deep ploughing and deep draining. These depend greatly on the nature of the rock, the dip and compactness of the strata, and the form of the surface in reference to the stratification. In a majority of cases, the subsoil is derived from the underlying rock, and the soil is derived from the subsoil; so that for the most part the soil indicates the rock. Thus in any estimate of the fertility of land the nature of the underlying rock comes into consideration, for both the depth and texture of the soil depend, to a considerable extent, on the rock beneath, and the productiveness is dependent on these. Thus, soils formed from rocks which abound in phosphates are often of extraordinary fertility. Even the fossils and shells that are found in, and are characteristic of, rocks increase the value of the land where they occur.

Agricultural Schools. See Scientific Schools.

Agricultural System, a theory of political economy invented by F. Quesnay (physician to Louis XV.), who taught that those only increase the wealth of a country who develop the resources of the earth, such as the products of the vegetable and mineral kingdoms.

Agriculture [Lat. *agricultu'ra*, from *a'ger*, gen. *a'gri*, a "field" or "land," and *co'lo, cultum*, to "till;" literally, the "tillage (or cultivation) of land"] is the art of increasing and assuring, by human effort and care, the production and growth of such material substances as contribute to the sustenance or enjoyment of our race, whether directly or through the nourishment of such animals as minister to the comfort and well-being of mankind. Its origin and progress are nearly identical with those of civilization. The absolute savage gathers and consumes the seeds, nuts, roots, etc. that gratify his appetite or renew his wasted strength; he may collect and save them in seasons of plenty to minister to his needs in time of want, but he never thinks of planting or tilling with intent to increase his stores. Save under the immediate pressure of hunger or cold, he has no habit of working—no days or hours set apart for industry. Were it otherwise, he would cease to be a savage.

The barbarian is primarily a careless, nomadic cattle-breeder or shepherd. Having captured and domesticated certain animals, he spares a part of them for weeks, or months, or years, that they may be available in time of greater need. Some of them—the horse and the dog, for instance—he values and preserves, though, unless sorely pressed by hunger, he rejects them as food. Some rarely found, like the beaver, otter, mink, etc., he prizes for their fur, whereby he may defend himself against cold, and sometimes increase his personal attractions. The breeding and rearing of the horse, cow, sheep, camel, reindeer, ass, hog, etc. form the earliest and rudest department of barbarian industry. Poorly and scantily fed or sheltered, these animals increase slowly, and thousands of them are often swept off by the unusual severity of winter. Land is lightly valued by the ruder herdsmen: if one locality does not serve, they seek and find another. A great dearth or famine has sometimes set in motion tribe after tribe, until a hunt for food became a migration, then an irruption, overturning dynasties and subjugating races more polished but less warlike than their conquerors.

Though the origin of agriculture is lost in the darkness which shrouds pre-historic times, it can hardly be doubted that men first sowed seeds in the annually-inundated lower valleys of the Nile and other great rivers, which, cradled in distant mountains, are swelled by melting snows more slowly and equably than others. These valleys are often more or less extensively seeded by grains or nuts brought down by the floods; and when such seeding failed or proved inadequate, observation would soon teach those whose subsistence depended on the process to supplement or eke out Nature's niggard, capricious bounty by human providence and industry. Nature had presented a pattern whereon man might profitably improve. After a time the sower strewed his seeds over the face of the stilled and slowly-receding flood, knowing that the softened soil beneath would retain and cover the germs which the sun would speedily quicken: hence the Hebrew proverb, "Cast thy bread upon the waters, and thou shalt find it after many days." Such seeding required no animal or mechanical power, no implement but the human hand and arm, while the annual inundation supplied in abundance the elements of growth. Such was probably the infancy of agriculture.

But the area naturally inundated is small and limited, while, under favoring circumstances, population tends ever to increase. To cultivate more acres was indispensable; and the most facile, rather than the most fertile, were first selected for such use. But here the earth required breaking up and pulverizing; so the aid of strong, docile animals was soon invoked, and rude implements devised to render their muscular strength serviceable. The yoke and the plough were thus called into existence—both rude, as the yoke still measurably is; the original plough being a forked stick or tree-top, with one prong left five or six feet long for a beam, and the other shortened to a foot or two, and sharpened, to serve as a coulter and share. Asia, Africa—nay, even Spain and Portugal—have made but moderate improvements thereon to this day; while Western Europe and the United States have left the primitive plough almost out of sight. Yet it was not till the beginning of the eighteenth century that Jethro Tull persuaded a few British farmers that iron was the true, chief material for ploughs; and only the enlightened cultivators of the present century have substituted steel for iron.

The ruling classes in most nations of antiquity wronged themselves by degrading labor. In the Brahminical hierarchy, which has so long petrified a large portion of the human race, priests rank above soldiers, and soldiers form a caste which looks down on the tillers of the soil. Nearly all the ancient kingdoms of Semitic origin or genius, the Hebrews excepted, concurred substantially in this mistaken estimate. Greece should have been more enlightened, but her ruling caste also, in the days of her glory, was a caste of warriors, while her soil was tilled mainly by slaves. Rome, in the days of her republican vigor, was a community of cultivators, every citizen being allotted land (usually about six acres), which he was expected to till with his own hands, as was done by some of her greatest warriors and wisest statesmen. But wars of conquest soon filled the republic with slaves captured in battle, and rural labor, as well as household service, was devolved on them, rendering tillage menial and (in the general regard) degrading. Agriculture drooped and withered under this burden, and Italy, naturally the garden of Europe, drew a great part of her bread for ages at first from Sicily, then from Egypt and other distant regions, which ignorance, neglect, and wretched husbandry could not render sterile or unfruitful. Feudalism in the West, Islamism in the East, planted themselves on the ruins of the mighty but corroded fabric of Roman power; and it was not till the Crusades had somewhat shattered the claims of feudalism that any substantial progress in agriculture was made since the ages of Moses and Homer. The average serf of Western Europe, at the date of the Norman conquest, and for generations thereafter, was nowise more fortunate, and was barely more efficient, than the Hebrew cultivator of the age of Samson or of David.

The law given by Moses, the book of Job, and the paintings still fresh and vivid in the Egyptian temples, together carry us back nearly or quite five thousand years, and show us that the plough has been in use for more than that number of years. Moses ordained that the soil should lie fallow every seventh year—a rude but tolerably certain mode of restoring, by rest and atmospheric influences, its exhausted fertility. Isaac, the son of Abraham, is said to have reaped a hundred-fold in one instance—a wondrous product if the crop were the most prolific known to Western Asia in that age. Indeed, historians agree that a yield of five bushels per acre of wheat was the full average of antiquity, if not beyond it. Rye, barley, and oats did better, though not much. Even middling husbandry, with modern implements and methods, yields at least twice as much per acre, and thrice as much per bushel of seed, as did that of Europe and Asia from ten to forty centuries ago. In the production of the grape, the olive, the apple, fig, etc., as also in the rearing of cattle, the ancients stood more nearly on a plane with us, save that their stock was inadequately and capriciously fed and sheltered in winter, whence great losses were from time to time encountered. A very few eminent breeders kept choice animals, but the great majority thought no more of blood in cattle than of grafting their apple trees or underdraining their marshes. In Greece, agriculture scarcely attracted the notice of the intellectual, powerful, and cultivated minority, who were intent on war and politics, art and music; and no work of noticeable ability survives to attest Greek devotion to, or interest in, the improvement of the soil. Rome was less sterile in this respect; her writers on agriculture proffered suggestions which, though more than two thousand years old, may still be pondered with profit by practical farmers. The original allotment of land to each Roman citizen ranging from two up to six acres, the advantage of thorough over shiftless cultivation is especially insisted on by them, while the advisability of early planting, tilling, harvesting, etc. is forcibly commended. Slavery having degraded labor, while luxury enervated the richer classes, Roman agriculture sank into decay, and Italy was for centuries largely supplied with bread-grain from abroad. The Northern barbarians who overturned and divided the Roman empire were but rude cultivators, and despised the arts of peace, as only befitting serfs and slaves. Of course they did nothing to improve the wretched methods of cultivation which they found in vogue in Greece, Gaul, Iberia, and Italy. But the Saracens, who soon wrested a great part of Southern Europe from the grasp of their degenerate offspring, introduced irrigation and kindred arts from Northern Africa, and made the Spanish peninsula flourish as it had never done, till then. The fact that their revenue in Spain amounted in the tenth century to $30,000,000 (equal to twenty times that amount in our day) indicates an efficiency and a thrift in cultivation, as well as manufactures, unknown to their modern successors.

So long as Europe bent to the yoke of feudalism, agricultural improvement was scarcely possible. The tillers of the soil were mainly tenants at will, bound to rush to arms at the call of their lord, and liable to be dispossessed at his nod. They usually paid their rents in kind, and one who grew unusually large crops would have been promptly required to increase his quota of rent. Leases for fixed terms, or for two or more lives, gradually replaced the older methods, the landlords at length discovering that their own true interest required that the tenant should be incited to improve his processes, enlarge his fields, and increase his crops.

The condition of the masses under the feudal system precluded efficient cultivation. Sunk in the grossest ignorance, grovelling in superstitious fear of a haughty priesthood, taking the law from the mouths of their landlords or feudal masters, they had neither means nor will to improve their holdings and methods. Wheat they seldom ate; their scanty crops of this grain were required by their masters; rye, barley, and oats afforded their meat and their drink—beer or mead being their only luxury. Even the aristocracy of most European countries, but especially of England, knew few edibles but these, esculent vegetables being as yet few and poor. Says "The British Cyclopædia:" "It was not till the end of the reign of Henry VIII. that any salads, any carrots, or other edible roots were produced in England. The little of these vegetables that was used was formerly imported from Holland and Flanders." Butcher's meat had been and was abundant and cheap, only because most of the country was uncultivated, lay in common, and was ranged over by cattle that received little care and less fodder. The invention of printing, the discovery of America, the dayspring of inquiry and mental freedom inaugurated by Martin Luther, rung the knell of feudalism. The New World supplied some excellent edibles to the Old—Indian corn and the potato foremost among them. No other grain but rice yields food for man so bounteously as the maize; no other root is so generally acceptable as the potato, though several others yield a larger bulk or weight per acre. Even if the maize were already known to China and the far East, its value to Europe was not lessened. And even tobacco, though making a heavy draft upon the soil, has largely contributed to enhance the gains of the husbandman, since many communities pay as much annually for this seductive narcotic as for bread.

Modern agriculture dates from the invention of printing, and the consequent multiplication of books and of readers. "The Book of Husbandry," the first English work of decided merit devoted to tillage, was first published in the reign of Henry VIII. (1534), and is attributed to a judge named Fitzherbert. It is eminently practical in its inculcations, and nearly as minute in its descriptions as its lineal successor, Mr. Stephens's "Book of the Farm." It was soon followed by several others of like purpose, which are often judicious, though sometimes fantastic, in their recommendations. The introduction of red clover and the turnip into Great Britain, about 1645, probably did more for her farmers than all the books ever printed had thus far done. It is said that Lord Bacon, having assiduously collected all the works treating of agriculture known in his day, after dipping into them sufficiently to form an opinion of their contents, at length consigned them to the flames, saying that they laid down rules arbitrarily and with no regard to principles. We presume this sweeping criticism contemplated the writings of German and French, as well as British, writers on the art of cultivating the soil.

Jethro Tull, a gentleman farmer of Berkshire, whose "Horse-hoeing Husbandry" appeared in 1731, seems to have been the first author who contemplated the farmer's calling with the eye of genius. He had for thirty years been drilling in his crops with decided advantage, and he tells others how to profit by his example. He insisted on the advisability of repeated ploughings before seeding, and of sowing in drills so wide apart as to admit of cultivation with a horse-hoe. Underdraining being as yet unknown, he laid his land in ridges, with shallow ditches intervening; he sowed but three pecks of seed to the acre; he hoed his wheat in the fall, and again in the spring; and, making the ridges of this year on the ground allotted to the ditches of last year, he grew thirteen crops of wheat in succession on the same field, and maintained that the soil was nowise exhausted thereby. He thus anticipated the Loisweden practice of our day, which consists in marking off a (drained) field into strips three feet in width, cultivating these in alternate years, and tilling the fallow spaces between the strips of grain. It is claimed for this practice that the crop is as large as when all the ground is sown, and that wheat after wheat may thus be grown *ad infinitum!* Tull sowed turnip seed in the same drills or ridges, at depths of one, two, and four inches respectively, calculating that the lowest would germinate in spite of any but the severest drouth, and that, the young plants appearing at different times, a part of them must at all events escape the fly. British agriculture owes very much to the turnip, which grows luxuriantly in its moist, cool climate, yet is there left in the ground, scarcely touched by frost, until gnawed away gradually by sheep, which are thus fattened more cheaply than they otherwise could be.

The breeding of choice sheep and cattle received signal attention in Great Britain during the last century, and the improvements thus effected have been maintained and extended. The Durham and Alderney breeds of cattle, the Leicester, Cotswold, and other excellent breeds of long or coarse-woolled sheep, are among the trophies of that century. The Merino was brought from its native Spain by George III. in 1788, but experience proved it unsuited to the British isles, where mutton is of more consequence than wool.

The high price of grain, caused by the persistent wars between France and England for twenty-five years prior to 1815, stimulated the progress of British agriculture. Scotland participated fully in this improvement, whereby millions of acres were reclaimed from heath and bog or rugged pasture, and made largely productive of grain and roots. Underdraining was greatly promoted by an act of Parliament providing that money should be advanced from the public treasury to defray its cost, upon the security of a first mortgage on the property thus reclaimed.

The progress of agriculture since 1800 has been so rapid that its recent triumphs outweigh all that preceded them. The use of dissolved bones as a fertilizer is hardly yet seventy years old, yet it has increased the annual grain-harvest of Great Britain by millions of bushels. For a generation the farmers of this and other countries saw cargo after cargo of bones taken from their shores to fertilize British fields, without even asking what this should suggest to them; but now they use all the bones attainable (mainly in the shape of superphosphate), and look around for more. Guano—whereby the fields of Peru and Chili were fertilized long before Columbus dreamed of a shorter passage westward to China and Japan—first found its way to Great Britain in 1841: its annual application already costs that country millions of dollars, and is still increasing. Lastly, the employment of steam in the direct service of agriculture, not only in threshing and winnowing, but in ploughing and tilling as well, is among the great and beneficent improvements of boundless scope and promise for which mankind are indebted to the intelligent and energetic cultivators and mechanicians of Great Britain.

American agriculture, like that of continental Europe, has too generally been content to follow and to copy where it might have pointed and led the way. Wrestling with giant forests, with stumps and roots, and often with a rocky or a sandy soil, with his capital absorbed in the purchase of his generally superabundant acres, the average American cultivator has been content to do as his grandfather did, heedless of all suggestions of improvement. Underdraining, deep-ploughing, the use of commercial fertilizers, etc., he instinctively dislikes, and resists so long as resistance is possible. Thus far the substantial triumphs of American agriculture have mainly been the trophies of mechanical genius. Thus, the cotton-gin of Eli Whitney has done more to diffuse comfort and plenty throughout the civilized world than any single achievement of an American farmer. Our people were among the first to reduce the weight and lessen the draft of the plough, and they have been among the foremost in its gradual transmutation from a rude implement, constructed mainly of wood, to one far more effective, whereof barely the handles are of wood, while the land-side, as well as the share, and nearly or quite all besides, are made of polished and excellent steel. In axes, scythes, hoes, spades, and nearly every other instrument of manual effort on a farm, our country may boast a decided superiority. In the profitable substitution of animal for manual exertion, however, have our most signal triumphs been won. By ploughing instead of hoeing Indian corn we have immensely increased the area cultivated, while reducing the cost of the product. Under our prompting the sickle has been superseded by the cradle in cutting all the smaller grains, and this again by the reaper, which cuts acres more rapidly than roods could be cut with the cradle. The mower (always akin to. and sometimes identical with, the reaper) has so reduced the cost and fatigue involved in our hay-harvest that cattle are kept far more cheaply in our old States, estimating their cost in hours of labor, than they could be prior to the last twenty or thirty years. Horse-rakes, hay-tedders, with fanning-mills and kindred devices for separating grain from chaff, threshers of many diverse patterns, corn-huskers, potato-diggers, etc., have immensely economized our labor and increased the bulk and value of our annual harvests. Underdraining, subsoiling, irrigation, etc. have as yet been naturalized among us entirely by the efforts of an enlightened but nowise numerous minority, but their benefits are so signal and indubitable that the many cannot long hesitate to adopt them.

In the use of steam in ploughing we are deplorably backward, owing in good part to our recent great and exhausting civil war. But for this a thousand portable steam-engines would doubtless have been tearing up our fields ere this, as is the case already in Great Britain, and must soon be here. As it is, we may fairly boast of *one* step in advance of our great rival. On the plantation of Mr. Effingham Lawrence, fifty miles below New Orleans, on the west bank of the Mississippi, the largest steam-engines yet constructed by Messrs. John Fowler & Co., the British makers of steam-ploughs and other cultivating machinery, are steadily and profitably employed, not merely in ploughing that glutinous, leathery clay to a depth of twenty-six to twenty-eight inches, but similar engines, worked entirely by blacks till recently slaves, are lifting and pulverizing to a depth of fully two feet the spaces which separate the rows of growing cane; and doing the work so thoroughly, when the cane is about one foot high, that it needs no further tilling till matured—the plants pushing their roots quickly into the mellow earth, and thence drawing sustenance for a growth so luxuriant as to smother and choke out all future weeds. So far as is known to this writer, no earlier cultivation of growing crops by steam has been seen on this planet.

And this is a hint by which thousands must profit. But few years can elapse before the vast prairies of the West and South-west will be cultivated largely, if not mainly, by steam—the same locomotive being employed to plough, seed, till, harvest, thresh, winnow, and perhaps transport the grain to the nearest steamboat wharf or railroad station. Working on untired through day and night, consuming nothing when idle, and thoroughly pulverizing fifty acres per day to a depth unattainable by horse-power, the steam-engine will prove here, as elsewhere, the mightiest friend and most useful servant ever vouchsafed to human genius at the call of an urgent need.

Early History of Agriculture.—As the Greeks and Romans appear to have arrived at as great a degree of perfection in legislation as the moderns, so they may be said to have attained great excellence in the art of agriculture. Till within the present century very little difference existed between the most approved agriculture of climates analogous to that of Italy and the agriculture of the Romans as described by Cato, Columella, and other ancient writers. The chief superiority of the moderns consists in their machinery, and especially in their knowledge of the sciences connected with this pursuit; the last, though extremely important, being of very recent date, and as yet by no means generally diffused. By science are not only acquired more enlightened and greatly improved methods of treating the soil, but superior breeds both of plants and animals have been originated; by improved machinery a more perfect tillage has been produced, and also a more complete separation of the produce of the soil from the refuse of the plants and other impurities.

In Great Britain the history of agriculture begins with the Roman Conquest. Julius Cæsar found the inhabitants in a state of semi-barbarism, but Agricola left them in possession of all the arts of civilization known to the Romans. Agriculture declined with the invasion of the Saxons, but was preserved through the dark ages after the establishment of Christianity by the intelligence of the members of religious establishments, who gradually became possessed of the greater part of the landed property in the country. The culture of the land will be found to have depended in every country principally on its climate and civilization, though partly, also, on its government and population. In the warmer climates, where nature produces fruits in the greatest abundance for the food both of men and animals, and where very little care is required to procure shelter or clothing, agriculture has made little progress, because it is comparatively unnecessary for the prosperity of the inhabitants. On the other hand, in climates of a directly opposite character agriculture has made equally slight progress, owing to the almost insurmountable obstacles opposed to it. It is therefore only in intermediate climates, where the soil admits of labor by man throughout a great part of the year, that agriculture is calculated to attain the highest degree of perfection.

Literature of Agriculture.—The literature of agriculture begins with the works of the Romans, of which COLUMELLA'S work, "De Re Rustica," may be considered the most comprehensive and valuable. VIRGIL'S "Georgics," a poem unequalled of its kind in any language, may be said to teach, with all the attractions of the most exquisite poetry, everything that was then known of the art of agriculture. In the dawn of modern agriculture, the principal writers were—Crescentius in Italy, Herrera in Spain, Olivier de Serres in France, Hereshbachius in Germany, and Fitzherbert in England. (For the recent literature of scientific agriculture, the reader is referred to the bibliography at the end of AGRICULTURAL CHEMISTRY.) At the beginning of the present century the most comprehensive author on agriculture in Italy was Fillippo Re; in France, Tessier; in Germany, Mayer; and in England, Marshall. About the best work from which a general idea may be obtained of the agriculture of France and corresponding climates is "Maison, Rustique du xix^{e} siècle, ou Encyclopédie d'Agriculture pratique," complete in one volume, 8vo.; and the corresponding British works are Loudon's "Encyclopedia of Agriculture;" Stephens's "Book of the Farm;" Morton's "Cyclopedia of Agriculture;" and Wilson's "British Farming." (See "The American Farmer," 2 vols., by Hon. C. L. Flint.) Horace Greeley.

Agriculture, Department of, was established by Congress in 1862 in Washington, D. C. By means of annual and monthly reports it diffuses information deemed advantageous to the agricultural interests of the country. It purchases and propagates seeds and plants, which are distributed to the people of the U. S. It is under the commissioner of agriculture, who is appointed by the President and confirmed by the Senate. It has a fine building, which stands W. of the grounds of the Smithsonian Institution. Connected with it are a museum, chemical laboratory, propagating gardens, and a library. Its monthly reports of the prospects of the staple crops are especially valuable. At the propagating gardens plants received by exchange from foreign governments and botanic gardens are tested with a view to introducing new and useful plants in U. S.

Agrigen'tum (now *Girgen'ti*), an ancient city of Sicily, situated on the slope of a mountain on the S. coast of the island. It was founded about 582 B. C., and once had about 200,000 inhabitants. Here are magnificent ruins, among which are the temple of Concord (said to be the most perfect extant structure of the early Greek architecture), and the temple of Olympian Jupiter, about 350 feet long. (See Girgenti.)

Ag'rimony [Lat. *Agrimo'nia*], a genus of herbaceous plants of the natural order Rosaceæ. The *Agrimonia Eupatoria*, a native of Europe and the U. S., has been used in medicine. Several species grow in the Southern U. S.

Agrippa, King. See Herod Agrippa.

Agrip'pa (Henry Cornelius), of Nettesheim, German physician, philosopher, and astrologer, was born at Cologne Sept. 14, 1486. He cultivated many departments of knowledge, and engaged in various pursuits in many countries of Europe. He acquired fame by his talents and his supposed skill in occult science, but he was regarded as an impostor and heretic by some of his contemporaries. He lectured on theology at Cologne and other places, and practised medicine in France. Among his works is a satire "On the Vanity of the Sciences" (in Latin, 1530). Died Feb. 18, 1535.

Agrip'pa (Marcus Vipsanius), an eminent Roman statesman and general, born in 63 B. C. He became in his youth a friend of Octavius (afterwards the emperor Augustus), to whom he rendered important military services, especially at the battle of Actium, where he commanded the fleet, in 31 B. C. Agrippa and Mæcenas were the principal ministers and advisers of Augustus after he had obtained the supreme power. He married Julia, the daughter of Augustus, about 21 B. C., and had several sons, two of whom were adopted by the emperor. Died in 12 B. C.

Agrippi'na I., a Roman lady, the daughter of M. Vipsanius Agrippa and his wife Julia, was married to the famous Germanicus. Her virtue is highly commended. Died about 32 A. D.

Agrippina II., a daughter of the preceding, was born about 14 A. D. She was the mother of the emperor Nero, and was notorious for her profligacy and her crimes. Her third husband was the emperor Claudius, whom she killed by poison. She was put to death by her son Nero in 60 A. D.

Ag'telek, or **Bar'adla,** the name of one of the largest and most remarkable stalactitic caverns of Europe, is in the county of Gömör, in Hungary. Here is a labyrinth of caverns, one of which is 96 feet high, 90 feet wide, and extends about 900 feet in a direct line.

Aguardiente (ah-gwar-de-en'ta), Spanish for Brandy, which see.

A'gua Volcan'de (*i. e.* "volcano of water"), a mountain of Central America, in the state of Guatemala, situated about 25 miles S. W. of Guatemala; so called from the fact that it sometimes pours forth torrents of water. The old town of Guatemala has been twice destroyed by it. Its crater is 15,000 feet above the sea-level.

A'guas Calien'tes (*i. e.* "warm springs"), a state of Mexico, is bounded on the N., E., and W. by Zacatecas, and on the S. by Jalisca. Area, 2216 square miles. The soil is very fertile, but poor in minerals. Pop. in 1880, 91,115. Capital, Aguas Calientes.

Aguas Calientes, a town of Mexico, the capital of the state of its own name, is on a plain or table-land 6000 feet above the sea, and 250 miles N. W. of the city of Mexico. It has numerous churches and three convents, and is surrounded by gardens and orchards of olives, pears, figs, etc. Hot springs occur in the vicinity. Pop. 22,380.

A'gue [probably from the Fr. *agu*, an old form of *aigu*, "sharp," in allusion to the violence of the disease] is the common name for the Intermittent Fever (which see).

Aguesseau, d' (Henri François). See Appendix.

Aguilar' de la Fronte'ra, a town of Spain, on the Cabra, 22 miles S. S. E. of Córdova, is noted for the whiteness of its houses and the cleanness of its streets. It has several fine public squares, a town-hall, and a dismantled Moorish castle. Pop. 11,836.

Aguilar (Grace), a Jewish authoress of Spanish extraction, was born at Hackney, near London, June 2, 1816. Among her numerous works are "Women of Israel," "Home Scenes and Heart Studies," and "Home Influence, a Tale." She died at Frankfort Sept. 16, 1847.

Agulhas, Cape, the most southern point of Africa, is about 100 miles E. of the Cape of Good Hope. A lighthouse was erected on it in 1849; lat. of lighthouse, 34° 49′ 8″ S., lon. 20° 0′ 7″ E.

Agusti'na, called the "Maid of Saragossa," died at Ceuta, Spain, in 1857. She greatly distinguished herself during the siege of Saragossa by the French in 1809, and as a reward for her services was made a lieutenant in the Spanish army and received numerous decorations. Byron extols her in "Childe Harold," canto i., stanzas 54, 55, 56.

Agyn'ians [from the Gr. α, neg., and γυνή, a "woman"], a Gnostic sect of the seventh century who condemned marriage and the use of certain kinds of meat.

A'hab [Heb. *Achab*], eighth king of Israel, who reigned B. C. 918–896. His wife was Jezebel, daughter of Ethbaal, the usurping king of Tyre. He dwelt at Jezreel, which he adorned with splendid buildings. The story of his weakness, his idolatry, and the stern opposition of the prophet Elijah is related in the first book of Kings. Ahab was killed in battle with Benhadad, king of Damascus.

Ahan'ta, a negro kingdom in Upper Guinea, which was formerly independent, but was conquered by Ashantee. It is one of the healthiest, richest, and most civilized districts on the coast, having a fertile and well-cultivated soil. The chief productions are sugar-cane, rice, and timber. The chief articles of export are palm oil, ivory, and gold. In 1683, Frederick William, the great elector, attempted to start a colony here, but in 1718 Prussia sold all her possessions on the Gold Coast to the West India Company in Amsterdam. The Dutch took possession of several other districts in this neighborhood, but in 1872 ceded all their possessions on the Gold Coast to Great Britain.

Ahasue'rus, the name of one Median and two Persian kings mentioned in the Old Testament. The Ahasuerus of Esther was probably Xerxes, the invader of Greece, who reigned from 486 to 465 B. C. He invaded Greece in 480, and is supposed to have married Esther the year after.

A'haz [Heb. *Achaz*, "possessor"], twelfth king of Judah after its secession from Israel, reigned B. C. 741–725. His reign was greatly disturbed by the attacks of Rezin, king of Damascus, and Pekah, king of Israel, as well as those of the Edomites and Philistines. Ahaz called to his aid the powerful Tiglath-Pileser, king of Assyria, who overthrew the enemies of Judah, but made Ahaz his vassal, and carried off rich treasures from the temple and palaces of Jerusalem. Ahaz was an idolater. A statement in 2 Kings xvi. 2 as to his accession would make his son and successor, Hezekiah, to have been born when he was eleven years old, but this must be a transcriber's error or the date of a viceroyship.

Ahazi'ah, ninth king of Israel, succeeded his father Ahab, and ruled under the direction of Jezebel, his mother, B. C. 897–896.—Also the name of the sixth king of Judah, B. C. 885–884. A famous error of some transcriber (2 Chron. xxi. 5, 20) makes him younger than his own son.

Ahith'ophel [Heb. *Achithophel*, "foolish"], a Hebrew politician and councillor of David. He took the side of Absalom in his rebellion, but, foreseeing the failure of the enterprise, went home and hanged himself.

Ahl'feld (Johann Friedrich), an eminent German preacher, born Nov. 1, 1810, became in 1847 clergyman in Halle, and in 1851 in Leipsic, and gained in both places the reputation of an excellent pulpit orator. He published several collections of sermons, all of which have had a large sale.

Ahl'quist (August Engelbert), a celebrated Finnish philologist, born Aug. 7, 1826, not only made the Finnish language his especial study, but also made it his object to raise it to the rank of a written language, and to create a national Finnish literature. For this purpose he travelled under the greatest difficulties through Northern Russia and Siberia to acquaint himself with the tribes of the Uralian-Altaic race living there. At present he is professor of Finnish language and literature in the University of Helsingfors. His chief works are "An Attempt at a Moksha-

Mordwinian Grammar" (1862), a "Grammar of the Wotish Language," and a description of his travels in Siberia (1853–58). He has also written many poems in the Finnish language, and made several translations from the German of Schiller.

Ahl'wardt (Theodore Wilhelm), a German Orientalist, born July 4, 1828, became in 1861 librarian and professor of Oriental languages at the University of Greifswalde. He published "Chalef el Ahmars Qasside" (1859), besides several historical works.

Ah'med IV., sometimes called **Abd'ul-Hâmid**, a Turkish sultan, born in 1725, succeeded to the throne in 1773. His reign is chiefly notable on account of the two disastrous wars with Russia, in which Turkey lost the Crimea, a portion of Circassia, with some other territories, and a number of important fortresses. Died in 1789.

Ah'medâbâd' (*i. e.* "the abode of Ahmed"), a city of British India, in the presidency of Bombay, is on the river Subbermuttee, 16 miles by rail N. N. W. of Surat; lat. 23° 1′ N., lon. 72° 48′ E. It was formerly a large and magnificent capital, but is now much decayed. Here are several beautiful mosques and other remains of its ancient splendor. It was founded by Ahmed Shah in 1412. Pop. 116,873.

Ah'mednug'gur (*i. e.* the "fort of Ahmed"), a city and fortress of British India, in the presidency of Bombay, on the Seena, 162 miles by rail E. of Bombay. It was founded by Ahmed Nizam Shah in 1493, and became a capital of the kingdom of the same name. It was taken by General Wellesley in Aug., 1803, and the fortress is now held by a British garrison. Pop. about 20,000.

Ah'medpoor'-Barra (*i. e.* "great Ahmedpoor"), a town of Hindostan, situated in a fertile tract 30 miles S. W. of Bhawlpoor. It has manufactures of matchlocks, gunpowder, cotton, and silk stuffs. Pop. about 20,000.

Ah'mood, a town of British India, in the presidency of Bombay, 12 miles N. by W. of Baroach. Pop. about 13,000.

Ahn (Johann Franz), a German writer and author of a new method of learning foreign languages, born at Aix-la-Chapelle Dec. 15, 1796, published a "Practical Course for the Quick and Easy Acquisition of the French Language" (167th ed. 1870), and other similar works, which have found an immense circulation. His method has been imitated by many other writers. Died Aug. 21, 1865.

Ah'rens (Heinrich), an eminent German, born July 14, 1808, lectured in Paris in 1833 on the history of German philosophy since the time of Kant, and became in 1834 professor of philosophy in Brussels, in 1850 professor of abstract law and political economy at Graz, in 1859 of practical philosophy and political science at Leipsic, and in 1863 was elected representative of the university in the first chamber of Saxony. His principal works are "Cours de droit naturel" (6th ed. 1869; German ed. 1846); "Philosophie des Rechts" (1851–52; 6th ed. 1870); "Juristische Encycl." (1855–57), which has been translated into several foreign languages.

Ah'riman, the principle of evil among the ancient Persians. (See Ormuzd.)

Ah'waz, a small town of Persia, 100 miles N. E. of Bassorah, was once an important city. The ruins of the ancient city extend 12 miles on the bank of the Karoon.

Ai, the native name of the *Bradypus tridactylus*, or three-toed sloth, an edentate mammal of South America. There are several varieties of this animal. It takes its name from the loud cry which it makes while moving in the forests. It is very tenacious of life, and will move its legs long after it has been disembowelled and beheaded. In habits it resembles the other sloths.

A'i (a "ruin"), a city of Palestine, which was destroyed by Joshua. Its site is not positively known.—Also a city of Ammon, destroyed by the Babylonians.

Aid'an, Saint, first bishop of Lindisfarne, was born in Ireland, and was sent as a missionary bishop to Northumbria by the bishop of Iona about 635 A. D. He was successful in establishing Christianity, being aided by the king and nobles. Died Aug. 31, 651.

Aides-de-Camp, confidential officers selected by general officers to assist them in their military duties, are *ex-officio* assistant adjutants-general (act Mar. 2, 1821). They are in the U. S. service attached to the person of the general, and receive orders only from him. Their functions are difficult and delicate. Often enjoying the full confidence of the general, they are employed in representing him, in writing orders, in carrying them in person if necessary, in communicating them verbally upon battle-fields and other fields of manœuvre. It is important that aides-de-camp should know well the position of troops, routes, posts, quarters of generals, composition of columns, and orders of corps. It is necessary that their knowledge should be sufficiently comprehensive to understand the object and purpose of all orders, and also to judge in the varying circumstances of a battle-field whether it is not necessary to modify an order when carried in person, or if there be time to return for new instructions. (*Scott's Military Dictionary.*) The existing law of the U. S. allows six aides-de-camp (colonels) to the general; two and a military secretary (lieutenant-colonels) to the lieutenant-generals; three (captains or lieutenants) to a major-general; and two (lieutenants) to a brigadier-general.

Aidin', or **Guzel-Hissar** (anc. *Tral'les*), a town of Asiatic Turkey, in Anatolia, on the river Mender (Meander), about 68 miles S. E. of Smyrna, with which it is connected by railroad. It has a large trade, being next to Smyrna in commercial importance, and is the residence of a pasha. Here are several fine mosques and synagogues. American missionaries have established here a flourishing Protestant mission. The ruins of the ancient *Tralles* are in the vicinity. Aidin is noted for its figs, great quantities of which are produced in the neighborhood, and many are exported. Pop. 30,000.

Aido'ne, a town of Sicily, in the province of Caltanisetta, 20 miles E. S. E. of Caltanisetta. Here are mineral springs. Pop. 5229.

Aignan (Étienne), born in 1773 at Beaugency-sur-Loire. He was chosen a member of the French Academy in 1814; joined the liberal opposition, after the restoration of 1815, as a publicist; wrote "The Condition of the Protestants in France" (1818), and made a fine translation of the Iliad in verse in the French language. Died in 1824.

Aiguebelle, a small town of France in Savoy, on the left bank of the Arc, 15 miles E. of Chambéry. Pop. in 1881, 1059. Here the combined French and Spanish armies defeated Duke Charles Emmanuel III. of Savoy in 1742. The road built by Napoleon over Mont Cenis commences near Aiguebelle.

Aiguebelle, d' (Paul Alexandre Neveue), a French naval officer in the service of China, was born Jan. 7, 1831. He took part with the Franco-Chinese corps against the Taï-Pings, and took in 1864 the important city of Hang-Chow-Foo. He entered the Chinese service, was created a mandarin of the first rank, organized an important military arsenal at Foo-Chow-Foo, and in June, 1869, he launched the first man-of-war of the new navy built on the European plan. He was then made grand admiral of the Chinese fleets, which title was expressly created for him.

Aigues Mortes, a town of France, in the department of Gard, 19 miles from Nîmes. Pop. in 1881, 3564. The large saline works of Peccais are in the neighborhood. An interview between Francis I. of France and the emperor Charles V. took place here in 1538. Louis IX. embarked from this place on the seventh crusade Aug. 25, 1248, and on July 4, 1270, on the eighth and last crusade.

Aiguille [Fr., a "needle"], the name of numerous sharp-pointed peaks in the Alps.

Aiguillon (Armand Vignerod Duplessis Richelieu), Duke of, a French statesman, born in 1720, was governor of Alsace, and afterwards of Brittany. He gained the favor of the king's mistress, Madame du Barry, and through her influence was made prime minister. Upon the accession of Louis XVI. he was removed from office and banished from court, and died in 1782.

Aiguillon (Armand de Vignerot Duplessis Richelieu), Duc, son of the preceding, earnestly supported the popular cause in the States-General of 1789. He commanded one of the armies in 1792, but was proscribed by the ruling party the same year, and escaped by flight. Died in 1800.

Aijalon. See Ajalon.

Aik'en, on R. R., capital of Aiken co., S. C. (see map of South Carolina, ref. 6–D. for location of county), is noted as a resort for invalids, especially those suffering from pulmonary complaints. Being situated on a plateau 600 feet above the level of the sea and 400 feet higher than the city of Augusta, which is 17 miles distant, and the soil being sandy and porous, the system of natural drainage is almost perfect, rendering the atmosphere peculiarly dry and elastic. The dew-point is invariably low. The climate is a mean between the dry, cold region of Minnesota and the moist, temperate section of Florida, and has proved efficacious in restoring health to thousands of invalids. Pop. in 1880, 1817.

Aiken (Charles Augustus), D. D., LL.D., was born at Manchester, Vt., Oct. 30, 1827, graduated at Dartmouth College in 1846, and at Andover Theological Seminary in

1853, was pastor of a Congregational church in Yarmouth, Me., from 1854 to 1859, professor of the Latin language and literature at Dartmouth from 1859 to 1866, professor of Latin in the College of New Jersey from 1866 to 1869, president of Union College from 1869 to 1871, and became professor of Christian ethics and apologetics in the Princeton Theological Seminary. He translated and edited the book of Proverbs in the American edition of Lange's "Commentary," and has published several articles in the "Bibliotheca Sacra" and "Princeton Review."

Aiken (William), born in Charleston, S. C., in 1806, graduated at South Carolina College in 1825. He was prominent in public affairs, was governor of South Carolina (1844–46), and a Democratic member of Congress (1851–57). He was a man of great wealth, being proprietor of Jehossee Island, where he formerly employed 1000 slaves in rice-culture. He was distinguished while in public life by his wisdom and moderate views, and has contributed largely to the cause of education and to benevolent objects. While in Congress in 1857 he lacked but one vote of becoming Speaker of the House of Representatives.

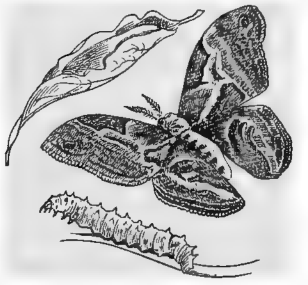
Aik'in (John), M. D., an English writer, born in Leicestershire Jan. 15, 1747. He produced, conjointly with his sister, Mrs. Barbauld, an instructive juvenile book called "Evenings at Home" (1792–95), which had great popularity. He practised medicine in London and other places. Among his numerous works is a biographical dictionary, entitled "General Biography" (10 vols. 4to, 1815). He edited the "Monthly Magazine" (1796–1806). Died Dec. 7, 1822.

Aikin (Lucy), a daughter of the preceding, born Nov. 6, 1781, wrote, besides other works, a memoir of her father (1823), and "Life of Joseph Addison" (1843). Died Jan. 29, 1864.

Aik'man (William), a distinguished Scottish painter, born at Cairnby Oct. 24, 1682; died in London June 7, 1731.

Ailan'thus, or **Ailan'tus** (*i. e.* "tree of heaven"), a tree which is a native of China, and has remarkably large pinnate leaves. It grows rapidly, and is often planted as an ornamental or shade tree in the cities of Europe and the U. S. The foliage is handsome, but it causes much annoyance by the rapid spread of suckers from the parent tree. The staminate flowers, which are borne on distinct trees, have an offensive odor that often produces headache and nausea. The female plants are free from this objection, and the clusters of winged fruit which they bear are quite ornamental, so that they should always be chosen for shade trees. Besides the above (*Ailanthus glandulosus*) there are several other species, chiefly tropical. They belong to the order Simarubaceæ.

Ailanthus Silkworm (the *Al'tacus cyn'thia* of the naturalists) is so named from its feeding on the leaves of the ailanthus tree. The silk obtained from this worm is extensively used in China and it is even thought by some that it will, for most purposes, ultimately supersede the culture of the common silkworm, as it is much hardier and not subject to many diseases to which the other is liable. In addition to this, the tree is easily cultivated, being readily acclimatized in most temperate countries. The eggs are hatched in a similar manner to those of the common silkworm, and the larvæ, after being fed through their first moult with picked leaves, are transferred to the trees, and there left.



Ailanthus Silkworm.

Ailly, Peter of, an eminent French prelate, born in Picardy in 1350. He became archbishop of Cambray in 1395, and a cardinal in 1414. He denounced and wished to reform some abuses in the Church. He was called "Malleus Hæreticorum" and "Aquila Doctorum." Died Aug. 9, 1420.

Ailred (**Æthelred** or **Alured**), Saint, Cistercian abbot of Rievaulx, Yorkshire, born in England in 1109, was educated in Scotland. He wrote numerous sermons, histories, and other works, part of which were edited by Twisden (1652), by Camerarius (1631), and by one Gibbon (Douai, 1631). Died Jan. 12, 1166.

Ail'sa, Marquesses of (1831), Barons Ailsa (1806, in the United Kingdom), earls of Cassilis (1509); Barons Kennedy (1452, in Scotland); baronets (1632, in Scotland), a prominent family of Great Britain.—Archibald Kennedy, the third marquess, born Sept. 1, 1847, succeeded his father in 1870.

Ail'sa Craig, an island 10 miles from the coast of Ayrshire, Scotland. It is a crag of trap-rock of a somewhat columnar character. It is 1098 feet high, and 2 miles only in circumference. It is not inhabited. It gives his title to the marquis of Ailsa, its proprietor.

Ailu'rus* Ful'gens, the scientific name of an animal of the class Mammalia, order Carnivora, family Ursidæ, found in the mountains of Nepal. By the inhabitants of that country it is termed *panda, chitwa,* and *wah,* the last name having been given it on account of its peculiar cry. It is about the size of a large cat, and is remarkable for its singularly rich and beautiful fur, which is mostly of a bright chestnut-brown, but deepens into a fine rich black on the chest and outside of the legs. It has a short head and a thick muzzle. The head is of a whitish fawn-color, with a ruddy chestnut spot under each eye. The tail is of the same color as the body, being marked with a series of dark rings. "The coat of the panda is not only handsome in appearance, but is very thick, fine and warm in texture, being composed of a double set of hairs—the one forming a thick woolly covering to the skin, and the other composed of long glistening hairs, that pierce through the wool and give the exquisitely rich coloring to the surface of the fur." Cuvier regarded the panda as the most beautiful of known quadrupeds. It is much to be regretted that these animals do not exist in sufficient numbers to render their fur an article of commercial value. The food of the panda is chiefly of an animal character, consisting of birds, their eggs, the smaller mammalia, etc. Its habits are partly arboreal.

Aimard (Gustave), a French novelist, born Sept. 13, 1818, came to America at an early age, and after a short stay travelled throughout Southern Europe. Among his works are "Les Trappeurs de l'Arkansas," "Les Aventuriers," "L'Araucan," etc. Died Apr. 30, 1883.

Aimé-Martin (Louis), a French writer, born in 1786, became in 1815 secretary of the Chamber of Deputies. He published, among other works, "Lettres à Sophie sur la physique, la chimie et l'histoire naturelle" (1810), and "L'éducation des mères de familles" (1834). He also published the complete works of Bernardin de St.-Pierre, with a biography of the author. Died June 22, 1847.

Ai'mon, or **Ay'mond,** a French Benedictine of Fleury, wrote a "Historia Francorum," extending from 253 to 654; also a life of Abbo of Fleury, and other works. Died in 1008.

Ain, a department of Eastern France, is bounded on the N. by the departments of Saône-et-Loire and Jura, on the E. by Haute Savoye, on the S. by Isère, and on the W. by Rhône and Saône-et-Loire. Area, 2239 square miles. The department is watered by the Rhône and the Saône, which flow along its boundaries, and by the Ain. The western part consists of a large plateau, which is very fertile. In the E. large mountain-ranges prevail, which contain iron, asphaltum, and the best lithographic stones in France. Pop. in 1881, 363,472. Chief town, Bourg-in-Bresse.

Ain-müller (Maximilian Emanuel), a German painter, born at Munich Feb. 14, 1807, is noted as the restorer of the art of painting on glass. Among his works are the windows of the cathedrals of Ratisbon and Cologne. Died Dec. 8, 1870.

Ai'nos, a race inhabiting the Koorile Islands and the north of Japan. They have attracted attention mainly from the greatly exaggerated, though not utterly false, statements of travellers, that their bodies were entirely covered with hair; from which circumstance they are often called "hairy Kooriles." They are said to be of a mild and amiable disposition. They worship the sun and moon, but have no priests or places set aside for religious services. They have a written language, which seems to be Aryan, are certainly not Turanian, and have been gradually supplanted by the Japanese.

Ainsworth, Neb. See Appendix.

Ainsworth (now **Pasco**), W. T. See Appendix.

Ainsworth (Robert), an English classical scholar, born near Manchester in 1660, taught school in London. He published a well-known Latin dictionary (1736). Died April 4, 1743.

Ainsworth (William Francis), an English physician and geologist, born at Exeter Nov. 9, 1807. He accompanied Colonel Chesney on an expedition to the Euphrates in 1835. He published "Researches in Assyria" (1842), and "Travels and Researches in Asia Minor, Mesopotamia, Chaldea, etc." (2 vols., 1842).

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* Ailurus signifies "having a waving tail," like that of a cat; from αἰόλος, "quickly moving" or "waving," and οὐρά, a "tail."

Ainsworth (William Harrison), an English novelist, born in Manchester Feb. 4, 1805. He published "Rookwood" (1834) and "Jack Sheppard" (1839), the latter of which had an extraordinary success, and "The Tower of London." In 1845 he became the proprietor of the "New Monthly Magazine." His numerous stories have had great popularity. Died Jan. 3, 1882.

Aintab′, a town of Asiatic Turkey, on the S. slope of Mount Taurus or Alma-Dagh, about 60 miles N. of Aleppo, and 92 miles N. E. of Antioch. It is well built, and has manufactures of leather, woollen cloths, etc. The American Protestant missionaries have had for years a flourishing mission among the Armenians of this town. Pop. 43,410.

Air [Gr. ἀήρ, from ἄω, to "breathe;" Lat. *a′ër*] was considered an element by the ancient philosophers, but it is now known to be a mixture of oxygen and nitrogen with some other gases. (For information respecting the properties and phenomena of the air, see Acoustics, by Prof. O. N. Rood, LL.D.; Barometer, by Pres. F. A. P. Barnard; and Pneumatics. (See also Atmosphere.)

Air (in painting). See Aërial Perspective.

Air, a town of Africa. See Asben.

Air-Bed, a sleeping apparatus made of air-tight cloth or vulcanized india rubber, divided into compartments and inflated with air. The coolness, cleanness, and elasticity of this bed render it desirable for the use of the sick.

Air-Bladder, or **Swimming-Bladder,** an organ in fishes which enables them to modify their specific gravity, and to move easily upward or downward, by increasing or diminishing the volume of air (in some instances replaced by nitrogen) in the bladder. This air is supposed to be obtained by secretion. The mackerel and some other species of fish have no air-bladder. It is the analogue of the lungs of air-breathing animals.

Air-Cells, in birds, are cavities connected with the respiratory system, and are distributed over the inside of the chest and abdomen. They also penetrate the bones and quills. Communicating with the lungs, they give a great extension to the surface with which the air inhaled comes in contact, and serve to increase the muscular energy and the animal heat, and to diminish the specific gravity.

Air-Cells, in plants, are spaces in the cellular tissue, containing air. They occur chiefly in aquatic plants.

Air′drie, a market-town and parliamentary borough of Scotland, in the county of Lanark, 11 miles E. by N. of Glasgow, with which it is connected by railway. It is well built and lighted with gas. The growth and prosperity of Airdrie have been increased by mines of iron and coal which are worked in the vicinity. Pop. in 1881, 13,363.

Aire-sur-l'Adour, an old town of France, in Landes, on the river Adour, 20 miles S. E. of Mont de Marsan, is the seat of a bishop, has a cathedral and a college. It was once the capital of the Visigoth kings. Pop. in 1881, 4562.

Aire-sur-la-Lys, a fortified town of France, in Pas de Calais, on the river Lys, 10 miles S. E. of St. Omer. It has a Gothic church. Pop. in 1881, 8238.

Airey (Richard). See Appendix.

Air-Gun, an instrument for projecting bullets or other missiles by means of the elastic force of condensed air. A strong reservoir of metal is constructed, into which air is forced by a condensing syringe. The reservoir may be of any form, but it is most conveniently disposed of by placing it within the stock. The bullet should fit the barrel very exactly, so as to leave no windage. On pulling the trigger, the condensed air escapes through the valve and rushes with violence into the barrel, propelling the bullet before it; and the instant the finger is withdrawn from the trigger, the valve is closed by the pressure of the air in the magazine, which remains in a somewhat less condensed state for the next discharge. Thus the same supply of air in the magazine will serve for several successive discharges, but the force becomes weaker and weaker after each. The force with which a projectile is propelled from an air-gun is commonly much less than that produced by an ordinary discharge of gunpowder, but they may be so made as to be very formidable weapons.

Air′lie, Earls of, Barons Ogilvy of Airlie (1491), Barons Ogilvy of Alyth and Lintrathen (1639, in the Scotch peerage), a prominent family of Great Britain. The first earl of Airlie was created in 1639.—David Graham Drummond Ogilvy, the tenth earl, was born May 4, 1826, and succeeded his father in 1849.

Air-Plants, a term applied to certain epiphytic tropical plants, which hang in festoons from forest trees, and are able to live suspended in the air, without the presence of earth or water. The family of Orchidaceæ furnishes some beautiful specimens of air-plants.

Air-Pump, a machine by which a partial vacuum is formed and air is exhausted from a vessel, was invented by Otto Guericke in 1654, and subsequently improved by several persons. It consists of a circular brass plate, on which is placed a bell-glass, called a receiver, and two vertical brass cylinders, each of which is furnished with a piston. By means of a hole in the centre of the plate, and a connecting tube, a communication is formed between the receiver and the cylinders. The movement of the piston expels the air from the cylinders, into which a portion of air then rushes from the receiver, and a valve is placed at the mouth of the connecting tube, so that no air can return into the receiver. Another valve in the piston opens outward and permits the air to escape. The air-pump is used in many scientific experiments to demonstrate the pressure of the atmosphere and various other properties of air.

Air′y (George Biddell), C. B., LL.D., D. C. L., F. R. S., born at Alnwick, Northumberland, June 27, 1801, graduated B. A. at Trinity College, Cambridge, in 1824, being senior wrangler. In 1826 he became Lucasian professor of philosophy, and in 1828 Plumian professor of astronomy. In 1835 he was appointed astronomer-royal, and placed in charge of the Greenwich Observatory. Dr. Airy has attained a very high rank as an astronomer and physicist, and has written much upon weights, measures, coinage, railways, and other kindred subjects. He has made important improvements in astronomical and philosophical instruments. He wrote the article "Gravitation" in the "Penny Cyclopædia," and "Trigonometry," "Figure of the Earth," and "Tides and Waves" in the "Encyclopædia Metropolitana;" also "Mathematical Tracts," "Ipswich Lectures on Astronomy," "Errors of Observation," treatises on "Sound," "Magnetism," etc., besides very numerous and important monographs and papers for periodicals.

Aisne, a river of the N. part of France, rises in the department of Meuse, flows nearly westward, passes by Soissons, and enters the Oise near Compiègne. Length, about 150 miles. The canal of Ardennes connects it with the Meuse.

Aisne, a department in the N. of France, is bounded on the N. by the department Nord, on the E. by Ardennes and Marne, on the S. by Seine-et-Marne, and on the W. by Oise and Somme. Area, 2839 square miles. It is traversed by the Oise, the Aisne, and the Marne rivers. The soil is fertile, and the manufacturing industry in this department is very large. Wheat and hay are among the staple productions. It is subdivided into 5 arrondissements, 37 cantons, and 838 communes. Chief town, Laon. Pop. in 1881, 556,891.

Aïssé (Mademoiselle), a Circassian woman, born in 1693, was bought at the age of four years by the French ambassador in Constantinople, who brought her to France. Her position in society, together with her romantic adventures, gave her quite a celebrity in the last century. Died in 1733. Her letters were published, with notes.

Aitkin, on R. R., capital of Aitkin co., Minn. (see map of Minnesota, ref. 6–E, for location of county). Pop. in 1880, 136; in 1885, 705.

Aiton (William), born in Scotland in 1731; director of botanical garden at Kew, England, 1759–93; published "Hortus Kewensis," a catalogue of plants in the Royal Botanical Garden at Kew. Died in 1793.

Aitze′ma, van (Lieuwe), a Dutch historian, born at Doccum in 1600, wrote a "History of the Netherlands from 1621 to 1668." Died in 1669.

Aix, āks (anc. *A′quæ Sex′tiæ*), a city in the S. E. part of France, in the department of Bouches-du-Rhône, 33 miles by rail N. of Marseilles. It was formerly the capital of Provence, and was a celebrated seat of learning in the Middle Ages. It is the seat of an archbishop, has a fine cathedral, a city hall (hôtel de ville), a museum, a royal college, and a public library containing about 100,000 volumes. Here are manufactures of silk and cotton, and warm mineral springs, from which it derived its ancient name. Pop. in 1881, 29,257.

Aix, a small town of France, in Savoy, in a delightful valley 8 miles N. of Chambéry. It is near Lake Bourget, and has thermal springs, which are much frequented. Here are some ancient Roman ruins. Pop. in 1881, 4741.

Aix-la-Chapelle [Lat. *A′quis Gra′num;* Ger. *Aa′chen*], a city of Rhenish Prussia, is situated on the frontier of Belgium, and on the railway which connects Liege and Cologne, 44 miles by rail W. S. W. of the latter. It was once a famous city, and the capital of the empire of Charlemagne, who made it his favorite residence. It is a well-built, handsome city, with a cathedral founded in 796 A. D., a large town-hall, an elegant theatre, a public library, and several hospitals. Here are celebrated mineral springs, the temperature of which is about 112° Fahrenheit. They are considered efficacious for the cure of the gout, rheumatism, and cutaneous diseases. This city has important manufactures of fine broadcloths, needles, and pins. The cathedral contains the tomb of Charlemagne and a collection of relics, which attract a multitude of visitors. The successors of Charlemagne and the emperors of Germany were crowned here from the ninth century until 1531. P. in 1880, 85,551.

Aix-la-Chapelle, Congress of. This congress was held in 1818 for settling the affairs of Europe after the war of 1815. The king of Prussia and the emperors of Russia and Austria were present in person. The different representatives were Metternich, Wellington, Castlereagh, Hardenberg, Bernstorff, Nesselrode, and Capo d'Istrias, with Richelieu on behalf of France. Their deliberations resulted in the withdrawal from French territory of the army of occupation, and prepared the way for what was afterwards known as the "Holy Alliance" (which see.)

Aix-la-Chapelle, Treaties of. I. *Treaty of* 1668. This treaty was concluded May 2, 1668, between Louis XIV. of France on the one side, and the "Triple Alliance," including England, Sweden, and Holland, on the other. At the death of Philip IV., Louis laid claim, in the name of his wife, and under the laws of succession of Brabant and Namur, to a large portion of the Spanish Netherlands. He had already seized several strongholds and fortresses, when Holland, becoming alarmed at his rapid progress, concluded the triple alliance with England and Sweden. Louis, rather than resort to a war against so powerful a league, determined to accept mediation; and a treaty of peace was concluded at Aix-la-Chapelle, by which France retained possession of Charleroi, Valenciennes, and other strong towns, which she had already seized.

II. *Treaty of* 1748. This treaty ended, in 1748, the Austrian war of succession, in which all the great powers of Europe were, either on one side or the other, engaged. Several German princes had disputed the claim of Maria Theresa to the throne of Austria, and from this cause the war arose. It lasted with various success for eight years (from 1740 to 1748); at the end of which time a peace was concluded which left the different states with nearly the same possessions as before.

Aiza′ni, an ancient town of Asia Minor, now in ruins. Among its ruins, the theatre, with accommodations for over 12,000 spectators, is in a fine state of preservation.

Ajaccio, â-yât′cho, or **Ajazzo,** â-yât′so, a seaport, the capital of Corsica, is on the W. coast, in lat. 41° 54′ N., lon. 8° 44′ E. It has a good port defended by a citadel. It has also a cathedral and a library of 18,000 volumes. Wine and olive oil are exported from this town. Napoleon Bonaparte was born here on Aug. 15, 1769. A magnificent monument, representing the emperor Napoleon I., surrounded by his four brothers, was finished in 1865. Pop. 16,545.

Aj′alon, a town of Palestine belonging to the Levites, in the land of Dan. It was probably on the spot now occupied by the village of Yâlo. Over the valley in which this town was situated the moon stood still while Joshua pursued the five kings.

Ajan′, a region of Eastern Africa whose coast extends from Cape Guardafui indefinitely southward.

A′jax [Gr. Αἴας], surnamed the Greater, the son of Telamon, a Grecian hero, was king of Salamis. He acted a prominent part at the siege of Troy, and exceeded the other Greek warriors in strength and stature. Having been defeated by Ulysses in a competition for the armor of Achilles, he became insane and killed himself.

Ajax, the son of Oïleus, surnamed the Lesser, to distinguish him from Ajax the son of Telamon, was king of Locris. He was one of the Greek heroes that fought at the siege of Troy, and excelled all the Greeks in swiftness, except Achilles. According to tradition, he offended Minerva by his impiety, for which he was drowned on his homeward voyage from Troy.

Ajmeer, Ajmere, or **Rajpoota′na,** a city of British India, in the North-west Provinces, capital of a division and a district of the same name, is 220 miles S. W. of Delhi, and situated in a picturesque valley. It contains several massive temples and mosques; also an English and Oriental school. Pop. estimated at 25,000.

Ak′abah, a fortified village of Arabia, near the N. extremity of the Gulf of Akabah. (See Elath.)

Akabah, Gulf of, a portion of the Red Sea, lying in the N. W. part of Arabia, and bounded on the W. by the peninsula of Sinai. It is about 100 miles long, from 12 to 17 miles wide, has high and steep shores and numerous coral-reefs.

Ak′bar, or **Ak′ber** (written also **Acbar** and **Ackbar**), **Mohammed,** surnamed Jalâl-ed-Deen, a famous and excellent Mogul emperor, was born at Amerkote, in the valley of the Indus, in 1542. He was a son of Humâyoon, whom he succeeded in 1556. He displayed great military talents and political wisdom, and extended his dominions by the conquest of Bengal and part of the Deccan. Under his reign the Christians and Jews were tolerated and protected. He encouraged literature and promoted commerce. He ordered a complete survey and census of his empire, the result of which, with minutely detailed statistics, was recorded in a book called "Ayeen Akbery" ("Institutes of Akbar"), which is very celebrated. Akbar was greatly distinguished for his justice, humanity, and magnanimity. He died in 1605, and was succeeded by his son Selim, surnamed Jehân-Geer.

A′ken, a town of Prussia, in the province of Saxony, on the left bank of the Elbe, 24 miles S. E. of Magdeburg, has factories of beet-sugar and chemicals. Pop. in 1880, 5284.

A′kenside (Mark), M. D., an English didactic poet of high reputation, was born at Newcastle-on-Tyne Nov. 9, 1721. He studied medical sciences at Edinburgh, graduated as M. D. at Leyden in 1744, and practised in London, where he settled in 1748. His success as a physician was hindered in some degree by his reserve or lack of affability. His reputation is founded chiefly on "The Pleasures of the Imagination," in blank verse (1744), which was received with great favor. It was commended by Dr. Johnson "as an example of great felicity of genius and uncommon amplitude of acquisitions." He wrote several shorter poems and medical treatises. His "Treatise on Dysentery" (in Latin, 1764) proved him to be an excellent classical scholar. He was appointed a physician to the queen in 1760. Died June 23, 1770. His character is represented as estimable and dignified in a high degree.

A′kerblad (Johan David), a Swedish antiquary and Orientalist, born in 1760. He visited Jerusalem in 1792, and the Troad in 1797, gained distinction by deciphering the demotic writing of ancient Egypt, and wrote a "Letter on the Egyptian Inscription of Rosetta" (1802). Died Feb. 8, 1819.

Akerman′, sometimes written **Akjerman,** or **Akkerman,** a fortified town of Bessarabia, on the right bank of the Dniester, about 4 miles from the Black Sea, and 28 miles S. W. of Odessa. It has a port, several mosques and Greek and Armenian churches, numerous factories, and an extensive trade in salt, etc. A treaty concluded at Akerman on Sept. 4, 1826, exempted the Danubian provinces from all but a nominal dependence on Turkey. Pop. 29,343. Lat. 46° 12′ N., lon. 30° 22′ E.

Ak′erman (Amos T.), attorney-general of the U. S. for a short time under Gen. Grant, was born in N. H. in 1823, but for fourteen or fifteen years previous to his appointment had been a citizen and practising lawyer of Georgia. He sided with the Confederates in the late war, but after the surrender of the Southern arms he advocated the sanction of the reconstruction measures of Congress, was a member of the State convention of 1867–68, and acted a prominent part in shaping the new constitution formed by that body. Died Dec. 22, 1880.

A′kers (Benjamin), commonly known as Paul Akers, an American sculptor, born at Sacarappa, Me., July 10, 1825, went to Boston in 1840, and made busts of Longfellow, Samuel Appleton, and others. Mr. Akers lived much in Italy, and executed some of his finest works there. The pieces done in America were chiefly portrait busts and medallions, which were highly esteemed as likenesses and as works of art. He died in Philadelphia May 21, 1861. A man of fine sensibility and pure genius, he lived up to the highest ideal of his art, and was beloved by many friends.

Akhalies, a class of religious warriors among the Sikhs in Hindostan. They deny God, believe in fate, and are very fanatical and turbulent. (See Nanekism.)

Akhalzikh, Akalzik, or **Akis′ka,** a city of Asiatic Russia, in Georgia, on an affluent of the Koor, about 92 miles W. of Tiflis. It contains a mosque and several churches, and has some trade in silk and honey. Many of the inhabitants are Armenians. The Russians defeated the Turks near this place in 1828, and it was ceded to Russia in 1829. Pop. 15,977.

Ak-Hissar (*i. e.* "white castle"), written also **Ek-Hissar** (the ancient *Thyati′ra*), a town of Asia Minor, in Anatolia, 53 miles N. E. of Smyrna. It contains no ancient buildings, the houses being mostly of mud. Pop. about 10,000, two-thirds of whom are Turks.

Akhlat′, a town of Asiatic Turkey, in Armenia, on the N. W. shore of Lake Van, 203 miles S. E. of Trebizond.

It was formerly the seat of the Armenian kings, and is at present the seat of an Armenian bishop. Pop. about 4000.

Ak'iba (Ben Joseph), a Jewish rabbi of great learning and influence, was president of the school of Bene Barak in the second century A. D. Having joined the rebellion of Barchochebas, he was flayed and burned by the Romans at the age, it is said, of 120 years.

Akmol'linsk, a province of Russia, in Central Asia, is situated S. of the government of Tobolsk. Area, 210,556 square miles. It consists of a plateau, in the N. level, and in the S. mountainous, having very little rain. It is frequently visited by heavy snow-storms. Chief town, Akmollinsk. Pop. 381,200.

Akron, city, R. R. centre, and capital of Summit co., O. (see map of Ohio, ref. 3–H, for'location of county), on the Ohio Canal, 36 miles S. of Cleveland, on the highest point of land between Lake Erie and the Ohio River. It has a variety of manufactures, 3 public parks, a beautiful cemetery, a public library, and a high school, and is the seat of Buchtel College. Pop. in 1870, 10,006; in 1880, 16,512.

Akshehr', or **Ak-Sheher** (*i. e.* "white city"), a city of Asiatic Turkey, in Karamania, about 70 miles N. W. of Konieh, contains near 1500 houses. It is the ancient *Philomelion* of Strabo.

Ak'su, a town of East Toorkistan, on a river of its own name, 250 miles N. E. of Yarkand. It has manufactures of woollen stuffs and jasper, and is visited by many caravans from all parts of Central Asia. Pop. about 60,000.

Ak'yab, a town of British Burmah, at the mouth of the Aracan River, 550 miles S. E. of Calcutta. Its situation is healthy and very advantageous for commerce, with a commodious and safe harbor. It has a large trade, especially of rice, large quantities of which are exported hence. Pop. about 10,000, mostly Bengalese and Chinese. Here is a Protestant missionary station.

Al, the Arabic definite article, forms a prefix to many Oriental names, as Al-Mansoor, "the victorious," Al-Amin, "the faithful," etc.

A'la [a Latin word signifying a "wing"], a Roman military term, denoting the wing of an army. At first, when the whole legion consisted of Roman citizens, it was applied to the body of horsemen who served with the foot-soldiers, but after the admission of *socii*, whether Latini or Italici, it was applied to the troops of the allies, both horse and foot, which were stationed on the wings. At a still later time, the alæ were composed of foreign troops serving with the Roman armies; while under the empire the term was given to bodies of horsemen raised generally in the provinces, and serving apart from the legion. (See Wing.)

Alaba'ma, a river of the U. S., is formed by the Coosa and the Tallapoosa, which unite about 10 miles above Montgomery, in Alabama. It flows nearly westward to Selma, and afterwards in a general S. W. direction, and unites with the Tombigbee to form the Mobile River. It is navigable for large steamboats through its whole extent, which is about 300 miles. It traverses a fertile region, of which cotton and maize are the staple products.

Alabama (signifying, in the Creek language, "Here we rest"), one of the S. or Gulf States of the U. S., lying between the parallels of 30° 15′ and 35° N. lat., and the meridians of 84° 56′ and 88° 48′ W. lon. from Greenwich. Length from N. to S., 336 miles; breadth, from 148 to 200 miles. Bounded on the N. by Tennessee, E. by Georgia and Florida, S. by Florida and the Gulf of Mexico, W. by Mississippi. Area, 52,250 square miles, or 33,440,000 acres.

Alabama, by census of 1880, ranked seventeen among the States in population, sixteen in value of agricultural products, and thirty-two in value of manufactures.

Surface, Rivers, etc.—In the N. broken and hilly, from outlying hills of the Blue Ridge; S. of this almost level, but gently declining to the Gulf. Principal rivers are Tennessee, near N. line of the State, Mobile, Tombigbee, Alabama, Coosa, Black Warrior, Tensaw, Perdido, and Chattahoochee, and their affluents. Of these the Tennessee, Tombigbee, Black Warrior, Alabama, Tensaw, Chattahoochee, and Perdido are all navigable. Mobile Bay is the principal bay of the State, Grand, Bonsecours, and Perdido bays being shallow.

Soil.—The soil is divisible into three belts or sections—viz., 1. The S. section, one-fifth of the State, a light but productive alluvial and diluvial soil, yielding moderate crops of corn, cotton, and fruits, with considerable forests of yellow pine. 2. The cotton belt, limestone and chalk lands, mostly prairie, producing good cotton and corn. 3. The N. section, a mineral region, yielding gold, coal, iron, etc., some of it poor and hilly land, but healthy and with good water-power. In this region also is the great Tennessee valley, with fine fertile side valleys yielding cotton, corn, cereals, and fruits, while the hillsides are well adapted to grazing.

Minerals.—Of gold, discovered in Randolph co. 1836, there had been deposited in the Mint to June, 1880, $219,873. There are also mined in the State silver, copper, lead, iron-ores of various kinds, and excellent bituminous coal; census of 1880 reports 322,934 tons of the latter. There are many rarer minerals, mineral earths, building-stones, and mineral springs.

Vegetation.—The forests in the N. belong to the temperate, in the S. to the semi-tropical, zone. Five species of oak, hickory, chestnut, poplar, cedar, elm, mulberry, and white pine in the N. are replaced in the S. by cypress, live-oak, yellow pine, magnolia, and loblolly, with brake or American bamboo, saw-palmetto, and other small trees and shrubs. The apple, pear, plum, and hardy peach give place to the fig, pomegranate, olive, apricot, Scuppernong grape, and orange.

Zoology.—The wild animals common to the W. and S. W. are found here. The alligator inhabits the rivers and bayous, and there are lizards, some venomous snakes, terrapin, turtles, and excellent fish, and most game-birds, also birds of prey, songsters, and birds of exquisite plumage.

Climate.—Temperature in Northern Alabama delightful, frosts rare, and no intense heat. In Central Alabama, greater heat, but cool nights; occasional frosts. In the S., protracted heat, but good breezes, cool nights, and heavy dew. Rainfall from 48 to 54 inches. Water in the N. excellent; in the S., poor.

Agricultural Productions.—Cotton is the largest crop, the State ranking, in 1880, fourth in cotton production, and thirteenth in the product per acre. Alabama was sixth among Southern States in production of corn, but other cereal crops were small. She makes a little cane-sugar and molasses, and more sorghum syrup. Ramie is grown in S. counties, and will be a good crop, as a machine for dressing it has been invented. The number of farms has doubled in the last decade, but nearly half are rented. Of the farms, eight-tenths are under 100 acres. The census of 1880 reports 699,654 bales of cotton, 25,451,278 bushels of corn, 3,039,639 bushels of oats, 1,529,657 bushels of wheat, 28,402 bushels of rye, 5281 bushels of barley, 363 bushels of buckwheat, 94 hogsheads of sugar, 795,199 gallons of molasses, 810,889 pounds of rice, 452,426 pounds of tobacco, 3,448,819 bushels of sweet potatoes, 334,925 bushels of Irish potatoes. The clip of wool was 762,207 lbs.

*Farm Animals.**—The census of 1880 reports 113,950 horses, 121,081 mules and asses, 751,190 cattle, 1,252,462 swine, 347,538 sheep.

Manufactures are not large, but increasing; lumber, iron, machinery, and cotton goods are the principal articles produced. The production of iron and steel reached 62,986 tons in 1880. The census of 1880 reports 2070 manufacturing establishments, employing 10,019 hands. Amount of wages paid, $2,500,000; capital invested, $9,668,008; aggregate value of products, $13,565,504.

Railways.—In Jan., 1880, there were 1852 miles of railroad in operation, which are sufficient for the present commerce and passenger traffic of the State.

Finances.—State debt, net, in 1880, was $9,071,765; local debt, net, $5,656,780; total debt, State and local, net, $14,728,545. The assessed valuation in 1880 was: Real estate, $77,374,008; personal, $45,493,220; total, $122,867,228; total taxation, $2,061,978.

Commerce.—Mobile is the only port of entry. Imports in 1880, $743,890; exports, mostly cotton, $7,187,703; foreign exports, $1037. Total imports and exports, $7,932,630. The number of vessels entering the port in 1880 was 130;

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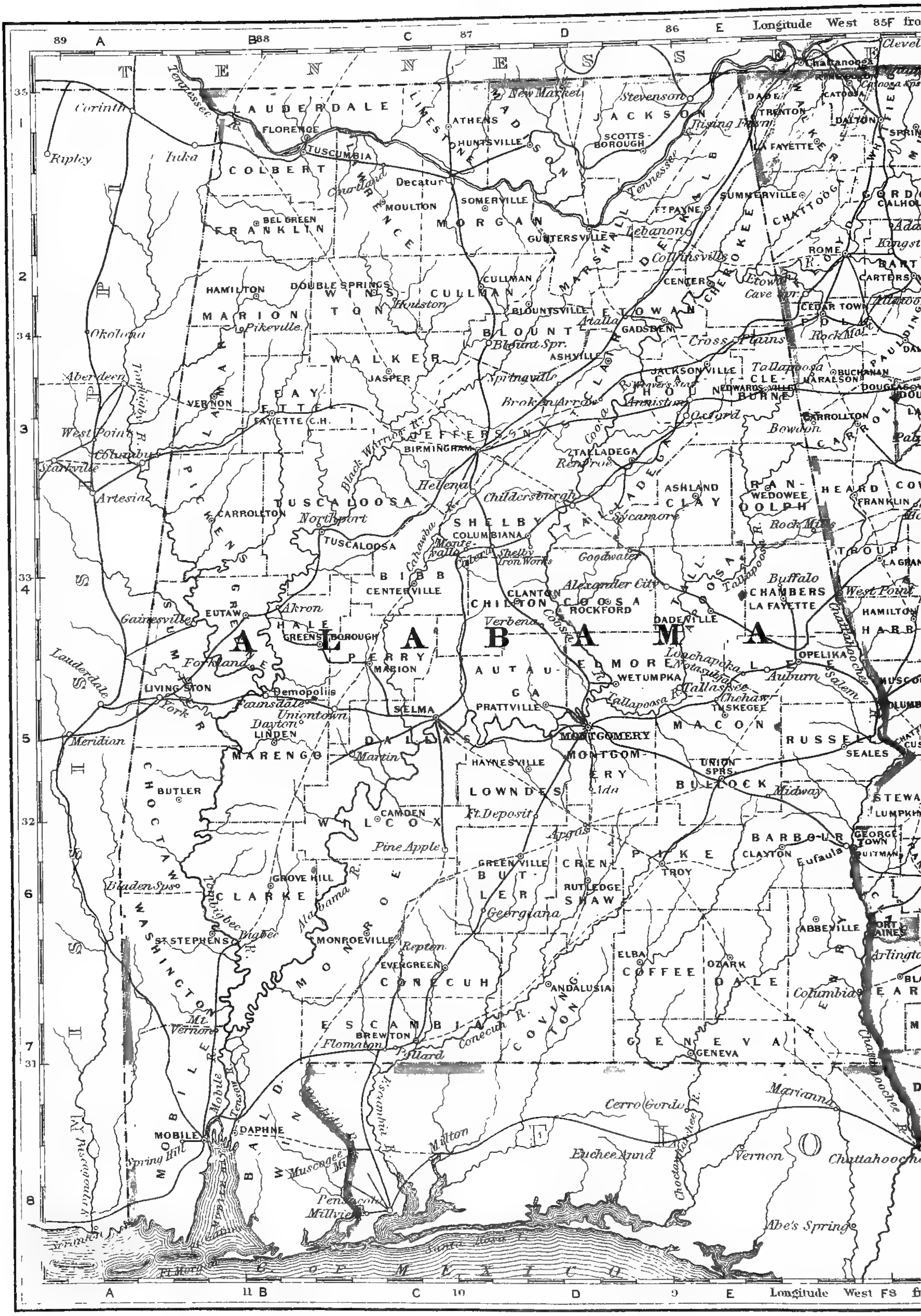
* On farms only.



Longitude West 85 from
89
A
B 88
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D
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E
T E N N E S S E E
Corinth
Ripley
Iuka
LAUDERDALE
FLORENCE
TUSCUMBIA
COLBERT
Tennessee R.
LIMESTONE
ATHENS
MADISON
HUNTSVILLE
New Market
Stevenson
JACKSON
SCOTTSBOROUGH
Bridgeport
Chattanooga
Cleveland
RINGGOLD
Catoosa Sps.
CATOOSA
DADE
TRENTON
Rising Fawn
WALKER
LA FAYETTE
DALTON
WHITFIELD
SPRING
Decatur
Courtland
LAWRENCE
MOULTON
SOMERVILLE
MORGAN
BEL GREEN
FRANKLIN
GUNTERSVILLE
MARSHALL
Lebanon
FT PAYNE
DE KALB
SUMMERVILLE
CHATTOOGA
GORDON
CALHOUN
Adairsville
Kingston
ROME
FLOYD
BARTOW
CARTERSVILLE
Collinsville
CHEROKEE
CENTER
Etowah
Cave Spr.
CEDAR TOWN
POLK
Rockmart
PAULDING
Allatoona
HAMILTON
DOUBLE SPRINGS
WINSTON
Houston
CULLMAN
MARION
Pikeville
BLOUNTSVILLE
BLOUNT
Blount Spr.
ETOWAH
Attalla
GADSDEN
Cross Plains
WALKER
JASPER
ASHVILLE
JACKSONVILLE
CALHOUN
Weaver's Sta.
Tallapoosa
BUCHANAN
HARALSON
DOUGLASVILLE
EDWARDSVILLE
CLEBURNE
Springville
Okolona
Aberdeen
LAMAR
VERNON
FAYETTE
FAYETTE C.H.
Broken Arrow
Anniston
Oxford
CARROLLTON
CARROLL
Bowdon
West Point
Columbus
Starkville
Artesia
Tombigbee R.
PICKENS
CARROLLTON
JEFFERSON
BIRMINGHAM
Black Warrior R.
ST. CLAIR
TALLADEGA
Renfroe
Coosa R.
Helena
Childersburgh
ASHLAND
CLAY
RANDOLPH
WEDOWEE
HEARD
FRANKLIN
TUSCALOOSA
Northport
TUSCALOOSA
SHELBY
COLUMBIANA
Montevallo
Calera
Shelby Iron Works
Sycamore
Rock Mills
TALLAPOOSA
TROUP
LA GRANGE
Goodwater
Alexander City
Buffalo
CHAMBERS
LA FAYETTE
West Point
Cahawba R.
BIBB
CENTERVILLE
CLANTON
CHILTON
COOSA
ROCKFORD
DADEVILLE
HARRIS
HAMILTON
Gainesville
EUTAW
Akron
GREENE
HALE
GREENSBOROUGH
A L A B A M A
Verbena
Tallapoosa R.
SUMTER
Forkland
PERRY
MARION
AUTAUGA
ELMORE
WETUMPKA
Loachapoka
Notasulga
OPELIKA
LEE
Auburn
Salem
Chattahoochee R.
MUSCOGEE
COLUMBUS
Lauderdale
LIVINGSTON
York
Demopolis
Faunsdale
Uniontown
SELMA
PRATTVILLE
Tallassee
Chehaw
TUSKEGEE
MACON
Dayton
LINDEN
DALLAS
MONTGOMERY
MONTGOMERY
RUSSELL
SEALES
CHATTAHOOCHEE
CUSSETA
Meridian
MARENGO
Martin
HAYNESVILLE
UNION SPRS.
BULLOCK
Midway
STEWART
LUMPKIN
CHOCTAW
BUTLER
LOWNDES
Ada
CAMDEN
WILCOX
Ft. Deposit
Argus
BARBOUR
CLAYTON
GEORGETOWN
QUITMAN
Eufaula
Pine Apple
GREENVILLE
BUTLER
CRENSHAW
PIKE
TROY
Bladen Sps.
GROVE HILL
CLARKE
Alabama R.
MONROE
RUTLEDGE
ABBEVILLE
FORT GAINES
Georgiana
ST. STEPHENS
Bigbee
MONROEVILLE
Repton
WASHINGTON
EVERGREEN
CONECUH
ANDALUSIA
ELBA
COFFEE
OZARK
DALE
HENRY
Arlington
Columbia
EARLY
BLAKELY
Mt. Vernon
ESCAMBIA
BREWTON
Flomaton
Pollard
Conecuh R.
COVINGTON
GENEVA
GENEVA
MOBILE
Mobile R.
Tensaw R.
BALDWIN
Escambia R.
Perdido R.
Marianna
Cerro Gordo
Choctawhatchee R.
MOBILE
DAPHNE
Spring Hill
Milton
F L O R I D A
Euchee Anna
Vernon
Chattahoochee
Pascagoula R.
Muscogee Mill
Pensacola
Millview
Abe's Spring
Ft. Morgan
Santa Rosa I.
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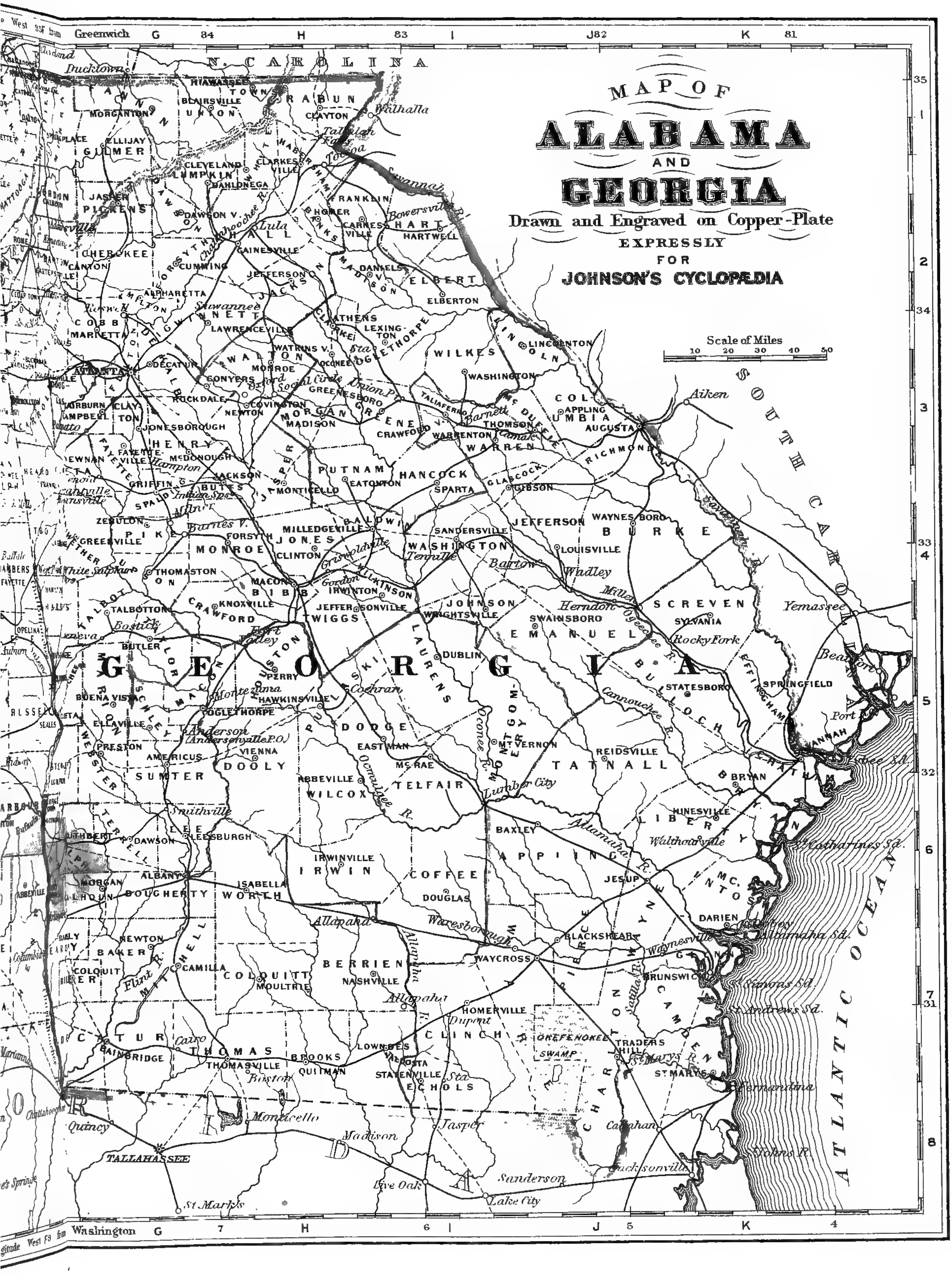


MAP OF
ALABAMA
AND
GEORGIA
Drawn and Engraved on Copper-Plate
EXPRESSLY
FOR
JOHNSON'S CYCLOPÆDIA

tonnage, 61,471 tons. The number which cleared was 156; tonnage, 69,181.

Banks and Insurance.—There were, Nov. 1, 1880, 9 national banks in operation; capital, $1,508,000, and outstanding circulation, $1,443,895; 6 State banks and trust companies; capital, $615,000. Private bankers and savings banks, 20; capital, $425,241; deposits, $1,257,221. The insurance, both life and fire, is mostly in the hands of foreign companies.

Education.—In 1879 Alabama had 4 universities and colleges, with 439 students; 59 seminaries, academies, and schools of secondary instruction, with 3784 students; a school population of 376,649, of whom 174,485 were enrolled in the public schools. The schools were kept nearly four months in the year; $430,131 was expended for school purposes in 1880; total number of public schools, 4629. There were also 7 scientific and professional schools.

Libraries and Newspapers.—The Educational Bureau's report on libraries published in 1876 states that in that year there were 31 public libraries of over 300 volumes, aggregating 60,000 volumes in all, and many private libraries, having in all nearly 600,000 volumes. In 1880 there were in Alabama 125 newspapers and periodicals, including 6 dailies.

Churches.—The Baptists are the leading denomination, but are followed by the others in the following order: Methodists, Presbyterians, Episcopalians, Disciples or Christians, Roman Catholics, Congregationalists, and minor denominations.

Population of Alabama in 1880 was 1,262,505, white 662,185, colored 600,320, including 213 Indians and 4 Chinese, an increase of 265,513 since 1870. In 1820 the State had 127,901 inhabitants, a little over one-tenth of its population sixty years later.

COUNTIES.	* Ref.	Pop. 1870.	Pop. 1880.	COUNTY TOWNS.	Pop. 1880.
Autauga	5–D	11,623	13,108	Prattville	977
Baldwin	8–B	6,004	8,603	Daphne	
Barbour	6–E	29,309	33,979	Clayton	761
Bibb	4–C	7,469	9,487	Centreville	1,644
Blount	2–D	9,945	15,369	Blountsville	222
Bullock	5–E	24,474	29,066	Union Springs	1,862
Butler	6–D	14,981	19,649	Greenville	2,471
Calhoun	3–E	13,980	19,591	Jacksonville	882
Chambers	4–E	17,562	23,440	La Fayette	1,061
Cherokee	2–E	11,132	19,108	Centre	144
Chilton	4–D	....	10,793	Clanton	2,407
Choctaw	6–A	12,676	15,731	Butler	194
Clarke	6–B	14,663	17,806	Grove Hill	176
Clay	4–E	9,560	12,938	Ashland	387
Cleburne	3–E	8,017	10,976	Edwardsville	267
Coffee	7–E	6,171	8,119	Elba	222
Colbert	1–B	12,537	16,153	Tuscumbia	1,369
Conecuh	6–C	9,574	12,605	Evergreen	985
Coosa	4–D	11,945	15,113	Rockford	1,533
Covington	7–D	4,868	5,639	Andalusia	596
Crenshaw	6–D	11,156	11,726	Rutledge	215
Cullman	2–C	....	6,355	Cullman	426
Dale	7–E	11,325	12,677	Ozark	512
Dallas	5–C	40,705	48,433	Selma	7,529
De Kalb	2–E	7,126	12,675	Fort Payne	
Elmore	5–D	14,477	17,502	Wetumpka	816
Escambia	7–C	4,041	5,719	Brewton.	
Etowah	2–D	10,109	15,398	Gadsden	1,697
Fayette	3–B	7,136	10,135	Fayette C.-H.	180
Franklin	2–B	8,006	9,155	Bel Green	81
Geneva	7–E	2,959	4,342	Geneva	
Greene	4–B	18,399	21,931	Eutaw	1,101
Hale	4–B	21,792	26,553	Greensborough.	1,833
Henry	7–F	14,191	18,761	Abbeville	2,258
Jackson	1–E	19,410	25,114	Scottsborough	722
Jefferson	3–C	12,345	23,272	Birmingham	3,086
Lamar	3–B	....	12,142	Vernon	208
Lauderdale	1–B	15,091	21,035	Florence	1,359
Lawrence	2–C	16,658	21,392	Moulton	3,503
Lee	5–E	21,750	27,262	Opelika	3,245
Limestone	1–C	15,017	21,600	Athens	1,011
Lowndes	5–D	25,719	31,176	Hayneville	2,152
Macon	5–E	17,727	17,371	Tuskegee	2,370
Madison	1–D	31,267	37,625	Huntsville	4,977
Marengo	5–B	26,151	30,890	Linden	1,975
Marion	2–B	6,059	9,364	Hamilton.	
Marshall	2–D	9,871	14,585	Guntersville	325
Mobile	8–A	49,311	48,653	Mobile	29,132
Monroe	6–C	14,214	17,091	Monroeville	122
Montgomery	5–D	43,704	52,356	Montgomery	16,713
Morgan	2–C	12,187	16,428	Somerville	209
Perry	5–C	24,975	30,741	Marion	2,074
Pickens	4–B	17,690	21,479	Carrollton	349
Pike	6–E	17,423	20,640	Troy	2,294
Randolph	4–E	12,006	16,757	Wedowee	2,358
Russell	5–F	21,636	24,837	Seale	257
Saint Clair	3–D	9,360	14,462	Ashville	1,443
Shelby	4–D	12,218	17,236	Columbiana	496
Sumter	5–B	24,109	28,728	Livingston	738
Talladega	4–D	18,064	23,360	Talladega	1,233
Tallapoosa	4–E	16,963	23,401	Dadeville	740
Tuscaloosa	4–B	20,081	24,957	Tuscaloosa	2,418
Walker	3–C	6,543	9,479	Jasper	269
Washington	7–A	3,912	4,538	St. Stephens	
Wilcox	5–C	28,377	31,828	Camden	590
Winston	2–C	4,155	4,253	Double Sps.	
Total		996,992	1,262,505		

* Reference for location of counties. See map of Alabama.

Principal Towns and Population, 1880.—Montgomery, the capital, 16,713; Mobile (present limits), 29,132; Selma, 7529; Huntsville, 4977; Eufaula, 3836; Opelika, 3245; Greenville, 2471; Troy, 2294; Marion, 2074; and Tuscaloosa, 2418.

History.—First settlement in 1702, by Bienville; Mobile planted in 1711–13; territory N. of 31° ceded by France to Great Britain in 1763, and in 1783 transferred to U. S.; first attached to Georgia and South Carolina, but in 1802 organized as Mississippi Territory; region S. of 31° belonged to Spain, but in the war of 1812 seized and annexed to Mississippi Territory; this region and Florida purchased from Spain in 1819; Creek war in 1813–14—480 whites killed, 400 wounded, and 1617 Indians killed; Gen. Jackson defeats the Creeks, who make peace and give up three-quarters of their territory; immigration increases; Mississippi set off as a State in 1817, and Alabama admitted to the Union in 1819. Alabama took an active part in removal of Indians to Indian Territory; as one of the largest slaveholding States in the Union, uniformly acted up to what were considered the interests of its section, taking strong ground in favor of the annexation of Texas, resisting all measures for the restriction of slave territory, and opposing with great vehemence what its political leaders characterized as Northern aggressions; in 1860–61 one of the first of the Southern States to declare for secession and a Southern confederacy; convention of all the Southern States held at Montgomery Feb. 4, 1861, to organize a Southern confederacy; provisional government organized; Jefferson Davis elected president, and Montgomery made capital of Confederacy; Gov. Moore seized in Jan., 1861, U. S. arsenal, arms, forts, and revenue-cutter; July, 1861, capital removed to Richmond, Va. In the progress of the war Alabama took an active part, though the northern portion of the State contained a strong Union party. Several severe battles were fought within the limits of the State—notably, the naval actions and the capture of the forts in Mobile Bay in Aug., 1864, the siege and capture of Mobile in Mar. and April, 1865, and the capture of Selma and other towns by Gen. Wilson in April, 1865. There were also minor conflicts at Athens, Montevallo, Scottsboro', Talladega, and Tuscumbia. After the close of the war Alabama was in the same condition with the other Southern States. Reconstruction measures: Provisional government appointed June 21, 1865, and State temporarily under military control; State convention met Sept. 25, 1865, and annulled ordinance of secession; military government very lenient; State convention called by Gen. Pope to meet Nov. 5, 1867, to form a new constitution and State government; constitution submitted to people Feb. 4, 1868. There was much opposition to it, and many of those opposed stayed away from the polls; the result was that, though the constitution received a majority of the votes cast, it did not receive a majority of those registered, and hence was deemed to have been rejected. Most of its provisions have, however, since been engrafted on the existing constitution. The State was admitted to a representation in Congress by an act passed over the President's veto June 25, 1868. Some minor troubles and difficulties were experienced before a complete adjustment was effected, but the trouble was much less than in other States of the South, and with the return of financial prosperity, and the development of the mineral, agricultural, manufacturing, and commercial resources of the State by the great railroad lines now traversing it, there is every reason to believe that she has entered on a new and more rapid period of growth and advancement.

Governors of the State.

William W. Bibb	1819–20	John Gill Shorter	1861–63
Thomas Bibb	1820–21	Thomas H. Watts	1863–65
Israel Pickens	1821–25	Lewis E. Parsons, *Prov.*	1865–65
John Murphy	1825–29	Robert M. Patton	1865–68
Gabriel Moore	1829–31	William H. Smith	1868–70
John Gayle	1831–35	Robert B. Lindsay	1870–72
Clement C. Clay	1835–37	David P. Lewis	1872–74
Arthur P. Bagby	1837–41	George S. Houston	1874–78
Benjamin Fitzpatrick	1841–45	Rufus W. Cobb	1878–82
Joshua L. Martin	1845–47	Edward A. O'Neal	1882–86
Reuben Chapman	1847–49		
Henry W. Collier	1849–53		
John A. Winston	1853–57		
Andrew B. Moore	1857–61		

L. P. BROCKETT.

Alabama Claims. The protracted negotiations, the treaty of Washington resulting therefrom, and the arbitration of Geneva by which this treaty was in part executed, may justly be deemed as forming the most important *cause célèbre* of modern diplomacy. The claims themselves were made by the government of the U. S. in favor of certain of its citizens and of itself upon the government of Great Britain, on account of the acts of certain warlike vessels which sailed from British ports in the interest or employ of the Confederate States during the war of the rebellion in the U. S. The treaty of Washington describes them as "differences [which] have arisen between" [the two governments], "and still exist, growing out of the acts committed by the several vessels which have given rise to the claims generically known as the Alabama claims." The Confederate cruisers in respect of which the U. S. made any reclamations before the tribunal of arbitration at Geneva should be separated into two classes: *first,* those which were substantially fitted out and adapted to warlike use in Great Britain, so that they actually commenced their hostile careers by sailing from a British port; and *secondly,* those which commenced their hostile careers in the Confederate service within other territorial jurisdictions.

First Class.—The Florida was an iron screw gunboat. The contract for her was made in 1861 by Bullock, the Confederate agent in England having the matter in charge, with a firm of builders in Liverpool. Her object and destination were well known at that place, but the formal pretence was kept up that she was designed for the Italian navy. She sailed for Nassau on the 23d of Mar., 1862, with a crew of fifty-two men, all British except three or four, of whom only one was an American. She was in every respect a man-of-war, except that her armament was not in place, but she could have been put in complete preparation for battle in twenty-four hours. While she was preparing to sail, shot, shells, etc. were sent by river from Liverpool to Hartlepool, and there shipped on board the steamer Bahama, which left for Nassau, and there joined the Florida. All these facts were from time to time diligently brought to the attention of the British authorities by Mr. Adams, the American minister, and by Mr. Dudley, the American consul at Liverpool. At Nassau certain abortive proceedings against the Florida were undertaken by the colonial government. She sailed from Nassau on the 8th of August, having cleared for St. John, New Brunswick. At the same time, a schooner laden with the shot, shell, and other munitions of war sailed from Nassau, and met her at a neighboring island, where the transfer was made, and the Florida immediately set out on a hostile cruise. On the 4th of September she ran through the blockading squadron into Mobile, by pretending to be a British man-of-war and flying the British flag. On the 26th of Jan., 1863, she escaped from Mobile. Her career as a Confederate cruiser ended Oct. 7, 1864. Three of her captures, the Clarence, the Tacony, and the Archer, were fitted out and armed as her tenders, and aided in the work of destruction. During her cruises she was repeatedly received into British ports, and permitted to repair and to take in full supplies of provisions and coals. She and her tenders captured and destroyed American merchant-vessels and cargoes amounting in value to many millions of dollars.

The Alabama was built for speed, and not intended for fighting, and was manned by British subjects. She was a wooden steam sloop of about 1040 tons register, built for the Confederate States by Laird & Sons at Birkenhead, in England, and was called "No. 290," from her number in the list of steamers constructed by that firm. She was barque-rigged, was furnished with two engines of 350 horsepower each, and was pierced for twelve guns. Strict precautions were taken to keep her destination a secret, but the suspicions of the agents of the U. S. having been excited before she was quite finished, the minister of the U. S. requested the British government to detain her. The British ministers consulted the Crown lawyers, and after some delay, caused by the illness of the queen's advocate, an opinion was given in favor of detaining her. In the mean time, the "No. 290" had escaped, under a pretext of a trial trip, near the end of July, 1862. She was not equipped with guns and warlike stores when she left the Mersey, but received them at Terceira, whither they were conveyed by another vessel. In August, 1862, Capt. Semmes took command of the steamer, which he named the Alabama, and began his cruise with a crew of eighty men. He burned the merchant-vessels which he captured, being unable to take them into any port of the Confederate States in consequence of the blockade. The Alabama never entered any port that was possessed by the Confederate States.

It is stated that she captured sixty-five vessels, and destroyed property valued at $6,000,000. Much greater than this amount was the damage inflicted on ship-owners of the U. S. by the heavy insurance for war-risks to which they were subjected, and by the difficulty in obtaining freight for their vessels.

After a long cruise in the Pacific Ocean, she returned to Europe, and entered the port of Cherbourg to refit and obtain a supply of stores, June 11, 1864. A few days later the war-steamer Kearsarge, of seven guns, commanded by Capt. Winslow of the U. S. navy, arrived at Cherbourg. Capt. Semmes came out of the port and offered battle on the 19th of June. When the vessels were about one mile apart, the Alabama began to fire rapidly and wildly, while the guns of the Kearsarge were served with cool precision and effect. Both vessels during the action moved rapidly in circles, swinging round an ever-changing centre. After they had described seven circles, the Alabama began to sink and raised a white flag. Capt. Semmes, who had lost thirty killed and wounded, escaped in the English yacht Deerhound. Capt. Winslow lost three killed and wounded, and took sixty-five prisoners. The Alabama went to the bottom.

The Georgia was built for the Confederates on the Clyde. She sailed early in 1863, and proceeded to a point off the French coast, where she met the steamer Alar, which had been sent from Liverpool with her arms, ammunition, etc. Some steps were taken by the British government to prevent her escape, but they were too late. After a warlike career of about a year, she returned to Liverpool, and was there sold by the Confederate agents, Mr. Adams remonstrating in vain against this proceeding. Shortly after the sale she left the port, and was captured by the U. S. cruiser Niagara.

The Second Class.—The Sumpter, the Nashville, the Retribution, the Tallahassee, the Chickamauga. These were all armed and equipped in, and sailed from, Confederate ports. The claims made in respect of them were based upon allegations that they were received into British ports, and permitted to augment their supplies of coal and supplies, in excess of the maximum amount permitted by the queen's proclamation of neutrality; and also in respect of the Retribution, that she was permitted to take captured cargo into one of the Bahamas, and there sell or dispose of it without any judicial process. The case of the Shenandoah was quite different. She was originally a British steamer, called the Sea-King, and had been engaged in the East India trade. She sailed Oct. 8, 1864, for Bombay in ballast, with a crew of forty-seven men. She was not then armed and equipped or fitted out as a man-of-war. On the same day another steamer, the Laurel, sailed from Liverpool, ostensibly for Nassau, having on board a number of Confederates and a quantity of guns, gun-carriages, and other munitions of war. These steamers met at Funchal, in the island of Madeira, where the transfer was made. Here she was taken command of by Captain Waddell of the Confederate service, and manned. A small part only of the original crew consented to remain with her, and she sailed with less than one-half of her regular force of men. On the 25th of Jan., 1865, she arrived at Melbourne, where she was permitted to repair and to coal. She also at the same place enlisted a large number of men, augmenting her crew by forty-five new enlistments. This was done so openly that it was the common talk of the town, and was freely commented upon by the local papers. The tribunal of arbitration decided that the colonial authorities did not exercise due diligence in preventing these enlistments. Leaving Melbourne, she proceeded to the Arctic regions, and there, beyond the reach of any U. S. cruisers, she made great havoc among the American whaling ships. This was continued for several months after the complete overthrow of the Confederacy. She finally arrived at Liverpool on the 6th of Nov., 1865, and was surrendered to the British government, and by it delivered over to the U. S.

A diplomatic correspondence arose at once from the foregoing events. We can only state in the briefest manner the points which were urged by either side. It should be carefully borne in mind that the protracted negotiations growing out of the recognition of the Southern States as belligerents by the queen's proclamation of neutrality on the 13th of May, 1861, had no necessary connection with the Alabama claims. Although the two alleged causes of complaint were often mingled, and perhaps deemed inseparable, in the popular opinion of Americans, yet they were entirely distinct, and were finally and definitively held to be so by the treaty of Washington. During the war the immediate object of all communications made on the part of the U. S. was to induce the British government to interfere and prevent the escape of the Confederate cruisers; the remote object of the same communications, and the sole purpose of those made after the war, was to present and urge a demand for compensation.

Mr. Secretary Seward and Mr. Adams placed themselves upon the fundamental position that a neutral nation is bound by the principles and doctrines of the international law, independent of any mere municipal regulations, to use all the means in its power to prevent its territory from being made the base of military operations by one belligerent against the other. To this it was added that if further legislation was necessary to enable the authorities to carry out their international duties, it was always within the power of the Parliament to enact the needed statute, and that an international obligation therefore rested upon that body to pass the act. The British government took issue with all these propositions; they denied all international duty antecedent to or beyond the existing statute; this statute, they claimed, was the limit of their power and responsibility. The statute referred to, known as the Foreign Enlistment act, was passed in 1819. In substance it provides "that if any person within any part of the United Kingdom shall . . . equip, furnish, fit out, or arm" any vessel, or attempt to equip, etc. any vessel, or procure any vessel to be equipped, etc., or knowingly aid in equipping, etc. any vessel, with intent that it may be employed in the service of one belligerent, he shall be guilty of a misdemeanor, and shall be fined and imprisoned, and the vessel, with its arms, etc., shall be forfeited. Lord Russell refused to go beyond this statute, and declared that the executive as such could not act, and that all proceedings under it must be judicial. To this end he demanded from Mr. Adams such preliminary technical proofs as would warrant a conviction by the courts. There was thus thrown upon Mr. Adams and Mr. Dudley the duty of acting as police agents and detectives for the British government in obtaining the evidence which the local officials did not busy themselves with discovering. At last, a construction was given to this statute by the English courts in the case of the Alexandra which, upon the theory before urged by Lord Russell, rendered the British government powerless. Like the Florida and the Alabama, she was constructed for the Confederates, in every respect a man-of-war ready for action, except that her guns and ammunition were not on board. She was proceeded against under the statute, which makes it the offence "to equip, furnish, fit out, or arm any vessel." The judge at the trial held that each one of these words means the same thing, and, as the Alexandra was not actually armed in a British port, the law was not violated. This ruling was sustained on appeal by the higher court. As the government had denied all international obligation, so this decision removed all municipal duty to interfere with the operations of the Confederate agents. Such was the course of the negotiations during the war.

In the year 1868 a change in the sentiments of British statesmen was apparent, and it was conceded that the matter was one for amicable adjustment. Under the influence of these opinions a convention was signed on the 14th of Jan., 1869, by Mr. Reverdy Johnson, the American minister, and Lord Clarendon, the British secretary for foreign affairs. It provided that "all claims upon the part of individuals, citizens of the U. S., upon the government of Her Britannic Majesty, and all claims on the part of individuals, subjects of Her Britannic Majesty, upon the government of the U. S.," arising since Feb. 8, 1853, shall be referred to commissioners or arbitrators to be settled. This treaty was rejected by the U. S. Senate, receiving but one vote in its favor. The reasons for this action were many: the most important were, that the treaty was expressly limited to claims of individual citizens, and ignored the existence of any on the part of the U. S. as a nation, and that it provided for the payment of claims against the U. S.

The long negotiations were ended by the treaty of Washington. The operative clause in this treaty is found in Art. I., which after reciting the "differences existing," as quoted before, proceeds: "Now, in order to remove and adjust all complaints and claims on the part of the U. S., and to provide for the speedy settlement of such claims, the high contracting parties agree that all the said claims growing out of acts committed by the aforesaid vessels, and generically known as the Alabama claims, shall be referred to a tribunal of arbitration," etc. This language is broad and without limit. A correspondence had taken place between Mr. Secretary Fish and Sir Edward Thornton, the British minister to the U. S., in Jan., 1871, preliminary to the negotiation of this treaty, in which Mr. Fish wrote, Jan. 30th, that "the removal of the differences which arose during the rebellion, and which have existed since, growing out of the acts committed by the several vessels which have given rise to the claims generically known as the Alabama claims, will also be essential to the restoration of cordial relations." To this suggestion Sir Edward Thornton acceded, and a joint high commission was agreed upon to negotiate the treaty. It will be noticed that the language of Mr. Fish's note is the same as that found in the first article of the treaty. The high commission consisted, on the part of the U. S., of Hamilton Fish, the secretary of state, Robert C. Schenck, the American minister to Great Britain, Samuel Nelson, one of the justices of the Supreme Court, Ebenezer R. Hoar, and George H. Williams; and on the part of Great Britain, of Earl de Grey and Ripon, president of the queen's council, Sir Stafford Northcote, M. P., Sir Edward Thornton, Sir John Macdonald, and Professor Montague Bernard. They completed the treaty of Washington on the 8th of May, 1871. In the deliberations the U. S. commissioners claimed compensation for "*direct losses*" in the destruction of vessels and cargoes, and in national expenditure in the pursuit of the Confederate cruisers, and for "*indirect injury*" in the transfer of American shipping to the British flag, in the enhanced rates of insurance, in the prolongation of the war, and in the addition to the cost of the war; they proposed that Great Britain should pay a lump sum, to be agreed upon, for all these claims. The British commissioners in answer proposed arbitration. The American commissioners would not agree to arbitration "unless the principles which should govern the arbitrators were first agreed upon." Finally, the latter suggestion was accepted; arbitration was adopted, and the rules which should govern the arbitrators were agreed upon. Articles I. to XI. of the treaty relate to the Alabama claims. The first describes, as has been shown, the matters submitted for decision; the others describe the constitution of the tribunal, its procedure, and the form of its decision. The seventh contains the important three rules, as follows:

First. That a neutral government is bound, first, to use due diligence to prevent the fitting out, arming, or equipping, within its jurisdiction, of any vessel which it has reason to believe is intended to cruise or carry on war against a power with which it is at peace; and also to use like diligence to prevent the departure from its jurisdiction of any vessel intended to cruise or carry on war as above, such vessel having been specially adapted in whole or in part within such jurisdiction to warlike use. *Secondly.* Not to permit or suffer either belligerent to make use of its ports or waters as the base of naval operations against the other, or for the purpose of the renewal or augmentation of military supplies or arms, or the recruitment of men. *Thirdly.* To exercise due diligence in its own ports or waters, and as to all persons within its jurisdiction, to prevent any violation of the foregoing obligations and duties; it being a condition of this undertaking that these obligations should in future be held to be binding internationally between the two countries.

These rules Great Britain denies to have been parts of the international law when the acts complained of were done, but for reasons of comity only consents that they retroact and apply to those acts, and be made the basis of decision. The article concludes as follows: "The high contracting parties agree to observe these rules as between themselves in future, and to bring them to the knowledge of other maritime powers, and to invite them to accede to them." In pursuance of the treaty, the following persons constituted the tribunal of arbitration: Count Edward Sclopis, named by the king of Italy; Mr. Jacob Staempfli, named by the president of the Swiss Confederation; Viscount d'Itajuba, named by the emperor of Brazil; Mr. Charles Francis Adams, named by the President of the U. S.; and Sir Alexander E. Cockburn, named by the queen of Great Britain. Each sovereign litigant was to present its claim to the tribunal in the form of a printed "case," and subsequently in an answer termed a "counter-case." Each case was to contain the facts and arguments relied upon by the party, and the counter-case was to be a reply to the case of the adversary. The American case was separated into six parts; it gave a minute history of the acts of the British government towards the U. S. during the rebellion, and of the fitting out and subsequent operations of each Confederate cruiser; and discussed the questions of international law involved in the controversy, and concluded with a demand of the compensation to be awarded. The British case was separated into ten parts, and covers a similar ground to the American case, though from a different point of view. Both were supplemented by many volumes of evidence. Two very distinct questions arose upon these papers: (1) What matters were submitted by the treaty to the arbitrators? and (2) By what rules and principles of law were the arbitrators to be guided in deciding the matters submitted to it? The consideration of the first and preliminary one of these questions gave rise to a controversy which for a while threatened to interrupt the whole scheme of arbitration. In Part VI. of the American case the U. S. presented the items of damage to which it claimed to be entitled. Quoting the language used by the American high commissioners, the case described claims for "direct" losses or damages, and other claims for "indirect" losses. The "direct" were said to include "losses growing out of the destruction of vessels and their cargoes by the insurgent cruisers, and the national expenditures in pursuit of those cruisers." The "indirect" were said to embrace "the loss in the transfer of the American commercial marine to the British flag," "the enhanced payments of insurance," "the prolongation of the war," and the "addition to the cost of the war." The presentation of these so-called indirect claims caused a great opposition in England. The government denied that they were included, or intended to be included, in the terms of the treaty. Fresh negotiations were opened; a supplemental treaty was proposed; the controversy was continued after the meeting of the tribunal, and for a while it seemed possible that the whole proceeding would be a failure. The British agent asked for an adjournment of the tribunal for eight months, to allow formal negotiations. Finally, on the 19th of June, Count Sclopis, president of the tribunal, announced that the arbitrators, without deciding the question whether these claims were included in the treaty, "had arrived, collectively and individually, at the conclusion that these claims do not constitute, upon the principles of international law applicable to such cases, good foundation for an award of compensation or computation of damages between nations." The difficulty was then ended and the arbitration went on.

The argument upon the merits which was presented by the litigant nations to this high tribunal was most able and exhaustive. There is not space to present it even in the briefest outline. It turned mainly upon the true meaning of the phrase "due diligence" used in the three rules. The counsel on the part of Great Britain was Sir Roundell Palmer, then the acknowledged leader of the English bar, and afterwards made lord high chancellor with the title of Lord Selborne. The counsel on the part of the U. S. were William M. Evarts and Caleb Cushing. The final decision of the tribunal was announced Sept. 14. The arbitrators decided unanimously in favor of Great Britain in respect of the Georgia, Sumpter, Nashville, Tallahassee, and Chickamauga, and similarly in respect of the Retribution, by a vote of three to two. They all decided (Sir Alexander Cockburn for reasons peculiar to himself) that Great Britain was liable for the original fitting out and escape of the Alabama, and for her subsequent free admission into British ports. The same conclusion was reached in respect to the Florida, Sir Alexander Cockburn alone dissenting. The ruling as to these vessels applied also to their tenders. The tribunal was unanimous that no liability arose in respect of the Shenandoah prior to her arrival at Melbourne; but three of the arbitrators, Count Sclopis, Mr. Staempfli, and Mr. Adams, held that the colonial authorities failed to exercise due diligence to prevent the enlistment of men at that port, and that Great Britain was liable for captures made after her departure thence. The tribunal, in making their award, formulated and announced the following general principles, a portion of which lie at the basis of the whole decision, while a portion apply only to the estimate of the quantum of damages: "Due diligence should be exercised by neutral governments in exact proportion to the risks to which either one of the belligerents may be exposed by failure to fulfil the obligations of neutrality on their part." The effects of a violation of neutrality, as committed by the Alabama and other such cruisers, were not done away with by a commission subsequently issued by the Confederate government. "The government of Great Britain cannot justify itself for its failure in due diligence on the plea of the insufficiency of the legal means of action which it possessed." The claim of the U. S. for the national cost of pursuing the Confederate cruisers cannot be distinguished from the general expenses of the war, and is therefore an indirect loss which cannot be allowed. Prospective injuries to shippers and ship-owners, such as loss of future profits, are equally uncertain and indirect. All double claims for the same losses are rejected, but interest is allowed. Upon these principles the tribunal awarded, for actual losses of ships and cargoes and interest, the sum of $15,500,000. It is thus seen that the tribunal wholly overruled the position maintained by Great Britain from the beginning, that its statute was the sole criterion of its power and duty. In like manner the tribunal brushed away all claims by the U. S. for indirect and national losses, and strictly confined its judgment to the compensation of American private citizens for losses of ships, cargoes, freight, and wages.

J. N. Pomeroy.

Alabama Indians, a remnant of the once powerful tribe of that name, reside in Polk co., Tex. They are under the care of the State, but are also assisted by the general government. They are peaceable and quite industrious. They use the English language, but no woman is allowed to speak to a stranger. They retain the dress and many of the peculiar habits of the aborigines, but the women are clothed somewhat like their white neighbors. The people are remarkably tall, strong, and well formed. They number about 260. Their language was of the Creek family.

Alabas'ter [Lat. *alabastri'tes* and *alabas'ter;* Gr. ἀλάβαστρος], a name applied to two kinds of white mineral substances which are similar in appearance, but different in composition. The alabaster proper is a fine-grained variety of gypsum or sulphate of lime; the finest quality of this is found near Volterra, in Tuscany. It is manufactured into various ornamental forms in Florence, Italy, which is the centre of the alabaster trade. The other is a crystalline carbonate of lime, and is harder than the first. Both are manufactured into ornaments.

Considerable deposits of alabaster of the gypsum variety are found in England, chiefly in Derbyshire and Staffordshire. It is used there to form the plaster moulds of the potters, and is hence called "potter's stone." The fine blocks are used by the turners. A yellow variety found at Sienna is called alabastra agatato.

Alabaster (William), D. D., born at Hadleigh, Suffolk, England, about 1567; educated at Westminster School and at Trinity College, Cambridge; was incorporated at Oxford in 1592; became fellow of Trinity; was chaplain to Robert, earl of Essex; was converted to Roman Catholicism in France in his twenty-fourth year, but did not long remain a Roman Catholic. He was enticed to Rome and imprisoned, but escaped at peril of his life. On his return to England he became prebendary of St. Paul's and rector of Hatfield, and was a famous Hebraist. Died about 1640.

Alabaster Box, or **Alabas'trum,** a vessel for containing precious perfumes, used by the ancients in various countries. They were made commonly of onyx-alabaster, but other materials were used. When the woman broke the "alabaster box of ointment" to anoint the feet of Jesus, as mentioned in the Gospels, it is probable that she had a vessel with a long tapering neck, which was sealed, and that she broke off the neck to get at the perfume. Alabastra of this form were not unfrequent.

Alabaster Cave, in Placer co., Cal., is a remarkable cavern 8 miles S. E. of Auburn, and 1 mile from the North Fork of the American River. This cave contains beautiful chambers incrusted with alabaster of various tints. It also contains a lake of undetermined extent.

Alago'as, a maritime province of Brazil, is between 9° and 10° S. lat. It is bounded on the N. and W. by Pernambuco, on the E. by the Atlantic, and on the S. by Sergipe and the river San Francisco. Area, 15,300 square miles. The surface is partly mountainous; the soil of the valleys and lowlands is fertile, and produces cotton, sugar, maize, etc. Capital, Maceio. Pop. of the province, estimated at 300,000.

Alagoas [Port. "the lakes"], a town of Brazil, in the province of the same name, on the Lake Maysuaba, was until 1839 the capital of the province. It was formerly a large and important city, but since the change of the seat of government it has declined very much. It has a considerable trade in tobacco. Pop. about 4000.

Alagon', a river of Spain, enters the Tagus about 2 miles N. E. of Alcántara. Length, about 120 miles. It is noted for its fine trout and other fish.

Alain de Lille [Lat. *Ala'nus de In'sulis*], the *Doctor Universalis*, flourished in the twelfth century, was a Cistercian monk, and wrote a great number of books, theological, philosophical, and poetical. (See Dupuy, "Alain de Lille," 1859.)

Alais (anc. *Ale'sia*), a town of Southern France, in Gard, on the Gardon, and at the foot of the Cevennes, 31 miles by rail N. W. of Nîmes, with which it is connected by a railway. It is in a productive coal-field, and has several manufactories, a college, and a school of mines. Alais was a stronghold of the French Protestants in the seventeenth century, and was captured in 1629 by Louis XIII. It has a citadel built by Louis XIV. and a fine Gothic church. The cold mineral springs in its vicinity are visited by great numbers in the summer season. Pop. in 1881, 22,255.

Alajuela, a city of the state of Costa Rica, Central America, situated 23 miles W. N. W. of Cartago, has considerable trade through the port of Puntas Arenas on the Pacific Ocean. Pop. 12,575.

Alameda, R. R. junction, Alameda co., Cal. (see map of California, ref. 4–B, for location of county). Pop. of township in 1870, 1557; in 1880, 5708.

Alamo, capital of Crockett co., Tenn. (see map of Tennessee, ref. 6–B, for location of county). Pop. in 1880, 276.

Al'amo, The [*alamo* is the Sp. for "poplar" tree], a celebrated fort at San Antonio, Tex. A small body of Texans, mostly from the U. S., here bravely resisted a Mexican force of ten times their number from Feb. 11 to Mar. 5, 1836, and nearly all perished rather than surrender to a foe whom they despised. The six who finally surrendered were murdered by the Mexicans; Travis, Crockett, and Bowie were here killed. In consequence of this heroic defence, Alamo is styled the "Thermopylæ of America." "Remember the Alamo!" became the war-cry of the Texans in their struggle for independence.

A'lamos, Los, a town of Mexico, province of Sonora, 110 miles N. W. of Cinaloa, has rich silver-mines in the vicinity. Pop. about 6000.

Alamo'sa, on R. R., Conejos co., Col. (see map of Colorado, ref. 6–C, for location of county), on the Rio Grande Del Norte, 130 miles S. W. of Pueblo, Col. Pop. in 1880, 802.

Å'land Islands, or **O'land,** a numerous group of small islands in the S. part of the Gulf of Bothnia, near the Baltic, belong to the grand-duchy of Finland, government of Åbo. About eighty of them are inhabited. Pop. about 15,000. They were ceded to Russia by Sweden in 1809. The Russian fortifications here were destroyed by the English and French troops in 1854, and by a separate convention annexed to the treaty of Paris (April, 1856) the emperor of Russia agreed "that the Aland Isles should not be fortified," etc.

Alangia'ceæ [from *Alan'gium,* one of its genera], a natural order of plants closely allied to the Myrtaceæ. It consists of Indian species having aromatic roots and eatable fruit.

Ala'ni, an ancient warlike tribe of unknown origin, who made incursions into the Roman empire as allies of the Goths and Vandals. They invaded Asia Minor in the reign of Aurelian, and co-operated with the Vandals in the invasion of Gaul in 406 A. D.

Alapayevsk, a town of Russia, in the government of Perm, 200 miles E. of Perm. It has large iron-works. Pop. in 1882, 5422.

Alarcon' y Mendo'za, de (Don JUAN RUIZ), an eminent Spanish poet and dramatist, born in Mexico about 1590. He became a resident of Spain in 1622, after which he obtained the office of reporter of the royal council of the Indies. A volume of his dramas was published in 1628. Among his works, which present a faithful delineation of Spanish manners, and are commended for elevation of sentiment, are "Las Paredes Oyen" ("Walls have Ears") and "La Verdad Sospechosa" ("Suspicious Truth"), which Corneille imitated in his "Menteur." Died in 1639.

Al'aric [Lat. *Alari'cus*], a celebrated conqueror, a Visigoth, was born about 350 A. D. Soon after the accession of Arcadius as emperor of the East, Alaric invaded Thrace, Macedonia, and other provinces, in 395 A. D. He took Athens and entered the Peloponnesus, from which he was driven out by Stilicho. Hostilities were then suspended by a treaty, and Arcadius appointed Alaric governor of Illyria in 396. He invaded Northern Italy in 402, but was defeated by Stilicho at Pollentia and Verona. Stilicho having been killed in 408, Alaric renewed the invasion of Italy, which the emperor Honorius was unable to defend. The army of the Visigoths invested Rome, then the richest and most important city in the world, but they were induced to retire by the payment of 5000 pounds of gold and 30,000 pounds of silver. After unsuccessful efforts to negotiate, Honorius rejected the terms of Alaric, who in 410 took Rome, and permitted his soldiers to pillage it for six days. He was marching to Sicily when he died at Cosenza, in 410 A. D. (See SIMONIS, "Kritische Untersuchungen über die Geschichte Alarich's," 1858.)

Alaric II., king of the Visigoths, began to reign in 484 A. D., at the death of his father Euric. His dominions included parts of Spain and of Gaul. He was killed in battle by the hand of Clovis, king of the Franks, in 507.

A Las'co, Alas'co, or **Alas'ko** (JOHN), a Polish Protestant, born in 1499, became Catholic bishop of Vesprim in 1529. He was afterwards converted, went to London, preached there a few years, but on the accession of Queen Mary, in 1553, he retired for safety to Germany. He wrote several theological works. Died Jan. 13, 1560.

Ala Shehr (the ancient *Philadelphia,* founded about 200 B. C. by Attalus Philadelphus), a walled city of Asia Minor, at the N. E. base of Mount Tmolus, 93 miles E. of Smyrna. Here are five Christian churches and numerous ancient ruins. Pop. about 15,000.

Alas'ka, a Territory belonging to the U. S., purchased from Russia in 1867 for $7,200,000, and comprising the extreme N. W. portion of the North American continent and the islands adjacent thereto. It has been compared to the head and horns of a Texan bull, to which it bears a slight resemblance, the mass of mainland forming the head, while the Sitkan peninsula and the Aleutian archipelago form the widely-extended horns. Its breadth from N. to S. is 20° of lat., while the distance between the tips of the horns is nearly 60° of long. or about 3000 miles. Its area is stated as 577,390 square miles, or 369,529,600 acres. Its shore-lines are estimated at 25,000 miles. It was formerly called Russian America.

Topography.—Mountains are a combination of Coast, Cascade, and Rocky Mountains, with outlying spurs. They range from 3084 feet to 19,500 (Mt. St. Elias). Rivers: Yukon, 2000 miles long, navigable 1500 miles; Kouskoquim, 600 miles; Nushergak, Atna or Copper, Chilcat, Takou, and Stickine. Extensive glaciers.

Minerals.—Gold, copper, iron, semi-anthracite and bituminous coal, petroleum, graphite, bismuth, etc.

Climate.—Nine months severe winter; a short and hot summer on the mainland; on the islands cold less protracted and warm weather longer.

Soil and Productions.—The lat. (52°–72° N.) precludes any great fertility, but the islands and the Sitkan peninsula produce wheat, barley, and the other cereals, and some root-crops, and the forests on the larger islands and the mainland are extensive and the trees of great size. Its greatest products, however, are from the fisheries, in which, in 1880, 6130 persons were employed; capital invested, $447,000; value of products, $2,661,640. The fur-seal and the sea-otter abound, and yield to the United States government an annual revenue of $300,000. Salmon, cod, halibut, sturgeon, and other fish swarm in the waters. The furs and pelts of land animals also yield some revenue.

The Population in 1880 was 33,426, of which 430 were whites and the remainder creoles, Indians, and Esquimaux of various tribes. The Sitka Indians are somewhat intelligent, but drunken and depraved. The Aleuts on the islands are hardy, industrious, and honest. There are mission stations at several points.

May 17, 1884, Congress created a district government for Alaska, with a governor, and a district court sitting at Sitka, the capital, and at Wrangel. The laws are those of Oregon. Alaska is a land district; land office at Sitka. (See YUKON.)

Governors.

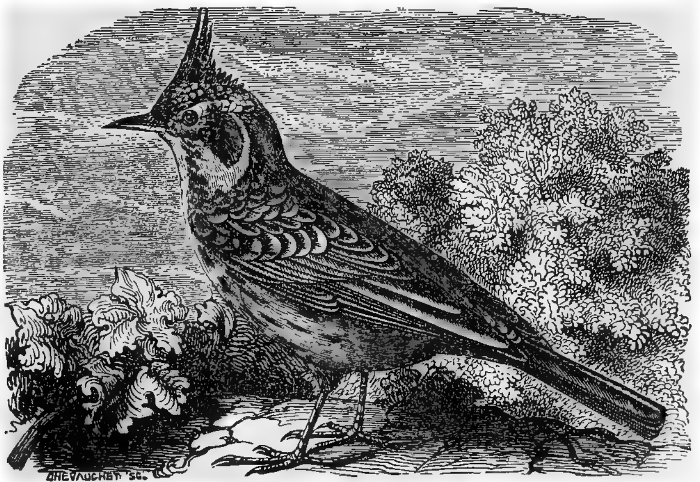
John H. Kinkead	1884–85	A. P. Swineford	1885–

L. P. BROCKETT.

Ala'tri, a town of Italy, in the province of Rome, 45 miles E. S. E. of Rome. The ancient city which occupied the site of Alatri was called *Alatrium,* or *Aletrium,* and was one of the principal cities of the Hernican league. Alatri is the seat of a bishop. Here are some of the finest and best-preserved cyclopean or polygonal walls in Italy. They were part of the defences of the ancient city, and were built of immense polygonal blocks of stone, without cement. Pop. 11,370.

Alatyr', a town of Russia, in the government of Simbirsk, at the junction of the Alatyr and Soora Rivers, 70 miles N. W. of Simbirsk. Pop. in 1882, 8451.

Alau'da, a genus of passerine birds which includes the skylark (*Alau'da arven'sis*), after the nightingale the most celebrated song-bird of Europe. The flesh of the skylark is esteemed a delicacy, and traps and nets of many kinds are employed for its capture. Its food consists of grasshoppers and other insects, worms, spiders, and grubs of various kinds. The beautiful *Alauda cristata,* or crested lark, is one of the most common birds of Europe and


CHEVAUCHET SC.

Alauda cristata: the Crested Lark.

Northern Africa. For other species of this interesting genus, see LARK.

Al'ava, one of the Basque Provinces in Spain, is bounded on the N. by Biscay and Guipuzcoa, on the E. by Navarre, on the S. by Logroño, and on the W. by Burgos. Area, 1205 square miles. The country is mountainous, but fertile, especially along the shores of the Ebro. The chief products are fruit, wine, grain, and hemp. Here are also several mineral springs. Chief town, Vitoria. Pop. in 1877, 93,191.

Alb, or **Albe** [Lat. *al'ba*, from *al'bus*, "white"], a long white linen vestment worn by the clergy of the Roman Catholic Church while they are performing the service. It sometimes has a cross embroidered upon the breast. At the end of the tunic and around the wrists are ornaments called "apparels."

Alba, DUKE OF. See ALVA.

Al'ba (the ancient *Al'ba Pompe'ia*), a town of Italy, province of Cuneo, on the Tánaro, 30 miles S. E. of Turin. Wine, silk, grain, and oil are the staple productions of the district, in which are also quarries of marble and rock-salt. It has a cathedral founded in 1486, and is the seat of a bishop. Pop. of the commune, 9687.

Albace'te, a province of Spain, comprises the N. part of the kingdom of Murcia and a portion of New Castile. It is bounded on the N. by Cuenca, on the E. by Valencia, on the S. by Murcia, and on the W. by Ciudad Real. Area, 5972 square miles. It is bounded on the N. W. by the Sierra de Alcaraz, and the surface is diversified by mountains, hills, and fertile valleys. It is drained by the river Segura, which rises within its limits. Among its staple products are grain, wine, tobacco, oil, cattle, and sheep. Capital, Albacete. Pop. in 1877, 219,122.

Albacete, a town of Spain, capital of a province of the same name, 172 miles by rail S. E. of Madrid. It stands on a fertile plain, has manufactures of knives and other steel goods, and considerable trade. Large cattle-fairs are held here in the month of September. Pop. 17,088.

Al'ba Lon'ga, a very ancient city of Latium, in Italy, was founded, according to tradition, by Ascanius, the son of Æneas, several centuries before the foundation of Rome. It was situated near the Alban Lake, about 16 miles S. E. from Rome. Its remains have been discovered.

Al'ban [Lat. *Alba'nus*], SAINT, one of three Christian martyrs who are said to have suffered in England about 286 A. D., during the Diocletian persecution.

Albanen'ses [from *Alba*, a town of Piedmont], that division of the Catharists who believed in absolute dualism. They taught that the world was created by the Evil Spirit. (See CATHARI.)

Alba'ni (ALESSANDRO), an Italian cardinal, a nephew of Pope Clement XI., was born at Urbino in 1692. He made a rich and celebrated collection of statues and other works of art at Rome. Died in 1779.

Alba'nia, the ancient name of a country bounded on the E. by the Caspian Sea, and comprising the modern Daghestan and Shirvan. Its inhabitants were often defeated, but never conquered, by Rome.

Alba'nia (called *Shkiperi* by the natives, and *Arnaoutlik* by the Turks), the south-western part of European Turkey, lies between lat. 39° and 43° N., and is bounded on the W. by the Adriatic and Ionian seas. Its length N. and S. is about 290 miles, and its width varies from 40 to 90 miles. It nearly coincides with the ancient Epirus. The surface is mountainous, being occupied with nine ridges that are nearly parallel. The highest peaks rise about 8000 feet above the level of the sea. Among the remarkable features of Albania are its subterranean rivers and its beautiful lakes. The chief articles of export are wool, horses, timber, and maize. The Albanians are rude and warlike mountaineers, more addicted to robbery than industry. They are probably descended from the ancient Illyrians and Epirotes. Philologists are not agreed respecting the affiliations of their language, which has several strongly marked dialects, and is probably Indo-European. The inhabitants are often called *Arnaoots* or *Arnaouts*, and *Skipetar*. Pop. estimated at 1,300,000. Besides these, a large number of Albanians live in Greece and other parts of the Levant.

Albano, a lake and mountain in Italy, about 14 miles S. E. of Rome. The lake, which is six miles in circumference, occupies the crater of an extinct volcano, and is 1000 feet deep or more. The lake has no natural outlet, but discharges its waters through an artificial tunnel cut through tufaceous rock. This tunnel or "emissary" was undertaken by the Romans in 397 B. C. It is one of the most remarkable remains of ancient Roman engineering. It is 6000 feet long. Alba Longa stood on the N. E. margin. From the E. shore of this lake rises Mount Albano or Monte Cavo, which is over 3000 feet high, and commands an extensive and magnificent prospect. On its summit are the ruins of the temple of Jupiter Latialis.

Alba'no (anc. *Alba'num*), a city of Italy, on or near Lake Albano, and on the Via Appia, 18 miles by rail S. E. of Rome. It occupies the site of Pompey's villa, is celebrated for beauty of scenery, and is a favorite summer residence of the wealthy citizens of Rome. Here is a museum of antiquities and a large convent. Pop. 6400.

Al'bany, or **Al'bainn,** an ancient name of the Highlands of Scotland. It is supposed that Albany, or Albion (see ALBION), was the original name given to the whole island by its Celtic inhabitants, and that it was afterwards restricted to the north-western part of Scotland, when the Celts had retired from the other parts of Britain. The title of duke of Albany was given to the second sons of several kings of Scotland and England.

Albany, a small maritime division of Cape Colony, South Africa, about 450 miles E. of Cape Town, is about 65 miles long and from 30 to 40 miles wide. It is traversed by Great Fish River. The soil produces maize, barley, cotton, and other commodities. Capital, Grahamstown. Pop. 16,264.

Albany, R. R. junction and capital of Dougherty co., Ga. (see map of Georgia, ref. 6–G, for location of county), on the right bank of Flint River, 106 miles S. S. W. of Macon. Large quantities of cotton are here shipped by rail. The Flint River is navigable to this point only at high water. Pop. in 1870, 2101; in 1880, 3216.

Albany, capital of Clinton co., Ky. (see map of Kentucky, ref. 5–H, for location of county), 126 miles S. of Frankfort. Pop. of district in 1870, 1629; in 1880, 2031.

Albany, R. R. junction, and capital of Gentry co., Mo. (see map of Missouri, ref. 1–D, for location of county), on Grand River, 52 miles N. E. of St. Joseph. It has manufactories of furniture, brooms, wagons, harness, lumber, etc., graded schools, a grist-mill, a foundry, and a machine-shop. Pop. in 1870, 607; in 1880, 979.

Albany, city and important R. R. and commercial centre, capital of N. Y. and of Albany co. (see map of New York, ref. 5–J, for location of county), is situated on the W. bank of the Hudson River, 145 miles N. of New York City, and 164 miles (or 201 by railroad) W. of Boston, in lat. 42° 39′ 49″ N., lon. 73° 44′ 33″ W.

Original Site.—The place was first settled by the Dutch in 1614 as a trading-post, and after Jamestown was the earliest settlement by Europeans within the limits of the thirteen States. Fort Orange, or Aurania, was erected here in 1624. The village was successively called Beverwyck and Williamstadt. In 1664 it was called Albany, for the duke of York and Albany, afterward James II. Till the Revolution it was the centre of a large Indian trade. The colony continued to be inhabited by the Dutch, brought over largely by the Van Rensselaer family, who secured, in 1629, 24 miles square on both sides of the river, and leased the lands to settlers. Feudal tenure was abolished in 1787. After the Anti-rent war in 1846 the State prohibited leases of agricultural land for a longer period than twelve years. It was incorporated as the city of Albany in 1686, and became the capital of N. Y. in 1797.

Modern Changes.—The site of the city extends from the bank of the river, with 4 miles of frontage, over the alluvial plain, and after a few hundred feet rises up on the sides of the hills to and upon the table-land 150 feet high, about five miles west. The view of the city from the E. bank of the river is picturesque and imposing, from the full exposure of the public edifices, with their domes and steeples, the Helderberg and Catskill Mountains being visible in the S. W. The corporate limits reached to Schenectady in a strip of land thirteen miles long and a mile wide until lately.

Streets, Public Buildings, and Institutions.—The principal streets are Broadway and Pearl street, which run parallel with the river, and State street, which ascends the hill to the Capitol, and thence to the limits of the city proper westward. Washington avenue runs parallel to it, W. on the N. side of the Capitol, beginning at the City Hall, and joins Central avenue, which continues to W. bound of the city.

The chief public edifices and institutions are the magnificent new Capitol, of which the corner-stone was laid in 1871, built of drilled granite, four stories high, 290 feet wide and 390 feet long, containing halls for the Assembly, the Senate, the Court of Appeals, the State Library, and rooms for the State officers, and will cost over $16,000,000; the State Museum of Natural History, in the marble State hall; the new City Hall, of rough granite (1882); United States

Custom-House and Post-Office (1882), three hospitals, Astronomical Observatory, State Agricultural Museum, opera-house, and music-hall. There are about 60 churches, the largest and most imposing being the cathedral of the Immaculate Conception.

The penitentiary, opened in 1848, receives annually, mostly for short terms, over 1000 prisoners, and has usually been self-supporting. Washington Park, in the western part of the city, contains 81 acres, with a lake 1700 feet long, and carriage-drives of several miles. The charitable institutions are numerous. The beautiful Rural Cemetery, about four miles from the city northward, contains 281 acres.

New State Capitol (Albany, N. Y.).

Education.—Albany has a high school for both sexes; one boys' academy and three for girls; a medical school, law school, and a State normal school. There are 10,000 pupils in the public schools. The Albany Institute is a society formed in 1791 for the advancement of science. The State Library has, with the law department, over 122,000 vols.

Manufactures, etc.—The census of 1880 showed 804 manufactories; capital, $14,684,130; average number of hands employed, 11,785; wages paid during the year, $4,566,424; value of products, $21,751,009. The most prominent manufacture is that of stoves, the product for 1882 amounting to $3,500,000. In late years nine large shoe-factories have been established. There are twenty breweries, two blast-furnaces, a cracker-bakery, twelve iron-foundries, and various other manufactures. The lumber trade of 1883 amounted to $10,000,000. It is the central market for the cattle trade from the West for New York and New England.

The city is supplied with water from an artificial lake in the sand plains, W. of the city, and also by pumping water from the river into elevated reservoirs. The fire department has ten steam-engines and a fire-alarm telegraph system. Pop. in 1790, 3506; in 1870 (the limits as extended), 76,216; in 1880, 90,758. H. A. Homes,

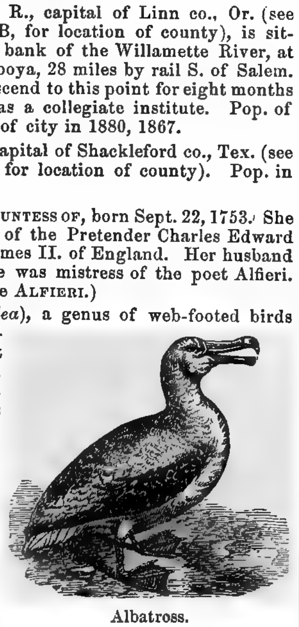
State Library, Albany, N. Y.

Albany city, on R. R., capital of Linn co., Or. (see map of Oregon, ref. 6–B, for location of county), is situated on the right (E.) bank of the Willamette River, at the mouth of the Calapooya, 28 miles by rail S. of Salem. Small steamboats can ascend to this point for eight months in the year. Albany has a collegiate institute. Pop. of precinct in 1870, 1992; of city in 1880, 1867.

Albany, on R. R., capital of Shackleford co., Tex. (see map of Texas, ref. 2–G, for location of county). Pop. in 1880, 129.

Albany (Louisa), Countess of, born Sept. 22, 1753. She became in 1772 the wife of the Pretender Charles Edward Stuart, a grandson of James II. of England. Her husband having died in 1788, she was mistress of the poet Alfieri. Died Jan. 29, 1824. (See Alfieri.)

Al′batross (*Diomedea*), a genus of web-footed birds of the family Laridæ, remarkable for their great size and powers of flight. The wandering albatross (*Diomedea exulans*) is the largest of all oceanic birds, having wings which measure twelve feet or more from tip to tip, but are narrow in proportion to their length. This bird is sometimes seen by voyagers over 100 miles from land. It feeds chiefly on fish. "Sometimes for a whole hour together," says the duke of Argyll, "this splendid bird will sail or wheel round a ship in every possible variety of direction, without requiring to give a single stroke to its pinions." There has been much discussion as to the means which enable the albatross to maintain this remarkable kind of motion; and the matter is not well explained. The above bird, known also as the man-of-war bird and the Cape sheep, is found near the coasts of most seas, but especially near those of Asia and Africa. Besides the above, there are the sooty albatross, *Diomedea fuliginosa*, of Eastern Asia, and the *Diomedea chlororhynchus*; and still other species are described.


Albatross.

Albay, a town in Luzon, one of the Philippine Islands, 258 miles S. E. of Manila, is the capital of a province. Pop. 13,115. Pop. of the province, 204,840.

Al′bemarle, a town of France. See Aumale.

Albemarle, cap. of Stanley co., N. C. (see map of North Carolina, ref. 3–F, for location of county). Pop. of township in 1880, 1802.

Albemarle Sound, in the N. E. part of North Carolina, extends from the mouth of the Roanoke River 60 miles eastward to a narrow island which separates it from the Atlantic. Its average width N. and S. is about 12 miles. It communicates by narrow inlets with Pamlico and Currituck Sounds. The water in it is nearly fresh. Its greatest depth is 24 feet; average depth, 20 feet.

Albemarle (George **Monk**), Duke of, a famous English general, chiefly known to history as the principal agent in the restoration of the Stuarts in 1660, generally known in his own time as "Old Monk," and described by Guizot as a "person capable of doing great things though himself not a great man." He was born of an ancient Devonshire family, at Totheridge, the residence of his father, Sir Thomas Monk, near Torrington Dec. 6, 1608. He joined the army in order to escape punishment for mishandling a sheriff who was about to arrest his father for debt. In 1625 he engaged in the expedition against Spain, the unsuccessful attempt to capture Cadiz, made by a relative of his, Sir Richard Greenville, took part in the following year in the attack upon the isle of Rhé, and served ten years in the Netherlands. In the campaign against the Scots he served as a lieutenant-colonel. He led a regiment against the Irish, and was governor of Dublin until peace was struck by the marquess of Ormond in 1643. In the civil war Monk was taken prisoner by Fairfax in 1644, and imprisoned in the Tower, and only regained his liberty after a confinement of two years by taking the Covenant. He was given a command by the Parliamentarians, but drew upon him suspicions of treachery, and cleared himself with difficulty before Parliament. After the defeat of the royalist cause Cromwell appointed Monk a lieutenant-general and chief of artillery, in which capacity he did such service at the battle of Dunbar that Cromwell made him general-in-chief of the army in Scotland. In 1652 he took part in the commission which drew up a pact of union between England and Scotland, and went to Scotland as governor in 1654; in which position he had great difficulties in maintaining his rule against the Presbyterians. The royalists had already some hopes of his support, and Charles sent him secret overtures in 1656. Monk delivered this letter up to Cromwell. After the death of the dictator, Monk declared in favor of Richard Cromwell, and assumed the authority of a defender of public order only when Lambert threatened to establish a military despotism. On the 1st of Jan., 1660, he marched over the border with 6000 men, joining Fairfax at York, and marched into London on the 3d of February, without drawing sword from scabbard. At first he kept every one in the dark as to his intentions. On Feb. 28 he recalled the Presbyterian members expelled from Parliament in 1648, thus creating a majority for the king. He held negotiations with Charles, and Parliament declared the latter king on the 8th of May. Charles gave Monk the offices of privy councillor, chamberlain, and lord lieutenant of Devon and Middlesex, besides creating him duke of Albemarle. In 1666 the duke of Albemarle commanded the naval expedition against Holland, was beaten by De Ruyter in the three days' conflict at Dunkirk, but defeated the Dutch admiral at North Foreland. Died Jan. 3, 1670.

Albemarle, Earls of (Viscounts Bury and Barons Ashford), one of the prominent families of England.—The first earl of this family, Arnold van Keppel, born in 1669, was a Dutch favorite of William, prince of Orange, with whom he went to England in 1688. After that prince became King William III., Van Keppel was created earl of Albemarle, and was a rival of the duke of Portland in competing for royal favor. Died in 1718.—The sixth earl, George Thomas Keppel, born June 13, 1799, was member of the House of Commons for East Norfolk from 1832 to 1835, and for Lymington from 1847 to 1850. He succeeded his brother as earl of Albemarle on Mar. 15, 1851. He is a lieutenant-general in the British army.

Alberic I., a ruler of Rome, was born in the beginning of the tenth century, the son of a Lombardian noble. He became margrave of Camerino, and, through his marriage with the celebrated Marozia, ruler of Rome. He was banished by John X. from Rome, and was murdered in 925. His son, Alberic II., was a powerful and wise ruler, and died in 954, after a reign of twenty-three years. He was succeeded by his son, Ottaviano, who was elected pope under the name of John XII. in 956.

Albero'ni (GIULIO), CARDINAL, an ambitious Italian, born near Piacenza May 31, 1664. He began his public career as envoy of the duke of Parma to the court of Madrid, and, having gained the favor of Philip V., became prime minister of Spain in 1715. His foreign policy was so audacious and violent that nearly all the powers of Europe combined against Spain. Among his offensive acts was the invasion of Sardinia in time of peace. He was removed from office in 1719, and banished from Spain. Died June 26, 1752. (See BERSANI, "Storia del Cardinale Giulio Alberoni," 1862.)

Al'bers (JOHANN FRIEDRICH HERMANN), an eminent German physician, born Nov. 14, 1805, became in 1831 professor of pathology in Bonn, established a celebrated asylum for insane and nervously affected persons in Bonn, and in 1856 became director of the pharmacological cabinet of the university. Died May 12, 1867. He has published, among other works, "Handbuch der allgemeinen Pathologie" (2 vols., 1842–44), "Lehrbuch der allgemeinen Arzneimittellehre" (1853), and "Die Spermatorrhöe" (1862).

Albert, a town of France, in the department of Somme, 18 miles N. E. of Amiens, has cotton-factories and paper-mills. Pop. in 1881, 5473.

Albert I., king of Saxony, born April 23, 1828, eldest son of King Johann I. and of Queen Amalie, daughter of King Maximilian I. of Bavaria. As crown prince he took part in the campaign in Sleswick-Holstein in 1849, was made lieutenant-general in 1853, and general in 1857, commanded the Saxon army in the war against Prussia in 1866, received the command of the twelfth army corps after the admission of Saxony into the North German Union, took part in the battles of Rezonville, Gravelotte, and Sedan in the Franco-German war of 1870, and received the command of the fourth army (of the Meuse). In July, 1871, he was created field-marshal of the empire, and soon after field-marshal of Russia. King Albert succeeded to the throne, at the death of his father, Oct. 29, 1873. He married, June 18, 1853, Queen Caroline, born Aug. 5, 1833, daughter of Prince Gustav of Vasa. He has a civil list of 2,940,000 marks per annum, or about $700,000; but the royal domains, consisting chiefly in extensive forests and some rich mines, became the property of the state in 1830.

Albert [in German, commonly *Albrecht*] **I.,** archduke of Austria, born in 1248, was a son of the emperor Rudolph of Habsburg. He was elected emperor of Germany in 1298, but his title was contested by Adolphus of Nassau, who had occupied the throne. These rivals fought a battle, in which Adolphus was killed. Albert, who was noted for his cruelty and avarice, was assassinated May 1, 1308, by his nephew, John the Parricide.

Albert V., a son of Albert IV., was born in 1397, and became duke of Austria in 1404. He was chosen king of Hungary in 1437, and emperor of Germany in 1438. His title as emperor was Albert II. Died in 1439.

Albert, archduke of Austria, a son of the emperor Maximilian II., was born in 1559. He was appointed governor of the Netherlands in 1596 by Philip II. of Spain, whose daughter Isabella he married about 1598. In 1600 he was defeated by Maurice of Nassau, who fought for the Dutch republic. The war was suspended in 1609 by a long truce. Died in 1621.

Albert I., margrave of Brandenburg, surnamed THE BEAR, was born about 1106. He was the founder of the House of Brandenburg. Died Nov. 18, 1170.

Albert III., of Brandenburg, born in 1414, was surnamed ACHILLES and ULYSSES, on account of his courage and wisdom. Died in 1486.

Albert (OF BRANDENBURG), first duke of Prussia, a grandson of the preceding, was born in 1490. He was elected grand master of the Teutonic Order in 1511, and was the last who held that office. In 1525 he became a Protestant, and duke of Prussia, which he held as a fief of the king of Poland. Died in 1568.

Albert (PRINCE), or, more fully, **Albert Francis Augustus Charles Emmanuel,** prince of Saxe-Coburg-Gotha and consort of Queen Victoria of England, was born near Coburg Aug. 26, 1819. He was a son of Duke Ernest I. His marriage with Victoria was celebrated in Feb., 1840, soon after which he obtained the rank of field-marshal in the British army. He patronized science and art, was a liberal promoter of benevolent institutions, and acquired great influence in public affairs as the prudent and trusted adviser of the queen. In 1857 he received the title of prince consort. Died Dec. 14, 1861. His death was lamented as a national loss. (Compare MORTON, "The Prince Consort's Farms" (1863), GREY, "The Early Years of the Prince Consort" (1867), and "Leaves from the Journal of Our Life in the Highlands from 1848–61.")

Albert Edward, prince of Wales, the eldest son of Queen Victoria, was born Nov. 9, 1841. He is the heir-apparent to the British throne. In 1860 he visited the U. S. He married, Mar. 10, 1863, the princess Alexandra of Denmark. His children by this marriage are—Prince Albert Edward Victor Christian, duke of Cornwall, born Jan. 8, 1864; Prince George Frederick Ernest Albert, born June 3, 1865; Princess Louisa Victoria Dagmar, born Feb. 20, 1867; Princess Victoria Alexandra Olga Mary, born July 6, 1868; Princess Maud Charlotte Mary Victoria, born Nov. 26, 1869; and Prince Alexander John Charles Albert, born April 6, died April 7, 1871.

Albert, a French revolutionist and mechanic, whose original name was ALEXANDRE MARTIN, was born at Bury (Oise) April 27, 1815. He founded in Paris in 1840 a journal called "L'Atelier" ("The Workshop"), and was a member of the provisional government formed in Feb., 1848.

Albert (FREDERICK RUDOLPH), archduke of Austria, eldest son of Archduke Charles, was born Aug. 3, 1817. In 1851 he was appointed military and civil governor of Hungary, which position he retained until 1860. In 1859 he was sent to Berlin to bring about an understanding between the two great powers of Germany; in 1866 was made commander-in-chief, and in 1869 became inspector-general of the Austrian army.

Alberti (JEAN), born at Assen, Holland, Mar. 6, 1698; became minister at Harlem, and afterward professor of theology in Leyden; wrote theological works, and edited first volume of Hesychius' "Lexicon." Died Aug. 13, 1762.

Alber'ti (LEON BATTISTA), an eminent Italian architect, poet, and writer on art, was born at Genoa (or, as some say, at Florence) in 1404. He was employed as an architect by Pope Nicholas V., completed the Pitti Palace at Florence, and designed the Church of St. Francis at Rimini. His "Treatise on Architecture" ("De Re Ædificatoria," 1485) is highly commended. Died April, 1472.

Albertinel'li (MARIOTTO), an eminent Italian painter, born about 1475, was a pupil of Roselli, and a friend and imitator of Fra Bartolommeo, with whom he painted several pictures. Among his most celebrated paintings is the "Visitation of Mary and Elizabeth" in Florence, "The Virgin Mary with Saint Domenico" in the Academy at Florence, "Saint Catherine" and the "Virgin Mary with the Child" in the Louvre. Died about 1520.

Albert Lea, city, R. R. junction, and capital, Freeborn co., Minn. (see map of Minnesota, ref. 11–E, for location of county), 128 miles W. of the Mississippi River. It has several manufactories, public park, library association, and high school. It is beautifully situated between two lakes, one of which bears its name, and the surrounding country of undulating prairie and timber is charmingly picturesque. An abundance of game has made it a popular resort. Pop. in 1880, 1966; in 1885, 3365.

Al'bert Mausole'um, erected in commemoration of Prince Albert, consort of Queen Victoria. The first stone of this building, at Frogmore, was laid by Queen Victoria in Mar., 1862, and the remains of Prince Albert were removed from St. George's Chapel to the mausoleum in December of the same year.

Al'bert Nyan'za (written also **Albert N'Yanza**), a large lake of Africa, and one of the sources of the White Nile, is situated under the equator, about 90 miles W. of Victoria Nyanza. It is 300 miles long or more, and is 92 miles wide where it is crossed by the equator. The northern extremity is in lat. 2° 45′ N. The southern part has not been fully explored. The surface of this lake is 2720 feet above the level of the sea. On the eastern side it is enclosed by rocky cliffs of granite and porphyry, the average height of which is about 1500 feet, and by isolated peaks, which are supposed to rise 5000 feet or more above the lake. Near the western shore is a range called the Blue Mountains, about 7000 feet high. The scenery around this lake is described as extremely beautiful. The water is fresh, sweet, and very deep. The Albert Nyanza was discovered and named by Sir Samuel White Baker, who with his wife reached Vacovia, on the eastern shore, in Mar., 1864, after several years of arduous and perilous adventures. "It was," he says, "a grand sight to look upon this vast reservoir of the mighty Nile, and to watch the heavy swell tumbling upon the beach, while far to the south-west the eye searched as vainly for a bound as though upon the Atlantic. It was with extreme emotion that I enjoyed this glorious scene." Embarking in a boat, he explored the lake to Magungo, which is near its northern extremity, and in lat. 2° 16′ N. The lake here was about 16 miles wide. The Somerset River, or Victoria Nile, which is the outlet of Lake Victoria Nyanza, enters Lake Albert near Magungo. Ascending the Victoria Nile, he discovered a grand cataract, 120 feet high (perpendicular), which he named Murchison Falls. (See Sir S. W. Baker, "The Albert Nyanza, Great Basin of the Nile," 1866.)

Alber'tus Mag'nus (*i. e.* "Albert the Great"), sometimes called Albert de Bollstadt. He was born in Bavaria in 1193, and became a Dominican friar. In 1254 he was chosen provincial of the Dominican Order, and in 1260 became bishop of Ratisbon. The episcopal office, however, was very uncongenial to him, and after the lapse of two years he was allowed to resign and retire to Cologne. He lectured for many years at Cologne, and wrote numerous works on theology, logic, philosophy, and other subjects. He was reputed one of the most learned men of the Middle Ages, and was regarded as a magician by some of his contemporaries. The great scientific exploit which made his name celebrated was the introduction of the complete system of Aristotle to the understanding of his age, which he effected by a kind of paraphrasing or loose reproduction, not of the Greek originals, but of the Arabic versions and commentaries, "De Prædicamentis," "Super Octo Libros Physicoram," etc. Died in 1280. Thomas Aquinas was one of his disciples.

Al'bi, or **Al'by** [Lat. *Albi'ga*], an old city of France, capital of the department of Tarn, on the river Tarn, and on a hill 42 miles N. E. of Toulouse. It has a museum of natural history, a college, a normal school, a cathedral, a public library, and a theatre; also manufactures of coarse linens, tablecloths, and cotton goods. Here is an archbishop's see. The Albigenses derived their name from this town, which suffered much in the religious wars of France. Pop. in 1881, 20,379.

Al'bia, city and R. R. junction, capital of Monroe co., Ia. (see map of Iowa, ref. 7–H, for location of county), 100 miles N. W. of Burlington, and about 65 miles S. E. of Des Moines. The county is mostly underlaid with coal of a good quality, and mines are being opened in numerous places. Pop. in 1870, 1621; in 1880, 2435; in 1885, 2142.

Albigen'ses [from *Albi'ga*, the Latin name of Albi, a town of France], a name given to several sects of reformers in the south of France which called themselves Catharists. Their leading idea was a return to the primitive Church, its doctrines, and its discipline, and that idea placed them in a decided opposition to the Roman Catholic Church. In the middle of the twelfth century they took possession of the church-buildings, drove the Roman Catholic priests away, elected priests and bishops of their own, and finally held a great synod at Toulouse, 1167, in order to perfect their organization. The Roman *curia* was startled at these proceedings. In 1208, Pope Innocent III. proclaimed a crusade against these reformers and against Raymond VI., count of Toulouse, one of their principal leaders. A large army was led against them by Simon de Montfort, earl of Leicester. The war was carried on with great bitterness of feeling on both sides, and with little intermission till 1229, when a treaty between the contending parties was concluded at Paris. Many of the Albigenses emigrated to other countries, while others perished in the Inquisition, which was established about the same time that the pope proclaimed his crusade. The name gradually disappears in the early part of the fourteenth century. (See Faber's "Inquiry into the History and Theology of the Ancient Vallenses and Albigenses," London, 1838.)

Albi'ni (Franz Joseph), an able German statesman and lawyer, born in Rhenish Prussia May 14, 1748. He passed some years in the service of the emperor Joseph II., after whose death (1790) he became chief minister of the elector of Mentz, whom he served with fidelity until 1802. Died Jan. 8, 1816.

Albi'no [Port., from the Lat. *al'bus*, "white"], a person who has a great deficiency or an absence of pigment in the hair, skin, and eyes. The complexion is very light, the hair often snowy white, the eyes red. Albinism in the human species may be observed in white and black races, and in the negro is sometimes partial, patches of the skin having the normal color. Albinism is frequent among Zuni Indians and other tribes in Arizona. A degree of nyctalopia (day-blindness) is common among albinos. Elephants, birds, mice, and other animals sometimes exhibit the phenomena of albinism, which is often hereditary.

Al'bion, the ancient Celtic name of Great Britain. The name, said to signify "white island," is supposed by some, though without good reason, to have been given on account of the chalky cliffs of Kent.

Albion, capital of Cassia co., Id. (see map of Idaho, ref. 6–B, for location of county). Pop. in 1880, 257.

Albion, on R. R., capital of Edwards co., Ill. (see map of Illinois, ref. 9–G, for location of county), has a high and healthy location, good schools, and a chemical laboratory. Pop. in 1870, 613; in 1880, 875.

Albion, Ind. See Appendix.

Albion, R. R. centre of Calhoun co., Mich. (see map of Michigan, ref. 8–I, for location of county), on the Kalamazoo River, 37 miles S. of Lansing and 96 miles W. of Detroit. It is the seat of Albion College, under the control of the Methodist Episcopal Church. The village has fine primary-school buildings, besides an excellent central school, large flouring and other mills, door, sash, and blind factories, a tannery, and extensive agricultural tool manufactory, machine-shop and furnace, and a library. Pop. of Albion township in 1880, 2896; in 1884, 3131.

Albion, on R. R., capital of Boone co., Neb. (see map of Neb., ref. 6–J, for location of county). Pop. in 1885, 916.

Albion, R. R. centre, capital of Orleans co., N. Y. (see map of New York, ref. 4–D, for location of county), on the Erie Canal, 30 miles W. of Rochester, has a brick courthouse, a jail, a furnace, public parks, a free library, and several important manufactories. It is the seat of a fine academy, and of Phipps' Union Seminary. Pop. in 1870, 3322; in 1880, 5147.

Albion, Dane co., Wis. (see map of Wisconsin, ref. 7–D, for location of county), is situated in an important tobacco-growing region. Albion Centre is the seat of Albion Academy, under the patronage of the Seventh-Day Baptist denomination. Pop. of township in 1870, 1142; in 1880, 1351; in 1885, 1518.

Albisson (Jean), a French politician, born at Montpellier 1732, made tribune 1802, and assisted in preparing a part of Napoleon's celebrated Code. Died in 1810.

Al'bite [from the Lat. *al'bus*, "white," and the Gr. λίθος, a "stone"], a silicate of alumina and soda, sometimes called soda felspar. It is a constituent of granite, being associated with true felspar, from which it may be distinguished by its greater whiteness and translucency. It also occurs in syenite and greenstone.

Al'boin [Lat. *Alboi'nus*], the founder of the Lombard kingdom in Italy, was a son of Alduin, whom he succeeded in 543 A. D. He conducted an army of Longobards into Italy in 569, and conquered the northern provinces. He married Rosamund, a daughter of King Cunimund, whom he had killed. Alboin was assassinated in 573 A. D., at the instigation of Rosamund.

Albo'ni (Marietta), a popular Italian singer, born at Cesena Mar. 10, 1824, was a pupil of Rossini. She performed with great applause in Paris and London in 1846–47, and afterwards visited the U. S. She was married to the count de Pepoli. Her voice was a contralto, in the highest degree sweet and sonorous. Retired in 1863.

Al Borâk' (*i. e.* "the lightning," so called on account of its fleetness), the name of a creature on which Mohammed is said to have made journeys to the celestial regions.

Albornoz' (Gil Alvarez Carillo), or **Ægid'ius de Albornoz',** a Spanish cardinal, born at Cuenca. He was appointed archbishop of Toledo by Alfonzo XI. of Castile, whose life he saved in a battle against the Moors. In 1353, Pope Innocent VI. sent him as legate to Italy, where he distinguished himself by his military and political talents, and restored the authority of the pope over many cities. Died Aug. 24, 1367.

Al'brecht, the name of many German princes. (See Albert.)

Al'brechtsberger (Johann Georg), one of the most learned contrapuntists of modern times, born Feb. 3, 1736, became director of the choir of the Carmelites in Vienna, organist to the court in 1772, musical director at St. Stephen's cathedral in Vienna in 1792, and died Mar. 7, 1809. He published "Gründliche Anweisung zur Composition" (1790; 3d ed. 1821).

Al'bright (Jacob), an American divine of the Lutheran Church, born in Montgomery co., Pa., in 1759. He founded in 1808 the Evangelical Association (which see). Died in 1808.

Albright Brethren (*Albrechts Brüder*). See Evangelical Association.

Albue′ra, La, a village of Spain, in Estremadura, on a small river of its own name, 13 miles S. E. of Badajos. Here on the 16th of May, 1811, the British general Beresford defeated the French marshal Soult, who lost nearly 9000 men. The allies lost about 7000.

Albufe′ra, a coast-lagoon near Valencia, Spain, abounding with fish and fowl, its banks studded with rice-plantations, owes its fame to the defeat (1811) of the Spanish by Marshal SUCHET (which see). The lake and domain were conferred on him by Napoleon, with title of "duc d'Albufera."

Albu′men [from *al′bus*, "white"], a Latin term signifying the "white of an egg," denotes in chemistry an organic compound of great importance, which, besides being the characteristic ingredient in the white of an egg, abounds in the serum of the blood, in chyle, lymph, the juice of flesh, and forms an important part of the skin, muscles, and brain. In Bright's disease it is found in considerable quantity in the urine. "It is obvious," says Liebig, "that albumen is the foundation, the starting-point, of the whole series of peculiar tissues which constitute those organs which are the seat of all vital actions." Albumen is also found in small quantities in most vegetable juices.

When heated to a temperature from 140° to 160°, albumen coagulates and becomes insoluble in water. It is also coagulated by alcohol and most of the acids. According to Liebig, the albumen of blood is $C_{216}H_{338}N_{51}S_3O_{68}$. Lieberkühn considers it $C_{72}H_{112}N_{18}SO_{22}$.

The fibrine of the muscles and the albumen of blood contain the same elements in the same proportion.

Egg albumen differs from serum albumen by being precipitated by ether and by turpentine, and being almost insoluble in strong nitric acid. When injected into the veins of dogs or rabbits it passes into the urine unchanged, while serum albumen injected in the same way does not appear in the urine at all.

Coagulated albumen is white, opaque, and elastic. It dries to a brittle, translucent, horny mass, which when placed in cold water swells up to its original form.

Albumen is a weak acid, apparently dibasic. Its salts with the alkaline metals are soluble; they are obtained by adding the caustic alkalies or alkaline carbonates directly to albumen. The other albuminates are insoluble, and are obtained by precipitation: Potassic albuminate $= K'_2C_{72}H_{110}N_{18}SO_{22}$; calcic albuminate $= Ca''C_{72}H_{110}N_{18}SO_{22}$.

The white of egg is recommended as an antidote to corrosive sublimate, mercuric chloride, as it forms mercuric albuminate, which is insoluble in water. As it is, however, slightly soluble in saline solutions, the physician should also secure vomiting, to remove the mercury from the stomach. Albumen is much used for clarifying syrups and other liquids. When boiled with them, it coagulates to flocks, entangling the suspended impurities, and carrying them either to the surface as a scum or to the bottom as a sediment. In cooking, the white of egg is employed; in sugar refining, bullock's blood. Albumen is also used for preparing the surface of paper for photographic printing, and for making a cement with lime.

Egg and serum albumen are now manufactured in large quantities by simply drying the natural fluids in thin layers in warm air, taking care that the temperature shall not be so high as to coagulate the albumen, and thus render it insoluble. The chief application of this albumen in the arts is in calico-printing. It is employed in fastening certain colors upon the fibres of cotton cloth, especially pigments such as ultramarine, chrome yellows, and oranges, Guignet's green, etc., and also the aniline colors. The pigments or colors are simply mixed with a solution of albumen, printed on the cloth, and fixed by steaming, which coagulates the albumen and renders it insoluble. A dark-colored, inferior quality of serum albumen, sold under the name of "dried blood," is used by sugar refiners to clear the solutions of raw sugar. C. F. CHANDLER.

Albu′minoids, or **Pro′teids,** an extensive class of organic bodies found in animals and plants. They form the chief constituents of blood, muscles, nerves, glands, and other organs of animals; and though present in plants in much smaller proportions than cellulose, starch, sugar, etc., they still play a most important part in plant life. Their exact constitution has not been determined. Analysis shows them to contain—

Carbon,	52.7 to 54.5.
Hydrogen,	6.9 " 7.3.
Nitrogen,	15.4 " 16.5.
Oxgyen,	20.9 " 23.5.
Sulphur,	0.8 " 1.6.

They are amorphous, more or less soluble in water, insoluble or nearly so in alcohol, insoluble in ether, soluble in excess of strong acetic acid, soluble in alkalies, and soluble in strong mineral acids. Nitric acid produces yellow xanthoproteic acid. Strong alkalies change them to leucine, tyrosine, oxalic acid, carbonic acid, ammonia, etc., according to the temperature. From their solutions they are precipitated by excess of mineral acids, by potassic ferrocyanide with acetic or hydrochloric acid, by acetic acid in presence of a considerable quantity of alkaline or alkaline earthy salt, gum arabic or dextrine, by mercuric nitrate, Millon's reagent.

They have been classified as follows:

I. Albumens, soluble in water: 1. Serum albumen; 2. Egg albumen.

II. Globulins, insoluble in water, soluble in very dilute acids and alkalies, soluble in dilute solutions of sodic chloride and other neutral salts: 1. Myosin; 2. Globulin; 3. Fibrinogin; 4. Vitellin.

III. Derived albumens, insoluble in water and in solutions of sodic chloride; soluble in dilute acids and alkalies: 1. Acid albumen; 2. Alkali albumen, or albuminate casein.

IV. Fibrine, insoluble in water, sparingly soluble in dilute acids and alkalies, and in neutral saline solutions.

V. Coagulated proteid.

VI. Amyloid substance, or lardacein.

VII. Peptones, produced by the action of the gastric juice on all albuminoids.

For further information on this important class of bodies see HOPPE-SEYLER, "Handbuch der Physiologisch-Chemischen Analyse;" the eleventh English edition of FOWNES' "Manual of Chemistry;" and the "Handwörterbuch der Chemie," 2t Auf. II., p. 124. C. F. CHANDLER.

Albuminu′ria [from *albumen* and the Lat. *uri′na*, "urine"] is the presence of albumen in the urine, constituting a very important symptom of disease. Albumen is sometimes observed in small proportion in the urine of persons apparently healthy. Artificial obstruction (by vivisection and ligation) of the emulgent veins in the lower animals produces albuminuria, thus illustrating the fact that passive engorgement of the kidney may cause this symptom, as in organic disease of the heart. Albuminuria has been reported as following the injudicious use of oil of turpentine, in which case it results from an active congestion of the kidney. Albuminuria is sometimes associated with dyspepsia, in which case it may be either a temporary and probably unimportant symptom, or a precursor of Bright's disease—a malady which is among the most formidable of all with which we have to deal. This symptom has also been observed in malarial and typhoid fevers, pneumonia, smallpox, scarlet fever, measles, erysipelas, peritonitis, consumption, pregnancy, rheumatism, leucocythæmia, purpura, and a great variety of other conditions. It usually results from a degeneration of the kidney, characterized by swelling, opacity, and molecular decay of the renal epithelium.

Albuminuria is best detected either by slightly acidulating and then boiling the urine in a test-tube, or by adding nitric acid. In either case the albumen coagulates into a white, semi-solid mass. Albuminuria is best treated by attention to hygienic conditions.

Albuñol′, a town of Spain, in the province of Granada, near the Mediterranean, 35 miles W. by S. of Almería. It is well built and has several convents. Pop. about 5000.

Albuquer′que, a town of Spain, in the province of Badajos, 26 miles N. of Badajos. It is 9 miles from the frontier of Portugal, and is built on high ground and defended by a very strong fortress situated on a mountain. The town was taken in 1705 by the allies of Charles, who was a claimant of the Spanish throne; but it was restored to Spain in 1715. It has a castle and manufactures of cotton and wool. Pop. about 7500.

Albuquerque, New Mexico. See APPENDIX.

Albuquerque, or **Alboquerque, d′** (AFFONSO), surnamed THE GREAT and THE PORTUGUESE MARS, a celebrated general, born at Alhanda, near Lisbon, in 1452, was related to the royal family. After he had distinguished himself in several expeditions to Africa and the East Indies, he was appointed viceroy of the Indies in 1509. He took the city of Goa in 1510, and conquered Malacca, in which he obtained booty of great value, in 1511. In 1513 his fleet entered the Red Sea, which had never before been navigated by Europeans. He captured the rich emporium of Ormuz in 1515. Having been removed from command, he died at Goa Dec. 16 of that year. He is said to have been eminent for justice and other virtues, which, combined with his military skill, greatly increased the power of Portugal in India.—ALBOQUERQUE (BRAS AFFONSO), a natural son of the preceding, was born at Alhandra in 1500. He was a naval officer, noted for his integrity and public spirit. He wrote a narrative of his father's campaigns, "Comentarios do grande Affonso d'Alboquerque." Died in 1580.

Al′burg, on R. R., Grand Isle co., Vt. (see map of Vermont, ref. 3-A, for location of county). This township has a celebrated mineral spring which is of a decidedly alkaline character and contains lithia. It is useful in gout and rheumatism, and other diseases. It has been recommended for cancer, but has no marked effect on that disease. Alburg has an academy. Pop. in 1870, 1716; in 1880, 1614.

Albur'num [from the Lat. *albus*, "white"], or **Sapwood,** is that part of the wood of exogenous trees which is most recently formed and is contiguous to the bark. It consists partly of tubes through which the sap ascends, and is of a white or pale color, whence its name is derived. It gradually hardens with age, and is converted into duramen or heart-wood, which is more valuable than alburnum.

Alcæ'us [Gr. 'Αλκαῖος], a celebrated Greek lyric poet, born at Mitylene, flourished about 600 B. C. In the violent contests between the democracy and the nobles of Lesbos he took side with the latter. He wrote in the Æolic dialect, and invented the metre called Alcaic. His poetry is impassioned and full of enthusiasm. Horace admired and imitated the odes of Alcæus, who, among the nine lyric poets of the Alexandrian canon, was recognized as the second, or, as some say, the first. He is said to have been a friend and admirer of Sappho, to whom some of his verses were addressed. His works are lost except small fragments.

Alca'ic Me'tre, in Greek and Latin poetry, was named from Alcæus, the reputed inventor. The greater alcaic verse consists of two iambic feet, a long catalectic syllable, a choriambus, and an iambus. The lesser alcaic is two dactyls, followed by two trochees.

Alcaide. See Alcayde.

Alcala' de Guadai'ra, a town of Spain, in the province of Seville, 9 miles S. E. of Seville, has a Moorish castle, and considerable trade in grain. Pop. about 7400.

Alcala' de Hena'res, a city of Spain, in the province of Madrid, on the river Henares, 21 miles by rail E. of Madrid, was built in 1083 near the site of the ancient Complutum. It was the seat of a celebrated university founded by Ximenes, which has been removed to Madrid. After this removal, Alcalá (which had 22,000 inhabitants in 1768) rapidly declined. Cervantes was born here in 1547. The celebrated Complutensian Bible was printed at Alcalá in 1514. Pop. 8745.

Alcala' la Real', a city of Spain, in the province of Jaen, stands in an elevated glen about 2700 feet above the sea, and 24 miles S. W. of Jaen. It has a court-house, several convents, a hospital, etc. Pop. 11,521.

Alcal'de [probably a corruption of the Arabic *al cadi*, "the judge"], the title given by the Moors, Spaniards, and Spanish American nations to a judicial or administrative officer, is sometimes erroneously confounded with *alcayde*. *Alcalde pedaneo* signifies justice of the peace.

Alcam'enes [Gr. 'Αλκαμένης], an eminent Athenian sculptor, a pupil of Phidias, flourished about 420 B. C. He was equal in celebrity to any sculptor of his time except his great master. Pausanias states that he was living in 400 B. C.

Al'camo, a town on the island of Sicily, in the province of Trapani, 24 miles S. W. of Palermo, has a college and picturesque ruins of an old castle. Pop. 20,890.

Alcañiz', ȧl-kȧn-yeeth', a town of Spain, in the province of Teruel, on the Guadalupe River, 57 miles S. E. of Saragossa. Pop. about 7500.

Alcántara, a town of Spain, in the province of Caceres, is situated on the left bank of the Tagus, near the Portuguese boundary. Here are ruins of a grand bridge built by the emperor Trajan in 103 A. D., of which a triumphal arch forty feet high still remains. The duke of Alva here defeated the Portuguese in a great battle on Aug. 25, 1580. Pop. 4200.

Alcántara, Order of, also called the **Order of Saint Julian,** a religious order of Spanish knighthood, founded in 1156 at Alcántara for the defence of the Christians against the Moors. In 1495 the office of grandmaster of this order was united to the Spanish crown. Their crest was a pear tree.

Alcatraz' (or **Alctra'ces**) **Island,** of California, sometimes called **Pelican Island,** is in the bay, 2½ miles N. of San Francisco. Length, 1650 feet; height, 130 feet. It is fortified, and commands the entrance of the Golden Gate. On its summit is a lighthouse 36 feet high, in lat. 37° 49′ 27″ N., lon. 122° 24′ 19″ W.

Alcava'la, or **Alcaba'la,** a tax formerly imposed in Spain and her colonies on all property sold, and payable as often as it changed hands. This tax, which was at first 10, and afterwards 14 per cent. *ad valorem*, was very injurious to the prosperity of the country.

Alcay'de, or **Alcaide** [from the Arabic *al*, "the," and *cadi*, a "magistrate"], a term applied by Spaniards, Moors, and Portuguese to a jailer or inferior magistrate.

Alca'zar (or **Alcazer**) **de San Juan',** a town of Spain, in the province of Ciudad Real, 47 miles N. E. of Ciudad Real, has manufactures of soap, nitre, and gunpowder. Pop. 7942.

Alca'zar Kebîr' ("the great castle"), a city of Morocco, 83 miles N. W. of Fez. Pop. in 1864, about 25,000. Near it is a bridge (*Alcántara*) where Sebastian, king of Portugal, was defeated and killed Aug. 4, 1578.

Alces'tis [Gr. 'Αλκηστις), in classic mythology, was a daughter of Pelias and the wife of Admetus, king of Thessaly. The poets feigned that she prolonged the life of her husband by suffering voluntary death as his substitute, and was rescued from Hades by Hercules. The story of her devotion is the subject of one of the tragedies of Euripides.

Al'chemy [for etymology, see below] is commonly understood to mean the occult science or art of transmuting the baser metals into gold. Some writers suppose that alchemy originated in Egypt, the ancient name of which was *Chem* ("dark," "mysterious"), and that it was introduced into Europe by the Arabs. The origin of alchemy seems to be connected with the widespread notion that the manifold forms of matter have a common basis, and that the individual properties of material bodies are due to formative force separable in thought, if not in fact, from this common substratum. Hence it followed that if this first matter could be dissolved or separated from all special formative forces, and the special "form" of gold or other precious substance discovered and got under control, these or any material body could be produced at will. From this point of view we may understand the reason of the alchemists' search for the "universal solvent" and for the special "forms" of things. The union of the *materia prima* and the "form" of gold would produce the actual metal. In like manner, if the vital principle or form of the bodily organization could be found and controlled, the tendencies to disease and decay in the bodily organization could be resisted. Hence the search after the elixir of life and the philosopher's stone. It was this search after "forms" and the *materia prima* which so vitiated the method of the Middle Age investigators. It was a reaction against this false analysis of Aristotle which led to the bitter opposition to his name and doctrines which marked the rise of modern science in Europe. When belief in the reality of the Aristotelian analysis passed away, alchemy ceased.

In the Middle Ages the alchemists expended immense labor and time in experiments, the object of which was to discover the philosopher's stone and an elixir vitæ (the elixir of life) which could cure all diseases and restore old people to youth. Many useful discoveries were the results of these visionary pursuits, in which the most eminent men of those times took part. Roger Bacon (1214–92) was a believer in the doctrine that base metals can be transmuted into gold. The works which he wrote on alchemy are the oldest extant European writings on that subject. Among the other famous alchemists were Basil Valentine, R. Lully, and Paracelsus. As late as the sixteenth century many men of superior intellect devoted their time and money to alchemy, and hoped to discover the grand arcanum. According to Liebig, "The great (Francis) Bacon, Luther, Benedict Spinosa, and Leibnitz believed in the philosopher's stone, and in the possibility of the transmutation of metals." (*Familiar Letters on Chemistry.*) The same writer affirms that "Alchemy was never at any time anything different from chemistry. It is utterly unjust to confound it, as is generally done, with the gold-making of the sixteenth and seventeenth centuries. Among the alchemists there was always to be found a nucleus of genuine philosophers, who were often deceived in their theoretical views; whereas, the gold-makers, properly so called, knowingly deceived both themselves and others." Revised by M. B. Anderson.

Alcia'ti [Fr. *Alciat*], (Andrea), an eminent Italian lawyer, born in 1492 at Alzato. He lectured on law at Bourges from 1528 to 1532, after which he was professor of law at Bologna, Pavía, and Ferrara. He wrote, besides other works, "Commentaries on the Digest" and a book of emblems. Died in 1550. Erasmus said of him, as Cicero said of Scævola, "He was the most jurisprudent of orators, and the most eloquent of lawyers."

Alcibi'ades [Gr. 'Αλκιβιάδης], a famous Athenian general and politician, born of a noble family about 450 B. C., was a son of Cleinias. He was educated at the house of his relative, the illustrious Pericles, and inherited a large estate. Pericles was a second cousin to the mother of Alcibiades. From nature he received great personal beauty and transcendent abilities, with strong passions and proclivities to licentious habits. As a favorite pupil and companion of Socrates he enjoyed in his youth great advantages for the cultivation of his mind. (See Socrates.) In 420 B. C. he began his political career as the leader of the democratic party and an opponent of Nicias, who advocated peace with

Sparta. Having induced the Athenians to send a great expedition (in 414 B. C.) against Syracuse, the ally of Sparta, he was chosen to command it, in conjunction with Nicias and Lamachus. Soon after the fleet had reached Sicily, Alcibiades was recalled to defend himself against a charge of sacrilege, but he escaped to Sparta, and in his absence was condemned to death by the people of Athens. He acquired much influence with the Spartans, whom he aided in their operations against his native country, but several jealous Spartan leaders having conspired against him, he fled to the Persian satrap Tissaphernes, and again changed sides. The next scene in the drama of his eventful and wayward career presents him as the commander of the Athenian fleet, in 411 B. C. He defeated the Spartans at Abydos in 411, and at Cyzicus in 410 B. C. Having by these and other victories restored the naval supremacy of Athens, he returned in triumph to the capital in 407, and regained his popularity. He was removed from the command in 406, in consequence of a reverse which his fleet suffered in his absence, and he again went into exile. He sought refuge in Phrygia, where he was assassinated by night in 404 B. C. (See PLUTARCH, "Life of Alcibiades;" GROTE, "History of Greece," vol. viii.; THIRLWALL, "History of Greece.")

Al'ciphron ['Αλκίφρων], a Greek epistolary writer, who is supposed to have lived about 180–200 A. D. He represented the manners and opinions of various classes of society in fictitious letters, the style of which is admired as a specimen of Attic purity.

Alci'ra, an ancient walled town of Spain, on an island in the river Jucar, in the province of Valencia, 25 miles S. of Valencia, has two fine stone bridges, besides an iron railway bridge. Near it is a curious cavern. Pop. 15,400.

Alcmæonidæ, The. See APPENDIX.

Alc'man [Gr. 'Αλκμάν], a celebrated Spartan lyric poet, born at Sardis, was originally a slave. He flourished about 650 B. C., and became a free citizen of Sparta. He wrote songs called "Parthenia," also bridal-hymns and other erotic poems which were greatly admired. According to some writers, he was the inventor of erotic poetry. Some small fragments of his works are extant.

Alcme'ne [Gr. 'Αλκμήνη], a daughter of Electryon and Anaxo, the daughter of Alcæus. She is said to have been the mother of Heracles by Zeus. Hera, jealous of Alcmene, delayed the birth of Heracles for seven days, that Eurystheus might be born first, and thus be entitled to greater rights, according to a vow which Zeus had made. There are different accounts of her death. According to Plutarch, Agesilaus opened her tomb at Haliartus in Bœotia, and carried her remains to Sparta.

Al'co, a kind of dog found wild in Mexico and Peru. It has been domesticated, and is described as having a very small head, with large and pendulous ears.

Alcock (Sir RUTHERFORD). See APPENDIX.

Al'cohol [from the Arabic definite article *al*, "the," and *kohol*, originally a "powder of antimony," used for painting the eyebrows, afterwards applied to anything very subtle], a limpid, colorless liquid, which has a hot, pungent taste, and is the essential principle of all spirituous liquors and intoxicating drinks. It is the product of the fermentation of sugar or saccharine substances, and is extracted by distillation from spirituous liquors, such as whisky and brandy, which contain nearly fifty per cent. of water. Pure alcohol is very inflammable, has a strong affinity for water, is a powerful solvent, boils at 173° Fahrenheit, and has never been congealed by the greatest degree of cold that could be produced. It is composed of carbon, oxygen, and hydrogen, the proportions being about 52 per cent. of the first, 35 of the second, and 13 of the last. Its symbol is C_2H_6O. In medicine, alcohol is used as a stimulant or excitant, mostly in the form of wine, brandy, or whiskey. In pharmacy, alcohol is extensively used as a solvent; its solutions are called tinctures. The strongest alcohol that can be procured is termed absolute alcohol or anhydrous alcohol; it is prepared by removing the last few per cent. of water by quicklime.

Alcohol may be produced synthetically by causing strong sulphuric acid to absorb ethene gas (olefiant gas), by which ethyl-sulphuric acid is produced, $C_2H_4 + H_2SO_4 = H.C_2H_5.SO_4$. On distilling this acid with water, alcohol is obtained, while dilute sulphuric acid is left in the retort or still, $H.C_2H_5.SO_4 + H_2O = C_2H_6O + H_2SO_4$.

The alcohol of commerce varies in strength from *proof spirits*, which contain 50 per cent. by volume, to *cologne spirits*, which contain from 93 to 95 per cent. It is manufactured from a variety of materials which contain either sugar or starch, such as molasses, beets, potatoes, Indian corn, etc. (For details of the manufacture, see article WHISKEY.)

Intoxicating beverages owe their peculiar effects on the system chiefly to the alcohol they contain. They are divided into fermented liquors and distilled liquors or spirits. Fermented liquors include (1) *wine*, made from saccharine fruits, such as the grape, apple, and pear; and (2) *beer*, made from materials which contain starch, usually barley. Distilled liquors are made from the refuse of the grape, *brandy*; or from molasses, *rum*; or from cereals or potatoes, *whiskey*. *Gin* is alcohol flavored with juniper-berries. (See articles, FERMENTATION, WINE, CIDER, BEER, RUM, BRANDY, WHISKEY, GIN.) C. F. CHANDLER.

Alcoholom'etry [from *alcohol*, and the Gr. μέτρον, a "measure"] is the method of obtaining the amount of absolute alcohol in a given quantity of spirits. This may be done—(1) by determining the specific gravity of the spirits, provided they contain nothing besides water and alcohol. The specific gravity of water being 1, that of pure or absolute alcohol is 0.7938 at 60° F. Tables have been carefully prepared showing the percentage of alcohol corresponding to different gravities between these extremes. (See SPECIFIC GRAVITY.) If the spirits contain sugar, etc., they must be purified by distillation before determining the gravity. (2) The percentage of alcohol may be determined by observing the boiling-point. Water boils at 212° F., absolute alcohol at 173° F. (3) By observing the tension of the vapor. The first method is always employed in practice.

Alcohols. The term alcohol, originally limited to spirit of wine, is now applied to a large class of bodies, some of which are solids. They are all similarly constituted, being saturated hydrocarbons, in which one or more hydrogen atoms are replaced by an equal number of molecules of hydroxyl (.OH). They may also be regarded as compounds of hydroxyl with alcohol radicals. Thus, propane yields three alcohols: propane, C_3H_8; propyl alcohol, $(C_3H_7)(OH)$ monatomic; propene alcohol, $(C_3H_6)''(OH)_2$ diatomic; propenyl alcohol, $(C_3H_5)'''(OH)_3$ triatomic. The last-mentioned is glycerine. The simplest alcohol is methyl alcohol or wood-naphtha, $CH_3.OH$. Common alcohol comes next in order, $C_2H_5.OH$. Cetyl alcohol ($C_{16}H_{33}$ OH), derived from spermaceti, and ceryl alcohol ($C_{27}H_{55}.OH$), derived from Chinese wax, are white crystalline solids. Those alcohols containing one molecule of OH are called *monatomic*. Other series of hydrocarbons yield similar alcohols; phenol or carbolic acid, $C_6H_5(OH)$, is the alcohol of benzol, C_6H_6. Diatomic alcohols contain two molecules of OH; those derived from the marsh gas or methane series of hydrocarbons are called glycols. Triatomic alcohols contain three molecules of OH; glycerine or propenyl alcohol, $C_3H_5(OH)_3$, is the last example. Tetratomic, pentatomic, and hexatomic alcohols are known. Manna sugar, or mannite ($C_6H_{14}O_6 = C_6H_8(OH)_6$), is a hexatomic alcohol, derived from the hydrocarbon sextane, C_6H_{14}. Glucose or grape-sugar is the aldehyde of this alcohol. (See ALDEHYDE.) Cane-sugar ($C_{12}H_{22}O_{11}$) is intimately related to glucose, as it corresponds to two molecules of glucose, less one molecule of water; it is called a polyglucosic alcohol. Starch and cellulose ($C_{18}H_{30}O_{15}$) are regarded as being the oxygen-ethers or anhydrides of the polyglucosic alcohols.

By replacing the OH in alcohols by chlorine, bromine, etc., haloid ethers are produced; thus:

Common or ethylic alcohol $= C_2H_5.OH$.
Ethyl chloride $= C_2H_5Cl$.
Methenyl alcohol (triatomic) $= CH(OH)_3$.
Methenyl chloride, chloroform $= CHCl_3$.

By replacing the hydroxyl by acid radicals, compound ethers are produced:

Amyl alcohol,	$C_5H_{11}.OH$.
Amyl acetate,	$C_5H_{11}.C_2H_3O_2$.
Propenyl alcohol, glycerine,	$C_3H_7(OH)_3$.
Glyceryl tristearate, stearine,	$C_3H_7(C_{18}H_{55}O_2)_3$.

C. F. CHANDLER.

Alco'ra, a town of Spain, in the province of Castellon, 11 miles N. W. of Castellon. It has potteries and distilleries of brandy. Fruits are the chief articles of export. Pop. about 6000.

Al'cott (AMOS BRONSON), an American ideal philosopher, and one of the principal contributors to "The Dial," was born at Wolcott, Conn., Nov. 29, 1799, and now resides at Concord, Mass. He has acquired some reputation as an educational reformer, but is chiefly distinguished for his conversational powers. He has held formal "conversations" in many of our principal cities on a wide range of speculative and practical themes, and has published two volumes of essays—"Tablets," 1868; "Concord Days," 1872.

Alcott (LOUISA MAY), an American writer, daughter of the preceding, was born in 1833. She has published a number of very popular works for children and youth; "Little Women" (1867), "The Old-Fashioned Girl" (1869), "Little Men, or Life at Plumfield" (1871), "Work" (1873), "Spinning-Wheel Stories" (1884), etc.

Alcott (William Alexander), M. D., an American writer on education, was born at Wolcott, Conn., Aug. 6, 1798. He contributed to several journals, lectured at various places on education, hygiene, and other subjects, and published a number of popular works, among which are "The House I Live In," "The Young Man's Guide," "The Library of Health," "The Young Woman's Guide," and "Moral Reform." Died Mar. 29, 1859.

Al'cove [Fr. *alcove;* Sp. *alcoba;* etymology uncertain], in architecture, a recess in an apartment, separated by an estrade or partition of columns, and occupied by a bed of state; a recess in a library or a lateral apartment for books.

Alco'y, a city of Spain, in the province of Alicante, 30 miles N. of Alicante. It is built on uneven ground among the hills, and has manufactories of paper and woollen goods. About 200,000 reams of paper are made here annually. A large part of this paper is consumed in the form of cigars (*papelitos*). Pop. in 1877, 32,497.

Al'cuin, born at York about 735; died at Tours, May 19, 804. Became in 766 master of the school of York, the representative of Irish learning on Anglo-Saxon ground, accepted in 782 the invitation of Charlemagne to assume the leadership of the palatial school at Aix-la-Chapelle; exercised a decisive influence on the ecclesiastical affairs of the Frankish empire; and wrote a number of theological works, books to be used in the schools he founded and led, poems, letters (of the greatest historical interest), etc., edited by Froben (Ratisbon, 1777, 2 vols. fol.). (See Monnier, "Alcuin et Charlemagne," Paris, 1863; also Werner, "Alcuin und sein Jahrhundert," 1876.)

Alcy'one, or **Halcy'one** [Gr. Ἀλκυόνη], in classic mythology, a daughter of Æolus and the wife of Ceyx. She was so inconsolable for the death of her husband that she threw herself into the sea. Tradition adds that Ceyx and Alcyone were changed into kingfishers to reward their mutual devotion.

Alcyo'nium [Gr. *ἀλκυόνιον*, from *'αλκυών*, a "kingfisher," so called from its supposed resemblance to the nest of a kingfisher], a genus of zoophytes belonging to the order Alcyonaria, presents a curious polype mass and star-like pores, through which polypes protrude themselves. The *Alcyonium digitatum* abounds on the shores of Great Britain. The *Alcyonium carneum* is found along the American coast from Cape Cod northward.

Aldan', a river of Siberia, the largest tributary of the Lena, rises in the Yablonoi Mountains, near the frontier of the Chinese empire. Flowing north-eastward, and afterwards in a N. W. direction, it enters the Lena about lat. 63° N., and nearly 60 miles below Yakutsk. Length, estimated at 1300 miles.

Aldan Mountains, a chain of mountains in the E. part of Siberia, connected with the Stannovoi Mountains, and extending about 400 miles, from lat. 61° 20′ N. to 67° 30′ N. The highest summit of these is Mount Kapitan, about 4200 feet high. Some geographers give the name a more extensive application—to all the mountain-ranges in the N. E. of Asia.

Ald'borough, a town of England, situated in the West Riding of Yorkshire, about 16 miles N. W. of York, is noted for its ancient remains. It occupies the site of the town of *Isurium* of the Romans. In it and its vicinity are found interesting ruins of aqueducts, extensive buildings, tesselated pavements, etc. Pop. 502.

Ald'borough, Earls of, viscounts of Aldborough (1766), Viscounts Amiens (1777), and barons of Baltinglass (1763, in the Irish peerage), a prominent family of Great Britain. The first earl was created in 1777.—Benjamin O'Neale Stratford, the sixth earl, was born June 10, 1808, and succeeded his father Oct. 4, 1849. D. Dec. 19, 1875.

Aldeb'aran [from the Arabic *al*, "the," and *dabaran*, "following," because this star follows the Pleiades], the name of a star of the first magnitude in the constellation of Taurus, otherwise called α Tauri. It is the brightest star of a group called the Hyades.

Aldegonde, Saint. See Marnix.

Al'degre'ver, or **Aldegraef** (Heinrich), a distinguished German painter and engraver, born at Soest, in Westphalia, in 1502, was a pupil and imitator of Albert Dürer. Among his numerous engravings are "The Labors of Hercules" and a portrait of Luther. Specimens of his painting are very rare, the only undoubted one being a portrait in the gallery at Berlin. Died about 1562.

Al'dehyde [from *al*, first syllable of *alcohol*, and *dehyd*, first two of *de-hydrogena'tus*, "deprived of hydrogen"], compounds formed by depriving alcohols of hydrogen. The term aldehyde was first applied to acetic aldehyde, produced from common alcohol by limited oxidation, effected by (1) imperfect combustion, as when a spirit-lamp burns out for want of alcohol; (2) by the action of potassic dichromate and sulphuric acid; (3) by the action of chlorine and water. Thus,

$$\overset{\text{Alcohol.}}{C_2H_6O} + \overset{\text{Oxygen.}}{O} = \overset{\text{Aldehyde.}}{C_2H_4O} + \overset{\text{Water.}}{H_2O}.$$

Acetic aldehyde is a limpid, colorless liquid of a peculiar ethereal odor, which when concentrated is very suffocating. By exposure to the air it absorbs oxygen, and passes into

$$\overset{\text{Aldehyde.}}{C_2H_4O} + O = \overset{\text{Acetic Acid.}}{C_2H_4O_2}.$$

It reduces oxide of silver to the metallic state. This aldehyde has been prepared in large quantities during the past few years, to be used in the manufacture of aldehyde green, one of the most beautiful of the aniline colors.

The aldehydes are intermediate in composition between the alcohols and the corresponding acids. By the loss of hydrogen the alcohol becomes an aldehyde; by the addition of oxygen the aldehyde becomes an acid:

Common ethylic alcohol,	C_2H_6O.
Acetic aldehyde,	C_2H_4O.
Acetic acid,	$C_2H_4O_2$.

By substituting an alcohol for hydrogen in an aldehyde, a ketone is produced, acetic ketone or acetone $= C_2H_3(CH_3)O$.

Among the other more important aldehydes may be mentioned acrylic aldehyde or acrolein (C_3H_4O), a very offensive liquid produced by the dehydration of glycerine. It is always found in the destructive distillation of oils and fats containing glycerine, and is the chief cause of the very pungent odor produced. Chloral (C_2HCl_3O), produced by the prolonged action of chlorine on alcohol, is trichlorinated acetic aldehyde. By combining with water it produces the "chloral-hydrate" so extensively used of late on account of its hypnotic effects. It is supposed to be transformed by the alkali of the blood into chloroform and formic acid, thus:

$$\overset{\text{Chloral-hydrate.}}{C_2HCl_3O.H_2O} + \overset{\text{Potassic-hydrate.}}{KHO} = \overset{\text{Potassic-formiate.}}{KCHO_2} + \overset{\text{Chloroform.}}{CHCl_3} + \overset{\text{Water.}}{H_2O}.$$

Bitter-almond oil (C_7H_6O) is benzoic aldehyde.

Aldehydes possess three characteristic properties: (1) they unite with alkaline bisulphites; (2) they unite with aniline; (3) when fused with caustic potash they give off hydrogen, forming the potassic salt of the corresponding acid.

C. F. Chandler.

Alden (Bradford R.), an American officer, born May, 1811, in Meadville, Pa., was descended from the famous Pilgrim Alden, who came out in the Mayflower and married the beautiful Priscilla Mullens, and his father, Roger Alden, was a major in the Revolutionary army. He graduated at West Point in 1831, captain Fourth Infantry June 14, 1842, served at Florida posts 1832–33, assistant instructor in various departments of the Military Academy 1833–40, aide-de-camp to Major-General Scott 1840–42, in military occupation of Texas 1845, commandant of cadets at Military Academy 1845–52, on frontier duty on the Pacific 1853, engaged as acting colonel commanding two volunteer battalions (which he had raised) on an expedition against the Rogue River Indians, engaged at Jacksonville, Or., Aug. 24, 1853 (severely wounded). After his resignation, Sept. 29, 1853, he travelled three years in Europe, endeavoring to regain his health. Subsequently, while on a visit to Western Pennsylvania, he became satisfied, by his extensive explorations, of the abundance of petroleum, and was among the first to appreciate and give effect in 1859 to the value of this discovery. After repeated efforts to serve in the civil war, the paralysis caused by his wound compelled him to desist. Devoting himself to the study of literature and art, in which he was accomplished, to the culture of Christianity, of which he was a bright exemplar, and to works of active benevolence, for which he was famed, he spent his after years till he died, Sept. 10, 1870, at Newport, R. I., aged fifty-nine.

George W. Cullum.

Alden (James), U. S. N., born Mar. 31, 1810, in Maine, entered the navy as a midshipman April 1, 1828, became a passed midshipman in 1834, a lieutenant in 1841, a commander in 1855, a captain in 1863, a commodore in 1866, a rear-admiral in 1871. He served in the Mexican war, and participated in the capture of Vera Cruz and Tobasco. In command of the steamer South Carolina, he engaged the batteries off Galveston, Tex., Aug. 3, 1861, and commanded the steamer Richmond in the engagement with Forts St. Philip and Jackson, and at the capture of New Orleans, April 24, 1862, and during the passage up and down the Mississippi River by Vicksburg, June 28 and July 15, 1862; in the engagement at Port Hudson, Mar. 14, 1863, commanded the Brooklyn at the great victory over forts, rams, and gunboats in Mobile Bay, Aug. 5, 1864, and in both the Fort Fisher fights, Dec., 1864, and Jan., 1865. Of his conduct in these affairs, Rear-Admiral David D.

Porter, in his official report of Jan. 28, 1865, speaks in terms of exalted admiration, and concludes his remarks thus: "I consider him able and worthy to fill the highest rank, and I know that the government has no one in its navy more full of energy, zeal, or intelligence in his profession. I shall feel much disappointed if Captain Alden is not promoted to a rank he has won more than once during this rebellion. I am sure the department will appreciate all I have said of this gallant officer. His record speaks for him." In 1869 he was appointed chief of the bureau of navigation, and in 1871 was appointed to the command of the European station. He retired from active service in 1873. D. at San Francisco, Cal., Feb. 6, 1877.

FOXHALL A. PARKER.

Alden (JOHN), one of the Pilgrim Fathers who came over in the Mayflower in 1620. He was a magistrate of Plymouth Colony for more than fifty years. He was born in 1599, and died at Duxbury Sept. 12, 1689.

Alden (JOSEPH), D. D., LL.D., was born at Cairo, N. Y., Jan. 4, 1807, and graduated at Brown University 1828, studied theology at Princeton, and was ordained pastor of a Congregational church at Williamstown, Mass. (1834), was a professor in Williams College (1835–52), in Lafayette College, Pa. (1853–57), president of Jefferson College (1857–67), and principal of the New York State Normal School at Albany (1867–82). Died Aug. 30, 1885.

Alden (REV. NOAH), a prominent advocate of religious liberty in Massachusetts. He represented the town of Bellingham in the convention which formed the constitution of that State. He was also a member of the convention which ratified the Constitution of the U. S. In 1766 he became pastor of the Baptist church at Bellingham, where he exercised his ministry with great influence and success for about thirty years.

Alden (TIMOTHY), D. D., born at Yarmouth, Mass., Aug. 28, 1771, graduated at Harvard in 1794. He was pastor of a Congregational church in Portsmouth, N. H. (1799–1805), and was for many years afterwards a prominent educator in Portsmouth, Newark, New York, Boston, Cincinnati, etc. He was the founder and first president (1817–31) of Alleghany College, Meadville, Pa. He published a collection of epitaphs (5 vols., 1814), "An Account of Missions among the Senecas" (1827), and other works. Died at Pittsburg, Pa., July 5, 1839.

Al'denhoven, a market-town of Prussia, in the Rhine province. Here the Austrians defeated the French on Mar. 1, 1793, and the French defeated the Austrians on Oct. 2, 1794. Pop. 2898.

Al'der [Lat. *Al'nus*], a genus of trees and shrubs of the natural order of Betulaceæ or Amentaceæ. They are natives of the temperate parts of Europe and North America. The wood of the common alder of Europe (*Alnus glutinosa*) is used by turners and joiners, affords good charcoal for the manufacture of gunpowder, and is valuable for mill-wheels and the piles of bridges. The alder is prized as an ornamental tree in landscapes. The *Alnus cordifolia*, a native of Italy, is a large and beautiful tree. The alders of the Eastern U. S. are shrubs or small trees, but *Alnus Oregona* of the W. coast grows to the height of sixty to seventy feet.

Al'derman (originally signifying an "older" or "senior" man), the title of a municipal officer or magistrate in the corporations of England and the U. S. The London court of aldermen exercises judicial and legislative authority in the corporation. In New York City the term is applied to the members of the city council, who are elected by the people. In some cities they are magistrates; in others councillors.

Alderney, aul'dęr-ne, or **Aurigny,** an island in the English Channel, 7 or 8 miles from Cape la Hogue (France), belongs to England. It is about 4 miles long, and less than 2 miles wide. Guernsey, another of the Channel Islands, is about 15 miles from this place. The people of Alderney are mostly of French extraction. This island produces a celebrated breed of small cows. It is separated from France by the Race of Alderney, a strait about 8 miles wide, the navigation of which is dangerous in stormy weather. It is politically a dependency of Jersey. Pop. in 1881, 2039.

Al'dershott Camp, a permanent camp formed in 1855 for the improvement of the British army in tactics and in evolutions on a large scale. It is situated on Aldershott Heath, on the confines of Surrey, Hampshire, and Berkshire. The area of ground appropriated to this purpose is 7063 acres. A thriving town has naturally sprung up near the camp.

Al'dine Edi'tions, the name given to the editions of Greek and Roman classics which were issued by Aldus Manutius and his descendants in Venice between 1490 and 1600. These editions are highly prized for the correctness of the text and the beauty of the typography. (See MANUTIUS.)

Aldobrandi'ni, a celebrated noble family of Florence. Among its most prominent members were Salvestro, born 1499, died 1558; Ippolito, born 1536, died 1605, who was elected pope in 1592 as Clement VIII.; his brother Tommaso, the fourth son of Salvestro; and Francesco, who was created a prince by his uncle Clement VIII.

Ald'rich (HENRY), D. D., an English scholar and composer of sacred music, was born at Westminster in 1647. He was one of the ablest champions of Protestantism in the reign of James II.; dean of Christ Church, Oxford, in 1689; composed anthems. Died Dec. 14, 1710.

Aldrich (NELSON W.), b. in Foster, R. I., Nov. 6, 1841; received an academic education; pres. Prov. (R. I.) common council 1872; member R. I. general assembly 1875–76, and was Speaker of its house of representatives in 1876; was member of 46th Congress, and re-elected; was elected, Oct. 5, 1881, U. S. Senator in place of Gen. Burnside, deceased.

Aldrich (THOMAS BAILEY), a poet, born in Portsmouth, N. H., Nov. 11, 1836. Lived in his youth in Louisiana, then in New York, where he was for a time a clerk, then a proof-reader, and afterwards attained eminence as a writer and editor. Wrote for the "Home Journal," "Atlantic Monthly," and other periodicals, and has published "The Bells," (1854), "The Course of True Love" (1858), "Pampinea" (1861), several volumes of poems, "Marjorie Daw" (1873), etc. Became editor of "Atlantic Monthly" Mar. 1, 1881.

Ald'ridge (IRA), a negro tragedian, born in Maryland in 1804, was in his youth a personal attendant of Edmund Kean. He performed with success in England and other countries of Europe. He received medals or tokens of honor from the king of Prussia and the emperor of Austria. Died Aug. 7, 1867.

Aldrovan'dus (ULYSSES), an eminent Italian naturalist, born at Bologna Sept. 11, 1522. He graduated as doctor of medicine in 1553, and became professor of natural history at Bologna in 1560. Having expended much time and money in collecting specimens and in the study of nature, he began in 1599 the publication of his "Natural History" (13 vols.), of which three volumes on birds and one on insects appeared during his life. The other volumes were edited by several persons after his death. His "Natural History" is a laborious and ill-digested compilation. Died Nov. 10, 1607.

Ale, a sort of beer, a fermented liquor produced from malt. Ale contains more alcohol than common beer, and is a favorite beverage of the British. Scotch ale and Burton ale have a high reputation. There are three varieties of malt liquor in general use in this country—ale, porter, and lager beer. All are prepared from malt, which is barley which has been allowed to germinate (sprout), and has then been dried by artificial heat. Hops are added to give the aromatic bitter flavor. The lower the temperature at which the malt is dried the lighter will be the color of the malt and the beverage. Ale and lager beer are made from light, porter from dark-colored malt. Ale and porter are fermented at temperatures of from 65° to 90° F. while lager beer is fermented at from 46° to 50° F.

In the manufacture of ale the first fermentation is checked at such a point as to leave a considerable quantity of saccharine matter in the liquor. By the subsequent fermentation in the barrels or bottles this is changed to alcohol and carbonic acid; the latter substance causing the characteristic effervescence. (See BEER, by C. F. CHANDLER.)

Alean'dro [Lat. *Alean'der*], (GIROLAMO), a learned Italian cardinal, born at Motta Feb. 13, 1480. He was appointed librarian of the Vatican in 1519, and was sent by Leo X. as papal nuncio to Germany in 1520, to counteract the influence of Luther. He showed a violent animosity to Luther at the Diet of Worms. In 1538 he was made a cardinal by Paul III., when he took the title of St. Chrysostom. Died Jan. 31, 1542.

Ale'do, on R. R., capital of Mercer co., Ill. (see map of Illinois, ref. 4–B, for location of county). It is the seat of a college. Coal is found in the vicinity. Pop. in 1870, 1076; in 1880, 1492.

Alegam'be (PHILIP), a learned Flemish Jesuit, born at Brussels Jan. 22, 1592. He removed to Rome, where he became superior of the order of Jesuits. He wrote a valuable contribution to the biography and bibliography of the Jesuit authors, entitled "Bibliotheca Scriptorum Societatis Jesu" (1643). Died Sept. 6, 1652.

Aleman'ni (*i. e.* "all men"), the name of certain German tribes who formed a confederacy against the Romans about 200 A. D., and at that time lived on the Main. They invaded Gaul in the reign of Julian the Apostate, who gained a victory over them in 357 A. D. Having been defeated by Clovis in 496, their confederacy was dissolved. From this word is derived the French *Allemand*, signifying "German."

Alembert, d' (JEAN LE ROND), a celebrated French geometer and philosopher, born in Paris Nov. 16, 1717, was an illegitimate son of M. Destouches-Canon and Madame de Tencin. Having been abandoned by his mother in the street, he was nursed by the wife of a glazier, and continued to live with her for about forty years. He received from his father an annual pension of 1200 livres, and was educated in the Mazarin College, which he entered in 1730. His favorite study was mathematics. In 1741 he was admitted into the Academy of Sciences, and in 1743 produced his celebrated "Treatise on Dynamics," which opened a new epoch in mechanical philosophy, by the demonstration of the principle "that there is an absolute equality at all times between the entire amount of force applied and the sum-total of the effects produced." His treatise "On the Theory of the Winds" gained the prize of the Academy of Berlin in 1746. In 1752, Frederick the Great offered him the presidency of the Royal Academy of Berlin, which he declined. D'Alembert was associated with Diderot as joint editor of the famous "Encyclopédie," for which he wrote an admirable "Preliminary Discourse" and many mathematical articles. He was admitted into the French Academy in 1754. He formed a *liaison* with the accomplished Mademoiselle l'Espinasse, who lived with him twelve years. He showed his independence and indifference to riches by refusing, in 1762, the invitation of Catherine II. of Russia, who offered him a salary of 100,000 francs to direct the education of her son. In 1772 he was elected secretary of the French Academy. He was an intimate friend of Voltaire, and assumed toward Christianity the attitude of a skeptic—*i. e.* a doubter and candid inquirer—while he openly avowed his hostility to the Church of Rome. His moral character is generally represented as noble and benevolent. Among his works are "Researches on some Important Points of the System of the Universe" (3 vols., 1754–56), "Mélanges of Literature and Philosophy," "Elements of Philosophy" (1759), and eulogies on the members of the French Academy who died between 1700 and 1772. He died in Paris on the 29th of Oct., 1783. An edition of his works was published by Bossange in 5 vols. 8vo, 1821. "His literary works," says Lacroix, "constantly directed to the perfection of reason and the propagation of correct ideas, were highly appreciated by all good judges. They are all remarkable for a pure diction, a neat style, and strong or pithy thought."

Alemb'ic [from the Arabic article *al*, and the Gr. ἄμβιξ, a "cup or pot"], an apparatus formerly used by alchemists and chemists in the process of distillation and sublimation. It has been superseded by the retort and receiver.

Alemte'jo, or **Alente'jo** ("beyond the Tagus"), a province of Portugal, is bounded on the N. by Beira, on the E. by Spain, on the S. by Algarve, and on the W. by Estremadura and the Atlantic. Area, 9416 square miles. It is intersected by the Gaudiana River, and is washed by the Tagus, which forms part of the northern boundary. The climate is hot and dry, the surface is hilly, and the soil of the northern and eastern valleys is fertile. The chief productions are wheat, maize, barley, grapes, rice, and figs. Capital, Evora. Pop. in 1878, 374,503.

Alençon, a city of France, capital of the department of Orne, is situated on the Sarthe and in a plain, 65 miles by rail W. S. W. of Paris. It is well built and handsome, has a cathedral, a public library, and a church about 1000 years old. Here are manufactures of various articles, including muslin, leather, and a celebrated lace called Point d'Alençon. Pop. in 1881, 17,237.

Alep'po, called by the Arabs **Ha'leb** (anc. *Chal'ybon* and *Berœ'a*), an important city of Syria, and one of the chief emporiums of the Ottoman empire, is on the Kowek, about 55 miles E. of Antioch; lat. 36° 11' N., lon. 37° 10' E.; 1300 feet above the sea. It is surrounded by limestone hills, and presents a picturesque appearance. The houses are well built of stone, mostly in the Saracenic style, with richly ornamented walls and ceilings. In the environs are celebrated gardens about twelve miles in extent. Aleppo has a castle, a Mohammedan college, and many Christian churches. It has an extensive trade in cotton and silk stuffs, tobacco, wine, oil, indigo, etc., and is visited by large caravans from Bagdad, Diarbekir, Mosul, and Armenia. It was a great emporium of trade during or before the Middle Ages. Its prosperity was greatly injured by the earthquake of 1822, which destroyed a large part of the city and about two-thirds of the inhabitants. The population, which before that event was more than 200,000, was about 70,000 in 1880.

Alesh'ki, a town of Russia, in the government of Tauria, 8 miles E. of Kherson. Pop. in 1882, 8187.

Ale'sia ('Αλεσία), the fortified capital of the Gallic tribe Mandubii, was built, according to a legend, by Hercules. Here the last desperate battle for freedom was fought by the Gauls, under Vercingetorix, against the Romans, under Julius Cæsar, in 52 B. C. The Gauls were completely defeated and the city destroyed. Alesia was rebuilt, and again destroyed by the Northmen in 864. It was on the present Mont Auxois, at the foot of which the modern town of Alise is situated.

Ale'sius [Gr. ἀλείνω, "to be a wanderer"], the name given, probably by Melanchthon, to Alexander Alane, who was born in Edinburgh April 23, 1500, was canon of St. Andrew's, turned Protestant, went to Germany in 1532, and again in 1540; was made professor at Leipsic, and died there Mar. 17, 1565. He wrote much and ably. It was he who translated the Book of Common Prayer into Latin.

Alessandres'ku (GREGORY), a celebrated Rumanian poet, born in 1812, was sent in consequence of political agitations to a convent, where he wrote his most celebrated work, "The Year 1840," in which he gives expression to the hopes of his party. In 1859 he was for a few months minister of finance, since which time he has belonged to the liberal opposition, which he has effectively aided with his poems and fables. A second edition of his collected works appeared in 1863.

Alessan'dri (BASIL), the most prominent Rumanian poet of modern times, born in 1821, took part in the liberal movement of 1848, was minister of foreign affairs for a few months in 1859–60, and has since resided a part of the time in Yassy and part of the time in Paris. Among his works are "Doinas" (1853), "Doine si lacrimivare" (1863), and "The Popular Ballads of Rumania" (2 vols., 1853).

Alessan'dria, a province of Northern Italy, is bounded on the N. by Novara, on the E. by Pavia, on the S. by Genoa, and on the W. by Cuneo and Torino. Area, 1952 square miles. The country consists partly of large fertile plains and partly mountains, and is traversed by the Tanaro, the Scrivia, and the Bormida. Chief town, Alessandria. Pop. in 1881, 728,750.

Alessandria (sometimes called *Del'la Pa'glia*, from its first houses having been roofed with straw), a fortified city of Italy, the capital of the province of the same name, is situated on a plain on the river Tánaro, and on the railway from Turin to Genoa, 46 miles E. S. E. of Turin. It was built by the Lombard League in 1168 to serve as a bulwark against Frederick Barbarossa. Its present name was given to it in honor of Pope Alexander III. It was called Cesarea for a time, and was unsuccessfully besieged in 1174 by Frederick Barbarossa. By the Peace of Utrecht it was ceded to Savoy, having belonged at different times to the houses of Montferrat and Milan. Bonaparte greatly enlarged and strengthened its fortifications during the French occupation (1800–14). The citadel of Alessandria was taken in 1849 by the Austrians after the battle of Novara. It is well built, has a cathedral, a royal college, several hospitals, and about fourteen churches. Here are manufactures of silk, linen, and woollen goods, and other articles. Two miles S. E. of this place is the village and battle-field of Marengo, where Napoleon defeated the Austrians in 1800. The citadel is regarded as one of the largest and strongest fortresses in Europe. Pop. of commune in 1881, 62,464.

Aleu'tian (or **Aleu'tan**) **Islands,** a group of 150 or more islands, sometimes called the **Catharine Archipelago,** in the North Pacific, extending in a row from the peninsula of Alaska toward the S. point of Kamtchatka. They were discovered in 1728 by Behring, and were carefully explored by Captain Krenitzin in 1760. In 1878, Captain Cook surveyed the E. part of the group. They are rocky and volcanic, having some active volcanoes, and are inhabited by rude natives, who subsist by fishing and hunting. The rock is covered only with a thin layer of argillaceous soil. The vegetation is very insignificant, and agriculture is almost completely unknown. The climate is harsh, subject to sudden changes, and very unfavorable to cultivation. Few trees are found on the islands, only some stunted shrubs of birch, willow, and alder. The inhabitants are of a race essentially Esquimaux. They are small, but well shaped, with swarthy faces, black eyes, and straight black hair. By Russian missionaries they have been converted to Christianity, but their religious and moral ideas are very little developed. They are described as unchaste, unreliable, and entirely destitute of self-control. These islands are part of Alaska and belong to the U. S. They are divided into three groups—the Aleutian, nearest to Kamtchatka, the Andreanov or Andreanovian, the middle group, and the Fox Islands, nearest to Alaska. Onemak or Unimak, the largest of the Fox Islands, is about 50 miles long. The seal, the sea-otter, and the Arctic fox are the chief prizes of the chase. Pop. about 8000.

Ale′wife [supposed to be a corruption of the Indian name *aloof*], (the *Alo′sa tyran′nus*), a species of American fish, belonging to the family Clupeidæ, and nearly allied to the herring and the shad. It abounds in the Chesapeake Bay, and is found along the Atlantic coast of the U. S. As many as 5000 barrels have been caught in one year in the waters of Massachusetts. In the spring the alewives ascend the rivers to deposit their eggs.

Alexander [Gr. Ἀλέξανδρος; surnamed THE GREAT, the third Macedonian king of the name, the most famous of all military heroes, was the son of Philip, the celebrated king of Macedon, and Olympias, the daughter of the king of Epirus, who claimed descent from Achilles. At the age of fifteen, Alexander was placed under the instruction of Aristotle, and soon distinguished himself by his rare intellectual powers and by his rapid advancement in every kind of knowledge. His descent from Achilles, for whose character and achievements he cherished an enthusiastic and misplaced admiration, appears to have given his mind an early direction towards military glory. Among all books the "Iliad" was his favorite, and we are told that every night a copy of that poem was placed, along with his sword, under his pillow. King Philip had such confidence in his son's courage and capacity that he left him, although only sixteen years of age, the regent of his kingdom during his expedition against Byzantium. At the age of eighteen years, Alexander greatly distinguished himself in the battle of Chæronea, and the victory won by the Macedonians on that occasion was due, in no small measure, to the valor of the young prince. On the death of Philip, in 336 B. C., Alexander, not yet twenty years of age, succeeded to the throne. Several of the states which his father had subjugated deemed this a favorable opportunity for recovering their liberty, but the courage and celerity of Alexander defeated all their schemes. While, however, the young king was engaged in reducing the Triballi, the Thebans raised the standard of revolt. He instantly directed his march towards Bœotia; Thebes was taken by storm, the houses were levelled to the ground, and the citizens who had escaped slaughter in the assault sold as slaves, excepting only the posterity of Pindar, the celebrated Theban poet, and those who had opposed the rebellion. Not long after, at an assembly of the Grecian states held at Corinth, Alexander was chosen generalissimo of the Greek and Macedonian troops destined for the invasion of Persia. Early in the spring of 334 B. C. he entered Asia with an army of about 35,000 men, including 4500 cavalry. At the river Grani′cus the Persians sought to prevent his passage. The Macedonians, though fighting at a great disadvantage, gained a signal victory. At Gordium he attempted to untie the famous knot, for he had been told that the empire of the world had been prophesied to him who should succeed in this attempt. But having for some time tried in vain, he at last drew his sword and cut it, saying that this was the only way to untie it. It is said that those whose office it was to decide upon the interpretation of the prophecy, either sincerely or from motives of policy, declared that the Macedonian king had fulfilled it. Having received reinforcements in 333 B. C., he engaged Darius, the Persian king, who commanded at the river Issus an army of 600,000 men. The Persians were defeated with immense slaughter; the mother, wife, and two daughters of Darius were taken captive, but were treated with the greatest respect and kindness by the conqueror. After this great success scarcely any of the cities of Asia presumed to offer resistance to his victorious arms. But Tyre, then a powerful maritime and commercial city, had the courage or temerity to oppose his progress. The city was taken after a most determined resistance, which lasted seven months, but the conqueror fixed an indelible stain upon his reputation by his merciless cruelty towards the conquered Tyrians, thousands of whom were cruelly slaughtered, and the rest, numbering nearly 30,000, were sold into slavery. Gaza soon after met with a similar fate. Alexander then advanced into Egypt, where the people, weary of the Persian domination, welcomed him as a liberator. In Egypt, on one of the principal mouths of the Nile, he founded a city called Alexandria.

He next visited the temple of Jupiter Ammon, situated on an oasis in the desert of Libya, with the hope, it is said, that the god would acknowledge him to be his son. This having been done through the priest of the temple, he again turned his thoughts to the invasion of Persia, where Darius had succeeded in collecting another army of more than a million men, with not less than 40,000 cavalry. Alexander had scarcely more than 40,000 infantry and 7000 horse. The opposing armies met at Gaugamela, not far from Arbela, in 331 B. C. The Persians were defeated with prodigious slaughter. Not long afterwards, Darius was murdered by Bessus, one of his satraps. As the dying king, covered with wounds, lay extended in his chariot, Alexander came up; at the tragic spectacle the conqueror could not restrain his tears. He caused the body of Darius to be taken to Persepolis, where it was interred in the tombs of the Persian kings. Bessus having been taken and put to death, Alexander carried his victorious banners beyond the Jaxartes (now called the Sihon, or the Sir Daria), subdued Sogdiana, and married Roxana, the daughter of a Bactrian prince whom he had conquered. After this he turned his thoughts to the invasion of India. He crossed the Indus 327 B. C., formed an alliance with Taxiles (or Taxilus, as the name is sometimes written), an Indian king, and advanced to the banks of the Hydaspes (now the Jhylum), where he encountered Porus at the head of an immense army, accompanied by a multitude of elephants. After a sanguinary battle, the Indian king was totally defeated and taken prisoner. Alexander's favorite horse, Bucephalus, having been mortally wounded in this battle, the conqueror founded a town on the spot where he was buried, which he called Bucephala. Taking one city after another, he had advanced as far as the Hyphasis (now called Gharra), when his troops, alike uninfluenced by his menaces and his entreaties, positively refused to go any farther. Being thus under the necessity of returning, he committed the fleet which he had ordered to be built on the Hydaspes to Nearchus, while he himself proceeded by land through what is now Beloochistân to Susa. His army encountered in this march incredible hardships and suffering, so that many soldiers perished from thirst and hunger. Having arrived at Susa, he married as his second wife a daughter of Darius. As he was forming schemes for the extension and improvement of his empire, he died, 323 B. C., at Babylon, in the thirty-third year of his age.

It would be unjust to Alexander to regard him merely as a great and successful military hero. He possessed some moral qualities of a high order, especially generosity and magnanimity. Many of his views of state policy were liberal and enlightened. But all that was most excellent and admirable in his character was impaired and vitiated by mistaken ideas of the dignity and glory which belonged to a great king. As his passions were stronger than his intellect, extraordinary as the latter undoubtedly was, they gradually acquired, during his long career of uninterrupted success, an almost unlimited ascendency over him. His uniform prosperity may be said to have been his greatest misfortune. Being a stranger to the "sweet uses of adversity," it was impossible for him to see his own character and conduct in their true light. After his unparalleled successes had turned his brain, regarding himself as little less than a god, he could not brook the slightest freedom of speech, even from his most faithful and most meritorious officers. In a paroxysm of ungovernable rage he slew his friend and foster-brother Clitus, who had once saved his life, after which a grief, scarcely less violent than his anger had been, took possession of his soul, so that if he had not been restrained he would probably have taken his own life. Pope (in "The Temple of Fame") sums up his career and character in one short line—

> "The youth who all things but himself subdued."

(See ARRIAN'S "History of Alexander's Expeditions;" QUINTUS CURTIUS'S "Life of Alexander;" WILLIAMS'S "Life and Actions of Alexander the Great," 1829; DROYSEN, "Geschichte Alexanders des Grossen von Macedonien," 1833; GEIER, "Alexandri Magni historiarum scriptores ætate suppares," containing the fragments of contemporaneous historians, 1844; THIRLWALL'S "History of Greece.")

J. THOMAS.

Alexander I. (Pope), SAINT, a Roman by birth, became bishop of Rome in 108 A. D. Died in 119.—ALEXANDER II. (ANSELMO BADAGIO) was elected pope in 1061. He declared William the Conqueror the true heir to the English crown. Died in 1073.—ALEXANDER III. (ROLANDO RANUCCIO BANDINELLI), one of the ablest men that ever sat on the papal throne, was a native of Sienna. He was elected pope in 1159. He was involved in a long contest with Frederick Barbarossa, and with the anti-popes who were supported by that emperor. Having been twice compelled by his enemies to leave Rome, he was in 1163 acknowledged pope by a council at Tours. The emperor, whom he had excommunicated in 1167, made his submission soon after the battle of Legnano, and was absolved. Thomas à Becket, who had been encouraged by Alexander in his resistance to Henry II. of England, was, after his assassination, canonized by the pope. According to Voltaire, Alexander proclaimed that no Christian should be held as a slave. He is said to have been the first who reserved to the Holy See the right of canonization. Died Aug. 1, 1181. (See

Reuter, "Geschichte Alexanders III. und der Kirche seiner Zeit," 1860, 2 vols.)—Alexander IV. (Rinaldo di Anagni) became pope in 1254. Died May 12, 1261.—Alexander V. (Pietro Filargo) was chosen pope in 1409. Died May 3, 1410.—Alexander VI. (Rodrigo Lenzuoli Borgia), born at Valencia, in Spain, in 1430, was a nephew of Pope Calixtus III. Before his election to the papacy he had several illegitimate children, among whom were the infamous Cæsar and Lucretia Borgia. He became a cardinal in 1456, and was chosen pope in 1492. Among the events of his pontificate was the death of Savonarola. Died Aug. 18, 1503. His character was an infamous compound of cruelty, treachery, licentiousness, and other vices.—Alexander VII. (Fabio Chigi) was born at Sienna Feb. 13, 1599, and became pope in 1655. He embellished Rome with architectural works. Died May 22, 1667.—Alexander VIII. (Pietro Ottoboni) was born in Venice April 19, 1610, and elected pope in 1689. He assisted the Venetians in a war against the Turks. Died Feb. 1, 1691.

Alexander I., king of Scotland, a younger son of Malcolm Canmore, began to reign in 1107. He was an able ruler. He died in 1124, and was succeeded by his brother, David I.—Alexander II., born in 1198, succeeded his father, William the Lion, in 1214. He married a sister of Henry III. of England in 1221. He is said to have been a wise and able prince. Died in 1249.—Alexander III., of Scotland, born in 1241, was a son of the preceding, and became king in 1249. He married, in 1251, Margaret, a daughter of Henry III. of England. His reign was peaceful and prosperous. He fell with his horse over a precipice, and was killed in 1286.

Alexander I. (or **Alexan′der Pav′lovitch**), emperor of Russia, the son of Paul I. and Maria, a princess of Würtemberg, was born at St. Petersburg in Dec., 1777. He married, in 1793, Elizabeth, a daughter of the crown prince of Baden, and succeeded his father, who was assassinated in Mar., 1801. He promoted civilization, education, industry, and trade. His foreign policy was pacific until he joined a coalition against Napoleon in 1805. In December of that year the Russian and Austrian armies were defeated at Austerlitz. After the Russian armies had sustained several other defeats, the war was ended by the treaty of Tilsit in 1807. Alexander then became the friend and ally of Napoleon, and declared war against England. But, alarmed by the insatiable ambition of Napoleon, he resolved on a change of policy, and formed an alliance with England and Sweden. Russia was invaded in 1812 by Napoleon, who took Moscow, but his army was soon compelled to retreat, and nearly all perished with cold and hunger or were taken prisoners. After the abdication of Napoleon, Alexander entered Paris with the victorious armies in 1814, and exhibited more generosity and clemency towards the French than the other allies showed. He again entered Paris in triumph in July, 1815, and in the same year formed, with the emperor of Austria and the king of Prussia, a coalition called "the Holy Alliance," the tendency of which was reactionary and hostile to the cause of liberty. The professed object of this alliance was to promote religion and peace. As he advanced in years he became more contracted and less liberal, a prey to hypochondria and suspicion. His projects of reform were abandoned, a rigid censorship of the press was maintained, and all liberal or progressive tendencies were repressed. He died without issue at Taganrog, Dec. 1, 1825, and was succeeded by his brother Nicholas. (See Russia.)

Alexander II. (Alexander Nikolaiewitch Romanoff), emperor of Russia, the fourteenth sovereign of the reigning dynasty, the eldest of the czar Nikolas's four sons, was born on the 29th of April, 1818. His education was intrusted, under the czar's own close inspection, almost exclusively to native Russians, foremost among whom stood the poet Joukovski, the generals Kavelin and Fredericks, and, before travelling abroad, the prince was sent on a progress through European Russia in order to acquaint himself with the country. He subsequently visited Germany, Italy, and England, and on his return, bringing back with him a host of new impressions, he was admitted, only a lad of eighteen, to the czar's conferences with his native ministers and foreign envoys. Five years later, on the 28th of April, 1841, at the age of twenty-three, he married the grand duchess of Hesse-Darmstadt, called by the Russians Maria Alexandrowna ("Mary, the daughter of Alexander").

Alexander II. ascended the throne on the 2d of March, 1855, during the Crimean war, which Russia had waged against France, England, and Turkey. He ended the war as soon as possible, but several years were required to restore the empire to its normal condition. In 1861 followed the serf emancipation, which prominently brought the new czar before the world and earned him his popular title of "the Liberator;" in 1863 followed the Polish rebellion, which was put down with wanton cruelty, the czar placing the destiny of the Polish people in the hands of men equally devoid of mercy and of justice—the Count de Berg and Mouravieff, the latter known by the nickname of "the Hangman." But, with this single exception of the Polish war, the nine years which elapsed after the abolition of serfdom became the brightest in the Russian history of the nineteenth century. Military colonies, oppressive statutes, all kinds of crippling restrictions, were abolished. The press began to make itself heard. Immigration was encouraged, agriculture developed, foreign inventions were adopted, foreign authors and institutions studied. Female education received a sudden impetus, and the senseless restrictions on travel were removed. On the 27th of Sept., 1866, landed Princess Dagmar of Denmark, the bride-elect of the hereditary grand duke, and in 1867 the czar himself appeared at the Paris Exhibition. Meanwhile, the works of national reform followed each other—the redistribution of land, the development of the railway system, the establishment of trial by jury, the abridgment of military service, and many others.

But reaction was not slow to appear. The revolutionary attitude of the five great universities of St. Petersburg, Moscow, Kieff, Dorpat, and Kazan, and the ill-timed petition of Moscow for free trade and the liberty of the press, startled the government into the belief that it had gone too far. At the same moment, the terror of victorious Germany from without, and that of the Nihilist conspiration from within, appeared to necessitate an immediate increase of strength, and in an instant all was changed.

But even this violent change could not deprive Russia of the substantial progress which she had already made. At the czar's accession, in 1855, she possessed only 419 miles of railway; in 1870 she could count 7123. In 1855 the total number of factories in European Russia was 17,536, representing a yearly value of 350,000,000 rubles ($262,500,000); the estimates for 1870 gave 23,721 factories, producing annually 500,000,000 rubles. In 1855, Russia's export trade averaged $30,000,000; in 1870, $256,500,000. The term of military service extended in 1855 over the enormous space of twenty-five years, while in 1870 it was limited to ten years. The press, the bar, the local administration, had all been considerably remodelled, and the village schools began to raise the 49,000,000 Russian peasants from mere soulless beasts of burden into thinking and reasoning men.

Only for a time the newly-awakened spirit of the country was diverted from the channel of home reform into that of foreign conquest. On Oct. 31, 1870, when neither England, France, nor Turkey was able to resist, Prince Gortschakoff informed the various cabinets that Russia felt compelled to deviate from the stipulations of the Treaty of Paris and keep a fleet of sufficient capacity in the Black Sea. The Khiva expedition of 1873 completed the conquest of Central Asia, and the Montenegro troubles of 1874, the Herzegovian insurrection of 1875, were appeals to Russia to gird herself for a fresh crusade against the Crescent. In April, 1877, the war of liberation began. The czar returned to St. Petersburg in triumph, but a triumph which was not unalloyed. The war-burdens were enormous. Russia was compelled to make considerable modifications of her first programme, and Austria's complete occupation of Bosnia irritated the Panslavists. Thus all things combined to produce a fresh explosion of the spirit of Nihilism, and a season of uprisings, assassinations, and terror ensued.

Nihilists (from Lat. *nihil*, "nothing") is a term, so far as is known, first employed by the great Russian poet Ivan Turgenieff to designate a secret revolutionary party in Russia attempting to destroy the existing order, yet without substituting any scheme of a new and better organization, or, to use the words of their great prophet, Michael Bakunin (which see), to destroy and annihilate everything as it now exists, because "if but an atom of the old world remains the new one will never be created." The party is made up of persons of every class. The red republicans, socialists, communists, form the bulk of the Nihilist party, while to these are added people disgusted with the prevailing corruption, every kind of exalted and unruly spirits, persons of the higher—nay, the highest—classes, who, not being possessed of sufficient power to carry their wants and projects into effect, seek to accomplish by secret plottings what they had not been able to bring about by legal means. Thus the conspiracy permeates the whole of society, embracing on one hand spirits of the highest intelligence, who only want the most healthful improvements (as representative assemblies, responsibility of officers to the law, etc.); on the other hand, the most radical criminals, who want destruction and annihilation at any price.

This movement was a legacy bequeathed to the czar by his father. The existence of secret political societies had made its first appearance in December, 1825, when, at the beginning of the reign of Nikolas I., an insurrection broke out which aimed at overthrowing the czardom and establishing a constitutional form of government. But the first definite manifestation of the Nihilist movement was the revolutionary journal started at Geneva in 1850 and afterward transferred to London. (See HERTZEN, ALEXANDER.) The disasters of 1854–55 gave fresh point to its unsparing attacks, and from a mere declamatory protest it grew into an organized rebellion.

Nihilist societies began to be formed in 1859 among the students of the Agricultural College of Petrovski, near Moscow. In the summer of 1862, St. Petersburg was ablaze for weeks together with incendiary fires, seditious pamphlets, and menacing inscriptions. The czar's own life was attempted by Karakozoff in April, 1866, and by Berezowski in August, 1867, and a third attempt was made in his own palace by half severing the chain of the elevator in which he was about to ascend. In 1871, Sergi Netchayeff, an ex-professor of Moscow, headed an extensive conspiracy, and in the ensuing year the five great universities planned a simultaneous outbreak. The existence of those revolutionary conspiracies was plainly established in 1877, when, after a great trial lasting eighteen months, one hundred and thirty-five persons were found guilty of belonging to such an organization. Soon after the trial of Vera Sassulitch in 1878 for shooting at General Trepoff, chief of the secret police, the Nihilists began to attract attention all over the world as a really formidable organization. Her acquittal by a jury of presumed responsibility and conservatism, after she had avowed the offence and in the face of evidence and the law, seemed to excite them to activity. A fourth abortive attack upon the czar ensued, the successor of General Trepoff, General Mezentzoff, was assassinated, the governor of Kharkow, Prince Krapotchkin, was shot, and so was General Drenteln, chief of the gendarmerie. Useless and barbarous severities from the government served the cause of the Nihilists far better than any efforts of their own. The number of their victims went on increasing. Terror was spread all over the country; on a period of murder followed a period of arson, and terrible conflagrations devoured whole towns and enormous amounts of property.

All these troubles preyed upon the health and spirits of the czar. The Afghan complications of 1878–79, the devastation of Russia by famine, pestilence, and fire, and the terrible financial crisis which reduced the ruble from its normal value of 75 cents to 45½, contributed to undermine his failing health. In his domestic life two events of importance, meanwhile, occurred—the death of the czarina on June 3, 1880, and his marriage, after a short interval, to the princess Dolgorouki.

The crimes and terrors of the Nihilists culminated as on March 13, 1881, Alexander II. was killed in the streets of St. Petersburg. While returning from a parade about two o'clock in the afternoon, in company with his brother, the grand duke Michael, a bomb was thrown under his sleigh; but its explosion did no further damage than to shatter the back of the vehicle. The brothers immediately alighted, when another bomb was thrown, which exploded at the emperor's feet, mutilating his legs below the knees in a terrible manner and inflicting other serious injuries. The wounded monarch was conveyed to the Windsor Palace, where, in the course of an hour and a half, he expired, surrounded by the members of the imperial family.

Alexander III., emperor of Russia, was born Feb. 26 (March 10, New Style), 1845, the second son of Emperor Alexander II. After the death of his elder brother, Nicholas, in 1865, he became the heir-apparent to the throne, and married, on Nov. 9, 1866, the princess Maria Dagmar (on her rebaptism into the Eastern Church called Maria Tedarovna), daughter of Christian IX., king of Denmark. The czar has been educated at Russian universities, and has received an education as thorough as was possible in Russia. In 1877 he was in command of the army of Biela, but in that capacity he did nothing of note, and was finally superseded. Toward the end of 1879 he came to an open rupture with his father. The czar then informed the czarovitch that during his reign not a single constitutional experiment ought to be made, and the son's reply was that his father had no right to compromise the future of the dynasty by denying reforms which were demanded by many ministers and generals, the administrative senate, and most of the army.

Alexander III. ascended the throne Mar. 1, 1881 (Mar. 13, New Style), on the assassination of his father. He has five children, among whom the grand duke Nicholas, born May 6 (May 18), 1868, is the heir-apparent. Alexander III. was crowned at Moscow, May 27, 1883.

Alexander (ARCHIBALD), D.D., an eminent divine, born near Lexington, Rockbridge co., Va., April 17, 1772. He became president of Hampden-Sidney College in 1796, and pastor of a Presbyterian church in Philadelphia in 1807. In 1812 he was chosen the first professor of the Theological Seminary of Princeton, N. J., then just founded. He was distinguished as a pulpit orator and as a writer on theology. Among his works are "Outlines of the Evidences of Christianity" (1824), a "History of the Israelites," and "Outlines of Moral Science" (1852). The first of these works has been translated into several languages. He married, in 1802, Janetta Waddell, a daughter of a well-known blind preacher. Died Oct. 22, 1851.

Alexander (BARTON STONE), an American officer, born in 1819 in Kentucky, graduated at West Point 1842, and Mar. 7, 1867, lieutenant-colonel of engineers. He served as assistant engineer, repairing fortifications, 1842–47, in the war with Mexico 1848, at the Military Academy as treasurer and erecting buildings 1848–52, constructing military asylum (Soldiers' Home) near Washington, D. C., 1852–55, altering Smithsonian Institution 1854, building Chelsea Marine Hospital, Mass., 1855–59, and erecting Minot's Ledge lighthouse, entrance to Boston harbor, 1855–61. In the civil war was aide-de-camp, with the rank of lieutenant-colonel, chiefly employed in the construction of the defences of Washington, D. C., 1861–66, in Manassas campaign 1861, engaged at Blackburn's Ford and Bull Run (brevet major), in Virginia peninsula campaign 1862, engaged at Yorktown (brevet lieutenant-colonel), West Point, Chickahominy, Fair Oaks, Gaines's Mill, and Golden's Farm, as consulting engineer of Major-General Sheridan's army in Shenandoah Valley 1864, present at Cedar Creek, and in preparation of bridge equipage, devising defensive works, and member of various boards 1861–66. He was made brevet col. and brig.-gen. 1865 for meritorious services. After the war he had charge of public works in Maine till 1867, when he became senior engineer and member of Pacific board of engineers for fortifications. Died Dec. 16, 1878. GEORGE W. CULLUM.

Alexander (JAMES EDWARD). See APPENDIX.

Alexander (JAMES WADDELL), D.D., an eminent divine, was born near Gordonsville, in Louisa co., Va., Mar. 13, 1804. He graduated at Princeton in 1820, and became in 1833 professor of rhetoric at the College of New Jersey (Princeton). From 1844 to 1849 he was pastor of the Duane street Presbyterian church in New York. From 1849 to 1851 he was professor of church history in the Princeton Theological Seminary. In 1851 he took charge of the Fifth avenue Presbyterian church in New York City, and died July 31, 1859. He was a man of various culture, and had uncommon unction and power as a preacher. He published numerous articles in the "Princeton Review," and a number of volumes, such as "Discourses on Christian Faith and Practice" and "Sacramental Discourses."

Alexander (JOHN HENRY), an American savant, born at Annapolis, Md., in 1812, published a "Treatise of Mathematical Instruments" (1835), "Contributions to the History of Iron" (1840), "Introits" (1844), "Dictionary of Weights and Measures" (1850), "International Coinage" (Oxford, 1857), and other works. Died at Baltimore Mar. 2, 1867. (See his Life by W. PINKNEY, 1867.)

Alexander (JOSEPH ADDISON), D.D., was born in Philadelphia April 24, 1809. He graduated at the College of New Jersey in 1826. He was chosen adjunct professor of Latin in 1833. In 1838 he went into the Theological Seminary as associate professor of Oriental and biblical literature, and in one chair and another continued to serve the institution till his death at Princeton, Jan. 28, 1860. He made extraordinary attainments in the Semitic and other languages. He was also an impressive preacher. He wrote much for the "Princeton Review." His móst important works are commentaries: "Isaiah" (2 vols. 8vo, 1846), "Psalms" (3 vols. 12mo, 1850), "Acts" (1 vol., 1857), "Mark" (1 vol., 1858). "Matthew" was published posthumously in 1860.

Alexander (NATHANIEL), born in Mecklenburg, N. C., in 1756, graduated at Princeton in 1776, served in the Revolutionary army, and afterwards practised medicine. He was member of Congress (1803–05) and governor of North Carolina (1805–07). Died at Salisbury, N. C., Mar. 8, 1808.

Alexander (STEPHEN), LL.D., a distinguished astronomer, born at Schenectady, N. Y., Sept. 1, 1806, graduated at Union College in 1824. He was professor of astronomy at College of New Jersey, 1840–77, and obtained in 1854 an additional chair of mechanics. He acquired distinction as a writer on astronomy. Died June 26, 1883.

Alexander (WILLIAM), earl of Stirling, a Scottish poet, born in 1580. He wrote, besides several dramas, a didactic poem entitled "Doomesday" (1614), which was much admired. He was appointed secretary of state for Scotland in 1626. Died in 1640.

Alexander (WILLIAM), styled LORD STIRLING, an American general, born in New York in 1726. He claimed the earldom of Stirling, but did not succeed in obtaining the estate belonging to it. Having espoused the popular cause in the Revolution, he served with distinction at Long Island, Germantown, and Monmouth, and obtained the rank of major-general. Died Jan. 15, 1783.

Alexander (WILLIAM LINDSAY), D. D. See APPENDIX.

Alexan'der Ba'las, a usurper of the throne of Syria, was a person of low origin, and lived in the second century B. C. He pretended to be the son of Antiochus Epiphanes, and with the aid of Rome and several Greek princes, defeated his rival Demetrius Soter in 150 B. C., and Demetrius was killed in the flight. After a short reign he was defeated by his father-in-law, and in 146 B. C. was murdered by an Arabian emir with whom he had taken refuge.

Alexander Jannæus, king of the Jews 104–78 B. C., was the third son of John Hyrcanus, and received from his subjects the surname THRACIDES ("as cruel as a Thracian"). His reign was an almost uninterrupted series of revolts and massacres; and when once, in despair, he asked the people what he should do to please them, he was answered, "Kill yourself." His wife, Alexandra, succeeded him, and reigned, by the aid of the Pharisees, in peace.

Alexander John I., prince of Rumania, born Mar. 20, 1820, was elected in 1858 to the assembly of Moldavia, became in the same year minister of war of the united principalities, was elected in 1859 first prince of Moldavia, and then prince of Wallachia, in both cases by a unanimous vote, but had to pledge himself to complete the union of the two principalities, and then resign in favor of some European prince. But he was not recognized by Turkey until Dec. 23, 1861, as prince of both principalities, on which day the union of the two principalities under the name of Rumania was proclaimed. But in consequence of several unpopular measures the most prominent men of Rumania planned a revolution, and in the night of Feb. 23, 1866, entered his apartments and forced him to sign his resignation. After that time he lived in Vienna as a private citizen. He died in 1873.

Alexander Karageorgevitch, prince of Servia, the son of CZERNY GEORGE (which see), the first prince of Servia, born Oct. 11, 1806. After the death of his father he lived for several years in a kind of exile in Wallachia, but finally obtained permission from Prince Michael Obrenovitch to return to Servia, and was even appointed his aid-de-camp. After Prince Michael's death he was elected prince of Servia in 1842. Russia protested against his election, but Mar. 27, 1843, he was again elected, and this time by a unanimous vote. The policy he pursued was one of peace. In spite of Russian and Austrian intrigues, he succeeded in keeping clear of any serious embroilment; even in 1853 he preserved neutrality, in spite of the internal excitement prevailing in the country. Meanwhile, a complete system of primary education was established; the finances of the state were brought in order; good roads were built, giving access to new markets; and in ten years the exportation of the country more than doubled. In consequence, however, of his peace policy toward the foreign powers, he became obnoxious to the people, and was deposed Dec. 11, 1858. In 1868 he was accused of complicity in the murder of Prince Michael, his successor, and was sentenced in 1871 by the authorities of Austria, where he had resided since his deposition, to eight years' imprisonment and the costs.

Alexan'der Nev'ski (or **Nev'skoi**), a Russian prince and hero, born in 1219, was a son of the grand duke Yaroslaf II. He gained in 1240 a signal victory over the Swedes on the Neva; hence his surname. On the death of his father, about 1246, he became grand duke of Vladimir. Died in 1263. By the Russians he is regarded as a saint. In his honor Peter the Great in 1712 built the Alexander Nevski monastery in St. Petersburg, on the spot where the hero and saint is said to have gained his great victory. The monastery is one of the greatest and richest institutions of the kind, forming a whole city by itself, and having nine churches, a theological seminary for 1000 scholars, the residence of the metropolite of St. Petersburg, etc.

Alexan'der of Aphrodis'ias, a celebrated Greek commentator on Aristotle, lived at about the close of the second century after Christ. Like his masters, Herminus and Aristocles the Messenian, he tried to free the Peripatetic philosophy from the syncretism of Ammonius and others, and to restore the true interpretation of Aristotle.

Alexander of Hales. See HALES.

Alexan'der Seve'rus, a Roman emperor, born about 205 A. D. His original name was ALEXIANUS BASSIANUS, but when upon his removal to Rome he was created cæsar, pontiff, consul, and *princeps juvenis* elect by his cousin, the emperor Elagabalus, he assumed the name M. AURELIUS ALEXANDER, and added SEVERUS afterwards. In 222 A. D., upon the death of his cousin, Alexander was proclaimed emperor by the prætorians, and confirmed by the senate. In 232 he gained a great victory over the Persians; in 234 he marched into Gaul against the Germans, but was waylaid and murdered by some mutinous soldiers in 235.

Alexan'dra (CAROLINE MARIE CHARLOTTE LOUISE JULIE), princess of Wales, a daughter of Christian IX., king of Denmark, was born in 1844. She was married in Mar., 1863, to Albert Edward, prince of Wales.

Alexan'dria [classical accentuation, *Alexandri'a*; Gr. Αλεξάνδρεια], an ancient and celebrated city and seaport of Lower Egypt, named from Alexander the Great, by whom it was founded in 332 B. C. It was situated on a low and narrow tract which separates Lake Mareotis from the Mediterranean, near the western mouth of the Nile, and 117 miles N. W. of Cairo. Lat. of Pharos, the Alexandria lighthouse, 31° 12′ 9″ N., lon. 29° 53′ E. Soon after its foundation it became the capital of the Grecian kings who reigned in Egypt, and one of the most populous and magnificent cities in the world. It was a great emporium of commerce, for which its position between Europe and India was very advantageous. Before, as well as after, the Christian era this city was a celebrated seat of learning and philosophy. Here was founded the greatest library of antiquity (see ALEXANDRIAN LIBRARY), and the celebrated Museum. Among the principal edifices was the Serapeion, or temple of Serapis. In front of the city stood a famous lighthouse called Pharos, on an island of the same name. It is supposed that during its greatest prosperity Alexandria had 600,000 inhabitants, a majority of whom were Greeks and Jews. Even after Egypt had been conquered by the Romans, this city was second only to Rome in size and importance. About the period 300–640 A. D. it was a great focus of Christian theology and sectarianism. It was captured by the Saracen caliph Omăr about 640, and then its prosperity declined. The discovery of a passage to India by the Cape of Good Hope (1497) aided in its ruin, and the population in 1778 was only 6000. The chief remains of its ancient grandeur are —a granite monolith erroneously called Pompey's Pillar; the Catacombs; and two obelisks named Cleopatra's Needles—one of these obelisks was taken to London, England, in 1877–78, and the other was presented to the U. S. by Ismail Pasha, and was taken to New York City in 1880.

The modern city, which again became populous and important, is built near the site of the ancient, and on a mole or isthmus connecting the main land with the island of Pharos. It is connected with Cairo by a canal and railway, and with Suez by a railway, which is continued from Cairo. In consequence of steam navigation, Alexandria again became a great emporium of the commerce between Europe and India. The chief articles of export are grain, sugar, drugs, cotton, gums, rice, dates, and hides. Steamers ply regularly between this port and Brindisi, Malta, and Constantinople. Newspapers are published here in the Italian, Greek, and French languages. Pop. in 1885, 208,775; among whom there are many Greeks, Italians, French, Germans, and Swiss, and other foreigners. Its new artificial harbor, with a breakwater 2 miles long, commenced in 1871, is one of the most important works of the kind in the Mediterranean. In consequence of the Egyptian revolution headed by Arabi Pasha, and which broke out during the summer of 1882, culminating in the most revolting cruelties against the Christians, Alexandria was bombarded by the English, under Admiral Seymour, July 11 and 12, 1882. The forts defending the harbor were dismantled, and on July 13 the best part of the city was practically a mass of ruins.

Alexandria, a town of Russia, in the government of Kherson, 148 miles N. E. of Kherson. Pop. in 1882, 20,666.

Alexandria, Dak. See APPENDIX.

Alexandria, the capital of Rapides parish, La. (see map of Louisiana, ref. 9–C, for location of parish), is on R. R. and S. bank of the Red River, 196 miles by R. R. and 350 miles by water N. W. of New Orleans. It has a convent of the Sisters of Mercy and four prosperous institutions of learning, also a large trade in cotton, sugar, molasses and hides, etc. Pop. in 1870, 1218; in 1880, 1800.

Alexandria, on R. R., capital of Douglas co., Minn. (see map of Minnesota, ref. 7–B, for location of county), 142 miles W. N. W. of St. Paul. It has a U. S. land-office and steam grist and saw mills. The village is pleasantly situated on one of the many beautiful lakes which abound in its vicinity. Pop. in 1880, 1355; in 1885, 1834.

Alexandria, Jefferson co., N. Y. (see map of New York, ref. 2–G, for location of county), in a township of its own name, on the St. Lawrence River, 25 miles N. by E. of Watertown. Alexandria Bay (P. O. name) is a port which is visited by steamboats. It has a lighthouse. The township embraces a part of the Thousand Isles and is a great summer resort. It contains a glass-factory. Pop. of Alexandria Bay in 1880, 587.

Alexandria, city, important R. R. centre, port of entry, and capital of Alexandria co., Va. (see map of Virginia, ref. 4–I, for location of county), is pleasantly situated on the right bank of the Potomac, 7 miles below Washington. The river is here 1 mile wide, and forms a good harbor, which is deep enough for the largest ships. An extensive cotton-factory has been in operation for a number of years, with flouring-mills, machine-shops, plaster-mills, and other industries. The city is not now as prosperous as in its earlier years, when it was a considerable mart for foreign trade. It has an extensive coal-trade by the Chesapeake and Ohio Canal from the Cumberland region, a large number of vessels being employed in the shipment of the product of the mines to Northern ports. Pop. in 1870, 13,570; in 1880, 13,659.

Alexan'drian Li'brary, the largest and most celebrated library of antiquity, was founded by Ptolemy Philadelphus, king of Egypt, about 275 B. C. He purchased many books at Athens, Rome, and other places. This library is said to have been partially destroyed by fanatical Christians about 395 A. D. According to some authorities, it was burned in 642 A. D. by order of the caliph Omăr, who argued that if books agree with the Koran they are unnecessary, if they differ they should be destroyed. (See RITSCHL, "Die Alexandrinischen Bibliotheken," 1838.)

Alexandrian (or **Alexandrine**) **School** is the name given to a certain type of thought and culture which began to prevail in Egypt about 300 B. C., and which exercised a palpable influence on Christianity, added a new chapter to the history of Greek philosophy, and produced even a hitherto unknown form of Judaism. In Alexandria the East and the West met for the first time peaceably, and even amicably, with each other, and compromises, often of the most curious description, were the natural results. All these various compromises—between the phantastic asceticism of India, the prophetic inspirations of Judaism, the imaginative reasoning of Greece, the positivism of the Romans, not to speak of the numerous minor peculiarities of spiritual character—had a certain character in common, which justly took its name after the place where it originated. But beyond this—an amalgamation of different civilizations, with the natural stimulus inherent in such a process—the Alexandrian school can hardly be said to have gone. It produced no new ideas; its ideas it always borrowed. But it tried new combinations, and the results were often very surprising; and the style in which it presented its thoughts was new and long-enduring. The intercourse of the Jewish and Greek colonists who had previously settled in that country had given rise to a blending of the peculiar religious ideas of each. The Gnostics, whose system was a mingling of Oriental with Christian thought, originated chiefly in Alexandria; and Philo-Judæus, the Jewish representative of Neo-Platonism, was also a native of that city. Athanasius, Gregory of Nazianzus, and other eminent Christian Fathers favored the Alexandrian School, and adopted to a certain extent the doctrines of the Neo-Platonists. This school was likewise renowned for the culture of mathematics and physical science, and numbered among its disciples Euclid, Aristarchus of Samos, and, according to some writers, Archimedes. The celebrated critic Aristarchus is said to have passed the greater part of his life in Alexandria, where he founded a school. With regard to correctness and elegance of expression the Alexandrian writers were highly distinguished, but they were deficient in life and spirit. In a school where imitation and rule took the place of inspiration, each generation became more artificial and lifeless than its predecessor, and both prose and poetry often became labored affectation. Special works on the history of the Alexandrine School have been written by MATTER, 2 vols., 2d. ed., 1840–44; BARTHÉLEMY ST.-HILAIRE (1845), and SIMON (2 vols., 1844–45).

Alexan'drine, a poetical metre or verse, formed of twelve syllables, which was first used by a French poet of the twelfth century, named Alexander of Paris. The second line of the following couplet from Pope's "Essay on Criticism," part ii., line 156, furnishes an example:

"A needless Alexandrine ends the song,
Which, like a wounded snake, drags its slow length along."

See also Virgil's "Georgics," iii., 424.

Alexandrine Age, a name applied to a period during which Alexandria was the principal centre of literature and science in the world. It extended from about 300 B. C. to 600 A. D., and was represented by many eminent grammarians and critics, who excelled in correctness and elegance of style, but were deficient in genius and originality.

Alexandro'pol (called also **Huenri** or **Guenri**), a fortified town of the Caucasus, in the government of Erivan, on the Arpa-Chai River, 85 miles S. W. of Tiflis. The fort, which lies about 2000 feet from the city, 300 feet above the level of the river, commands the entire vicinity, and can hold 10,000 men. Alexandropol is an important strategical point, as it is the key to Armenia. Pop. in 1882, 20,600.

Alexan'drov, a town of Central Russia, in the government of Vladimir, 70 miles W. N. W. of the city of Vladimir. It contains a convent founded by Ivan IV., who is said to have also established here the first printing-press in Russia. Pop. in 1882, 6779.

Alex'is (or **Alex'ius**) COMNENUS, the name of several emperors who reigned at Trebizond (Trapezus) in the thirteenth, fourteenth, and fifteenth centuries. They belonged to the same family as the Alexis Comnenus mentioned below.

Alexis (or **Alexius**) **I.,** COMNENUS, emperor of Constantinople, born in 1048. Having distinguished himself by his military talents, he was proclaimed emperor by his soldiers about 1080, in place of Nicephorus, who was then deposed. He showed himself an able and a crafty ruler. Some writers censure him for his failure to support the operations of the first Crusade, which occurred in his reign. He died in 1118, and was succeeded by his son John.

Alexis ALEXANDROVITCH, grand duke of Russia, a younger son of the emperor Alexander II., was born in Jan., 1850. He visited the U. S., making an extensive tour in 1872, and meeting nearly everywhere a warm reception among the Americans.

Alexis MICHAELOVITCH, czar of Russia, was born Mar. 10, 1629, and succeeded his father Michael in 1645. He promoted civilization and improved the laws. He was the father of Peter the Great. Died Jan. 29, 1676.

Alexis PETROVITCH, or PETROWITSCH, a Russian prince, a son of Peter the Great, was born in 1690. He showed such a hostility to the reforms of his father that the latter resolved to exclude him from the throne. While Peter was travelling in Western Europe in 1717, Alexis fled to Vienna and Naples. He was soon brought back, and condemned to death on a charge of treason or rebellion. He was found dead in prison July 7, 1718. Scarcely a doubt can be entertained that he was poisoned by the order of his father. His son Peter became emperor in 1727.

Alex'isbad, a watering-place of Germany, in the Harz Mountains, 9 miles from Ballenstädt, was established as a watering-place by the duke of Anhalt-Bernburg in 1810. It has two springs—the Selke spring, which contains no carbonates, and very little carbonic acid gas, but large quantities of chloride and sulphate of iron, and is only used for bathing; and the Alexis spring, containing carbonate of iron, is used for drinking. The scenery in the neighborhood is beautiful.

Alex'ius, SAINT, the son of a noble Roman, who lived at the time of Pope Innocent I. (402–416). He married at the wish of his father, but fled after the marriage, and after having lived for a long time as a hermit, he returned and devoted himself to a life of charity, and only made himself known a short time before his death. His life was dramatically treated in the Middle Ages.

Alfalfa. See LUCERN.

Alfalu, a town of Austria, in grand duchy of Transylvania. Pop. 5041.

Alfie'ri (VITTORIO), COUNT, the most popular Italian poet of his time, was born at Asti, in Piedmont, Jan. 17, 1749, and inherited a large fortune. He was sent to the Academy of Turin, in which he learned little, and which he quitted about 1764. Recoiling with disgust and resentment from the stupid pedantry and tyranny of his teachers, he plunged into dissipation and neglected the cultivation of his mind. He passed many years in travel, for which he had a strong passion, and visited nearly all the countries of Europe, impelled by morbid unrest and love of excitement, rather than a rational resolution to complete his education. He began his literary career by the drama of "Cleopatra," which was performed with applause in 1775. About this time he entered a more regular course of life, and devoted himself with passionate ardor to study and composition. It is stated that he commenced the study of Greek after he was forty years old. His literary success was promoted, as he affirms, by the influence of the countess of Albany, the wife of the Pretender Charles Edward Stuart. (See ALBANY, COUNTESS OF.) He passed many years in her society at Florence and Rome, and in France. He composed numerous tragedies, comedies, satires, and lyrical poems. His reputation is founded chiefly on his tragedies, among which we notice "Virginia," "Filippo II.," "Orestes," "Abel," "Mary Stuart," "Myrrha," "Octavia," and "Saul." His dramas, which display great energy of language and intensity of passion, and abound in noble sentiments, were well adapted to reform the national literature, which had become effete, insipid, and destitute of manly vigor. "The aim of his works," says Madame de Staël, "is so noble, the sentiments which the author expresses accord so well with his personal conduct, that his tragedies ought always to be praised as actions, even when they may be criticised as literary works." (*Corinne.*) Alfieri was liberal in politics, and ardently desired to improve the political and social condition of Italy by his writings. Among his works are an "Essay on Tyranny," five odes on the American Revolution, and his interesting Autobiography. He died at Florence Oct. 8, 1803. His complete works were published at Pisa in 22 vols. 4to, 1808. A new edition of his dramatic works was published by Milanesi (1855, 2 vols.). His life was written by TEZA (1861).

Alfon'sine (or **Alphon'sine**) **Tables,** the name of the astronomical tables prepared by the order of Alfonso X. of Castile and Leon, at a cost of 400,000 gold ducats—say, $800,000. They were published in 1252.

Alfon'so III. of Asturias, surnamed THE GREAT, began to reign in 866 A. D. He enlarged his dominions by victories over the infidels of Spain. Died in 901.

Alfonso I. of Castile (or **Alfonso VI.** of Leon), surnamed THE BRAVE, was a son of Fernando I. He became king of Leon in 1065, and of Castile in 1073. Aided by the famous Cid, he defeated the Moors in several battles. He died in 1109.—ALFONSO VIII. of Castile (sometimes called ALFONSO III.) was born about 1155, and became king in 1158. He defeated the sultan Mohammed An-Nâsir in a great battle in 1212. Died in 1214.—ALFONSO XI. of Castile, born in 1311, succeeded his father, Fernando IV., in 1312. He gained a great victory over the sultan Abool-Hassan at Tarifa in 1340. Died in 1350.

Alfonso X., king of Leon and Castile, surnamed EL SABIO ("the Wise"), was born in 1221. He succeeded his father, Fernando III., in 1252. He was one of the most learned men of his time, but he was not prosperous in political and military affairs; his reign was disturbed by rebellions. Under his auspices an excellent code of laws was given to Spain, and the Bible was translated into Castilian. Died April 4, 1284.

Alfonso I., king of Naples and Sicily, born about 1385, was a son of Fernando I. of Aragon, whom he succeeded in 1416. On the death of Joanna II., queen of Naples (1435), that kingdom was claimed by Alfonso and René of Anjou. After a long war between these rivals, Alfonso obtained the throne of Naples in 1442. He died June 27, 1458, and was succeeded by his son, Ferdinand I.

Alfonso [Port. *Affon'so*] **I.,** the first king of Portugal, born about 1100, was a son of Henry of Burgundy. Having gained a great victory over the Moors at Ourique in 1139, he assumed the title of king. He afterwards took Lisbon, and became master of all Portugal. He died Dec. 6, 1185, and left the throne to his son, Sancho I.

Alfonso XII., king of Spain, born Nov. 28, 1857, the son of Queen Isabel and of the Infante Francisco; was educated at the military academy of Woolwich, Eng.; on Dec. 31, 1874, Gen. Martinez Campos proclaimed him king; on Jan. 9, 1875, he landed at Barcelona and took command of the army; Jan. 23, 1878, he married Princess Maria de las Mercedes, b. June 24, 1860, youngest daughter of the duke of Montpensier; became a widower June 26, 1878, and married, in second nuptials, Nov. 29, 1879, Archduchess Maria Christina of Austria, b. July 21, 1858. King Alfonso XII. died at Madrid Nov. 25, 1885.

Alford (HENRY), D. D., an English poet and theologian, born in London in 1810. He became a fellow of Trinity College, Cambridge, in 1834, incumbent of Quebec street chapel, London, in 1853, and dean of Canterbury in 1856. His most popular poetical work is "The School of the Heart, and other Poems" (1835), which was highly commended by the "Edinburgh Review" for Jan., 1836. He gained a high reputation as a biblical critic by his edition of the Greek New Testament (1844–52). A revised edition of it appeared in 4 vols. (1859 *et seq.*). He published also a small volume entitled "The Queen's English," which attracted some attention. Died Jan. 12, 1871.

Alford (MICHAEL), born at London, England, in 1587, was a Jesuit, and wrote "Britannia Illustrata" (1641), concerning the ecclesiastical history of Britain. Died in 1651.

Al'fred, surnamed THE GREAT, written also **Ælfred, Alured,** or **Alvred** [Lat. *Ælfre'dus*], king of the West Saxons in England, was born in Berkshire in 848 or 849 A. D. He was a younger son of Ethelwolf, and succeeded his brother Ethelred in 871, when he found the country in a miserable condition. In the preceding reign the kingdom had been invaded and ravaged by an army of Danes, whom the Saxons were unable to resist. After the accession of Alfred these piratical incursions were continued or renewed, and nearly all of the kingdom was conquered by the Danes. Alfred was forced to flee from his court and conceal himself in the hut of a cowherd. Having by furtive measures raised a small army, he attacked and routed the Danes at Eddington in 878. Soon after this battle the Danish king Godrun (or Guthrun) surrendered himself, was converted to Christianity, and remained a peaceable subject of Alfred, who now directed his attention to civil affairs. He founded or improved the British navy, rebuilt cities and forts, established schools, compiled a code of laws, and reformed the administration of justice. In that age of ignorance he was distinguished as a scholar, as well as a patron of learning. He translated several works from the Latin into Anglo-Saxon. About 886 he was recognized as the sovereign of all England. His kingdom was again invaded in 894 by an army of Northmen under Hastings, who is said to have had a fleet of 300 ships. Alfred defeated them in several battles, and finally drove them out of the island. He died in 901, and was succeeded by his son, Edward the Elder. Alfred is regarded as the wisest and greatest of all the kings of England. He was, says Freeman, "a saint without superstition, a scholar without ostentation, a conqueror whose hands were never stained with cruelty, a prince never cast down by adversity, never lifted up to insolence in the day of triumph." (See also SHARON TURNER, "History of the Anglo-Saxons.")

Alfred (ERNEST ALBERT), duke of Edinburgh, is the second son of Queen Victoria of England, and was born Aug. 6, 1844; entered the royal navy Aug. 31, 1858; was married Jan. 21, 1874, to Grand Duchess Marie of Russia, the only daughter of Emperor Alexander II.

Alfred, on R. R., capital of York co., Me. (see map of Maine, ref. 11–A, for location of county), 32 miles W. by S. of Portland. It has manufactures of lumber and woollen goods, and contains a Shaker village. Pop. in 1880, 306.

Alfred, on R. R., Allegany co., N. Y. (see map of New York, ref. 6–D, for location of county), has an academy and is the seat of Alfred University, a Seventh-Day Baptist institution. Pop. of tp. in 1870, 1555; in 1880, 1526.

Alfred (or **Alured**) **of Beverley,** an English priest and historian, born about 1100. He wrote a history of Britain in Latin, an abridgment of Geoffrey of Monmouth.

Alfred Centre, N. Y. See APPENDIX.

Al'freton, a market-town and parish of England, in Derbyshire, 12 miles N. N. E. of Derby. It is supposed to have been named in honor of Alfred the Great. Pop. 13,885.

Al'gæ (the plu. of Lat. *alga*, a "sea-weed"), the scientific name of the sea-weeds, etc., a division of cryptogamous plants belonging to the class Thallogens, and comprising many species which grow in salt or fresh water, and are greatly diversified in form, size, and structure. Some are too small to be seen by the naked eye, while the stem of the "giant kelp" of the W. coast of America sometimes attains a length of from 1000 to 1500 feet. Having no true roots, they sometimes adhere to rocks or the sea bottom, and sometimes they float on the surface. Navigators sometimes meet with masses of gulf-weed (*Sargassum*) many miles in extent. An area of this kind in the Atlantic is said by Maury to be as large as the Mississippi Valley. There are several such areas in the ocean, called SARGASSO SEAS (which see). Algæ are cellular in structure, are useful as manure, and some species, like Irish moss, are used as food. Kelp or barilla, made by burning sea-weeds and other marine plants, yields soda and iodine. The Algæ proper are divided into three groups—the green-spored, the red-spored, and the brown-spored Algæ, each containing many orders. (See PHYCOLOGY.)

Algar'di (ALESSANDRO), an eminent Italian sculptor and architect, born at Bologna about 1600, studied design under the Caracci. His masterpiece in sculpture is a colossal work in relief in St. Peter's church, Rome, the subject of which is Pope Leo forbidding Attila to enter Rome. He was, according to some critics, equal or superior to any sculptor of his age. Among his works are statues of St. Philip de Neri and Innocent X. Died in 1654.

Algarot'ti (FRANCESCO), COUNT, an eminent Italian writer, born at Venice Dec. 11, 1712. He was a skilful connoisseur of the fine arts, and wrote, besides other works in prose and verse, "Letters on Painting," which are highly commended. He removed to Berlin, where he passed many years, enjoying the favor and intimacy of Frederick the Great, who gave him the title of count in 1740. He corresponded with Voltaire. Died at Pisa in 1764.

Algarovil'la, an astringent substance procured from a tree called *Juga marthæ*, found in New Carthagena, South America. It is a powerful agent for tanning leather.

Algar′ve, the southernmost province of Portugal, is bounded on the N. by Alemtejo, on the E. by Spain, and on the S. and W. by the Atlantic Ocean. Area, 1872 square miles. The surface is mostly mountainous. The main exports are wine, salt, dates, and other fruits. The chief towns are Faro and Lagos. Pop. in 1878, 205,901.

Algazza′li (Abu Hamed Mohammed). See Appendix.

Al′gebra [supposed to be derived from the Arabic *al*, "the," and *gabara* (or *jabara*), to "bind," to "consolidate"], an important branch of mathematics, sometimes called universal arithmetic, but it may be more properly described as a calculus of symbols. The symbols it employs are of three kinds: (1) those of quantity, known or unknown, which consist of ordinary numbers and letters of the alphabet; (2) those of operation, amongst which are +, −, ×, ÷, √, etc.; and (3) mere abbreviations for ordinary words. (See Sign.) The combination of these symbols according to fixed laws leads to algebraical expressions or formulæ, in which actual computations are indicated rather than performed. The universality of algebra as compared with arithmetic consists in the fact that in the latter, computations being effected as they arise, all traces of the intermediate steps are obliterated, and the result is applicable to a single case only; whereas in algebra the formulæ contain implicitly the answers to an unlimited number of questions. Again, to the equivalence of two algebraical formulæ always corresponds a general theorem, which arithmetic can only *verify* in particular cases. Thus, from the algebraical identity,

$$(a+b)\ (a-b)=a^2-b^2,$$

we learn that the "product which results from multiplying the sum by the difference of *any* two numbers is equal to the difference of their squares."

The systematic notation, to which algebra owes its chief power as an instrument of research, has been of very gradual growth, and is still being extended. In the first known treatises on the subject, by Diophantus, who probably lived in about the fourth century of our era, the few symbols employed are mere abbreviations for ordinary words. The Arabians, who obtained their algebra from the Hindoos, did little or nothing towards its extension, though their treatises, after being carried into Italy by a merchant of Pisa, Leonardo Bonacci (1202 A. D.), gave rise to important improvements. Scipio Ferreus of Bononia is said to have solved the first problem of the third degree (1505); but it was Tartaglia, or rather Cardan, who first gave the general solution of a cubic equation, and employed letters to denote the unknown quantities, the *given* one being still mere numbers. Without extending algebraic notation, Ferrari, a disciple of Cardan, discovered the general solution of a biquadratic equation, and thus, unknown to himself, reached the barrier which, as has since been proved, will ever remain impassable to the searcher for *general* solutions of equations of the fifth and higher degrees. (See Equations.) Towards the middle of the sixteenth century algebra was introduced into Germany, France, and England, by Stifelius, Peletarius, and Robert Recorde, respectively. In doing so, the latter also invented the very convenient symbol of abbreviation =, and Stifelius the far more important symbols of operation +, −, √. In the same century, through her far-famed son Vieta, France contributed still more to the progress of the science. Vieta introduced letters as symbols for known as well as for unknown quantities, and by the increased power thus acquired he laid the foundation of the general theory of equations. In this direction he was followed by Girard, Harriot, Descartes, and others; in short, the science now advanced rapidly towards its present state of perfection. It would be fruitless here to attempt to trace its progress. (The reader who wishes to do so may consult with advantage Hutton's "Mathematical Tracts," vol. ii., Bonnycastle's translation of Bossut's "Histoire des Mathématiques," or the works of Montucla.) The last great improvement in algebraic notation, that of determinants, is of quite recent date. (See Determinants, by Prof. H. A. Newton.)

Algeci′ras, or **Algezi′ras,** a seaport-town of Spain, in the province of Cadiz, 6 miles W. of Gibraltar, from which it is separated by the Bay of Gibraltar; lat. 36° 8′ N., lon. 5° 26′ 5″ W. Pop. in 1877, 12,465. Leather and charcoal are exported from this port. Here occurred a naval battle between the English and French in July, 1801.

Al′ger (Cyrus), born at West Bridgewater, Mass., in 1782, became in 1809 an iron-founder in South Boston, and became famous as a founder of cannon. He was also distinguished for his benevolence and public spirit. Died Feb. 4, 1856.

Alger (Rev. Horatio, Jr.) was born at North Chelsea (now Revere), Mass., Jan. 13, 1834, and graduated at Harvard in 1852. He studied divinity at Cambridge, and in 1864 was ordained over the Unitarian church at Brewster, Mass. He published "Bertha's Christmas Vision" (1855), "Paul Preston's Charge" (1865), "Do and Dare" (1884), etc.

Alger (William Rounseville), born at Freetown, Mass., Dec. 11, 1823, graduated at Harvard Theological School in 1847. He is a Unitarian clergyman and a diligent and various author. Besides his most important work, "A Critical History of the Doctrine of a Future Life" (1861), his "Genius of Solitude" (1867) and "Friendships of Women" (1870) have been admired. He has also translated Oriental poetry from the German. He was in 1875 pastor of a church in New York City, and subsequently pastor of Unity church, Denver, Col.

Alger of Liege, or **Alger of Clugny** (Alger Scholasticus, or Alger Magister), was born at Liege about 1055; deacon and *scholasticus* at church of St. Bartholomew about 1100; and afterward canon at cathedral of S. Mariæ et S. Lamberti; retired about 1121 to monastery of Clugny. Among his works is "De sacramentis corporis et sanguinis Domini," libri iii. Died about 1131.

Alge′ria, a French colony in Northern Africa, between the parallels of 30° and 37° N. lat. and the meridians of 2° W. and 10° E. lon. Area, 257,487 square miles. Boundaries, Mediterranean on the N., Tunis and Tripoli on the E., Sahara S., Morocco W.

Topography.—Coast high and steep, with few good harbors; near the coast, Little Atlas Mountains; mountainous region with coast-streams and deep, fertile valleys. Back of these mountains an extensive arid plateau 2000 to 3000 feet high, declining toward the Sahara. Between this plateau and the desert, main Atlas chain, with wooded slopes. No large rivers.

Climate warm, but very uniform. Rainy season from September to April, but rains not constant. Summer almost rainless. Heat not as intense as in some countries, but protracted.

Soil and Vegetation.—The soil of the valleys and the Metidjah, or northern plain, is very fertile. Near the coast market-vegetables are grown largely and exported to Europe. The valleys and plain produce wheat, barley, and tropical fruits. The grasses and reeds of the Shott or great plateau afford rich pasture to the Arab or Berber horses, cattle, asses and mules, and sheep. The esparto grass, extensively used in paper-making in England and France, grows all over this plateau. The forests are of different species of palm, cedar, and cork-oak. The date-palm ripens its fruit in the south. The wild beasts, except the hyena and jackal, are mostly exterminated. The minerals are iron, lead, copper, marble, sulphur, and salt.

Commerce.—In 1882 the imports were $82,000,000, and the exports about $30,000,000. Of the exports more than $2,500,000 were esparto grass. In 1882 there were 951 miles of railway, and in 1881 3624 miles of telegraph, in Algeria.

History.—Under the control of Carthage, and inhabited by Numidians and Moors, till the fall of Carthage, 146 B. C.; a Roman colony and the granary of Rome thenceforward till its conquest by Vandals, and later by Saracens, and the suppression of Christianity by the Moslem sword in the ninth century. In 1505 the ameer called in the pirates of Barbarossa to his help, and they became masters of the country and acknowledged the suzerainty of Turkey. For three centuries the Algerine pirates were the terror of Southern Europe and the Mediterranean. In 1705 they renounced allegiance to Turkey, and their piracies grew more audacious for the next hundred years. Partially checked by Napoleon I., they returned to their bloody deeds after the peace, but in 1815 were compelled to sue for peace by a U. S. squadron. After a time they became bolder than ever, and France resolved to chastise them. After a three years' blockade of the ports of Algeria the French bombarded and captured Algiers, July 5, 1830. The country was under French military control for forty years, and there was constant fighting with the Arabs and Kabyles. It was generally believed that the French rule had been a failure, and that the colony had cost much more than France would ever receive for it; but in 1871, after the suppression of a serious rebellion, Algeria was put under a civil administration. There has been since that time some trouble with the native tribes, but as a whole the civil administration has proved a success. A standing army is still maintained there of 60,000 men, but half of them are native troops. In 1881 a war commenced with the native tribes of Tunis, which resulted in the establishment of a protectorate over that country by France.

Population in 1881, 3,310,412, of which 189,944 were foreigners and 233,937 French; the remainder were Arabs, Kabyles (a mountain tribe), and Jews. The Arabs and Kabyles are Mohammedans. L. P. Brockett.

Alghe'ro, or **Alghe'ri,** a fortified town and seaport of the island of Sardinia, is on the W. coast, 15 miles S. W. of Sassari. It has a cathedral and several convents. Wine, grain, tobacco, coral, etc. are exported from it. Pop. of commune, 8419.

Algiers' [Arab. *Al-Jezair'*; Fr. *Alger*], a seaport and city of North Africa, on the Mediterranean; lat. 36° 47' 3" N., lon. 3° 4' 5" E. It was formerly the capital of the dey of Algiers, but since 1830 has been the capital of the French colony of Algeria. Built on the slope of a steep hill which rises to the height of 500 feet, it presents from the sea an imposing appearance, which is partly owing to the whiteness of the houses. The old streets are mostly narrow and crooked, but several straight and elegant streets have been made since the French became masters of the city. The houses are built of stone and brick, have flat roofs, and are annually whitewashed. Among the public buildings are numerous mosques, several Roman Catholic churches, a fine cathedral and exchange, and a public library. The beauty and prosperity of the city have been much improved by the French, and its commerce has been greatly increased. Among the articles of export are wheat, coral, animal skins, and olive oil. Steam vessels ply frequently between Algiers and Toulon and Marseilles. This city was for three centuries the rendezvous of the Algerine pirates, who, though few in number, defied the power of the greatest nations of Europe. It was bombarded by the English admiral Lord Exmouth in July, 1816, when a large part of the city was reduced to ruins, and was taken by the French in July, 1830. Pop. in 1881 was 64,714, exclusive of the military.

Algo'a Bay is on the S. coast of Africa, in Cape Colony, about 425 miles E. of Cape Town. Here is a good harbor and a flourishing seaport called Port Elizabeth, situated at the mouth of the Baasher River.

Al'gol, a star in the constellation of Perseus, is remarkable for its periodical variation in brightness.

Algo'na, R. R. junction, capital of Kossuth co., Ia. (see map of Iowa, ref. 2–F, for location of county), on the East Fork of the Des Moines River, 51 miles W. of Mason City, and about 120 miles N. by W. of Des Moines. Pop. in 1870, 860; in 1880, 1359; in 1885, 1826.

Algon'kins, one of the two great families of Indians that formerly occupied the Valley of the Mississippi and the regions east of it. The Indians of New England were Algonkins. The Chippewas are at present the most numerous tribe of the Algonkins. Their migration eastward (some 1200 years ago) is supposed to have been later than that of the Iroquois. (See PARKMAN'S "The Jesuits in North America;" BALDWIN'S "Ancient America," 1872.)

Algon'quin, a post-township of McHenry co., Ill. (see map of Illinois, ref. 1–F, for location of county). It contains the villages of Algonquin, Cary, and Crystal Lake. The first is noted as a milk-shipping station, also for its fine water-power and flouring-mills and its mineral spring. Crystal Lake is a R. R. junction and a fine summer resort; the lake of the same name is a beautiful sheet of water, from which ice is harvested for the Chicago market. Pop. in 1870, 2157; in 1880, 2321.

Al'gorithm [Fr. *algorithme;* It. *algoris'mo,* formed from the Arabic *al,* "the," and the Gr. ἄριθμος, "number," with the insertion of the letter *g* between the article and initial vowel of *arithmos*], the art of computing in reference to some particular subject or in some particular way, as the *algorithm* of numbers, of surds, etc.

Algreen-Ussing (TAGE), a contemporary Danish jurist and statesman, born at Frederiksborg, in Seeland, in 1797. He became in 1848 procurator-general for the kingdom of Denmark, and professor of law at Copenhagen. He has published several legal works. Died in 1870.

Alguazil', or **Alguacil',** the name given in Spain to an inferior officer appointed to execute the law, corresponding to a constable, bailiff, or policeman.

Al-Hak'em-Ibn-At'tâ (called **Al-Moken'na, -Mokanna,** or **-Mukanna,** *i. e.* "the veiled one"), an impostor who in 774 A. D. announced himself as a prophet and lawgiver in Khorassân. Having been attacked by the troops of the caliph Mahdi in 780, he set fire to his castle and consumed himself to ashes. His story is the subject of Moore's "Veiled Prophet of Khorassân."

Alha'ma (*i. e.* "the bath"), a town of Spain, in the province of Granada, in a beautiful valley 23 miles S. W. of Granada. Here are celebrated warm springs. Pop. 6931.

Alham'bra (the "red citadel"), a famous palace and citadel of the Moorish kings of Granada, was built 1248–1314 in a suburb of the city of Granada. It is surrounded by beautiful gardens and groves of aromatic trees. The interior of the palace is exceedingly gorgeous, and richly ornamented with arabesques, filigree, and fretwork. Among the portions now standing are the Court of the Lions and the Court of the Fish-pond. The former, which is built of white marble and alabaster, is named from a fountain in its centre supported by twelve lions, and surrounded by a gallery resting on columns and arches which are admirably light and elegant. This place capitulated to the Spaniards in 1491, and was entered in triumph by Ferdinand and Isabella in 1492. (See IRVING, "The Alhambra," 1832.)

Alhaurin' el Gran'de, a town of Spain, in the province of Malaga, 15 miles S. W. of Malaga. Marble and granite quarries are worked in the vicinity. Pop. 5514.

A'li, pasha of Yanina, born in 1741, was the son of an Albanese chief. Upon the death of his father, who had been robbed of all his possessions by his neighbors, his mother placed him, when only sixteen years old, at the head of their partisans. At first he was unsuccessful, owing to a want of funds, but at last defeated his enemies and returned in triumph to Tepelen, his native town. The day after his return he murdered his brother, and then imprisoned his mother in the harem, where she soon died, he having accused her of this crime. He now rendered some important service to Turkey, so that he was first appointed in the place of Dervendshi Pasha, who had to look out for the safety of the highways, and then pasha of Tricala in Thessaly. He seized the city of Yanina by means of a forged firman, and then forced the inhabitants to demand him as ruler from the sultan. He was for a time in correspondence with Napoleon, but afterwards occupied the places on the Albanian coast belonging to Napoleon. In 1803 he was made governor-general of Rumelia. In 1820, in consequence of his treasonable intercourse with France and Russia, an army was despatched against him, but owing to the Greek revolution, which he used for his own ends, he succeeded in keeping Yanina until 1822, when he surrendered, having been promised amnesty. He was nevertheless executed, and his head was sent to Constantinople.

A'li, or **A'li-Ibn-A'bi-Tâ'lib',** surnamed THE LION OF GOD, an Arabian caliph, a cousin-german of the prophet Mohammed, was born at Mecca in 602 A. D. He married Fâtimah, a daughter of Mohammed, whose doctrines he adopted and enforced with great ardor and courage. In 632 his rival, Abu-Bekr, was chosen caliph, after a contest which caused a schism and the formation of the sects of Sunnites and Shiites, the latter of which were partisans of Ali. He succeeded Othmân as caliph in 655, and was assassinated about 661 A. D. His son Hassan became caliph. Ali was distinguished as an author of maxims and proverbs. His religious party, the Shiites, are especially numerous in Persia and Turkestan. His descendants have ruled in Egypt, Spain, Western Africa, and Syria. The sentences ascribed to him were published by Fleischer (1837); a new edition of his "divan" (lyrical poems) was published at Boulâk, near Cairo, in 1840.

Alia, a town of Italy, on the island of Sicily, in the province of Palermo, is situated on a high mountain, 28 miles S. E. of Palermo. Pop. 5425.

Ali-Bey, a celebrated chief of the Mamelukes, born in Abkhasia in 1728. He was taken to Egypt at an early age, and raised himself from a servile condition by his ability, became bey of the Mamelukes, and in 1757 bey of Egypt, and succeeded in becoming independent of Turkey. He attempted to restore the ancient Egyptian empire, and had almost conquered Syria when his chief general, his adopted son, was bribed by the Turks, and drove him from Egypt. He succeeded in getting up another army, but after a few victories was again defeated and captured, and died a few days after, in 1773.

Alibert (JEAN LOUIS), a distinguished French medical writer, born in Aveyron May 26, 1766. He was first physician-in-ordinary to Louis XVIII. after 1815. He wrote, besides other able works, a "Description of the Diseases of the Skin" (1806–25), which is commended for its style and other merits. Died Nov. 6, 1837.

Al'ibi [Lat., meaning "elsewhere"], in law, is the absence of a person accused of crime from the place where the offence is charged to have been committed. If established, it is a defence to the accusation.

Alican'te, a province in the south-eastern part of Spain, is bounded on the N. by Valencia, on the E. by the Adriatic, and on the S. and W. by Murcia. Area, 2118 square miles. The country consists partly of fertile plains and partly sterile mountains. Pop. in 1877, 408,154. Chief town, Alicante.

Alicante (anc. *Lucen'tum*), a fortified city and seaport of Spain, the capital of the above province, is on the Mediterranean Sea; lat. 38° 20' N., lon. 0° 26' W. It is well built, with high and substantial stone houses, and contains several hospitals, one college, and a theatre. Wine, grain, soda, oil, oranges, etc. are exported from this place, which is the chief seaport of Valencia. Pop. in 1877, 34,926.

Alica'ta, or **Lica'ta,** a seaport-town of Sicily, in the province of Sicily, on the S. coast, 25 miles S. E. of Girgenti. It exports grain, wine, sulphur, etc. Near it are the ruins of the ancient *Gela*. Pop. 17,036.

A'lien [from the Lat. *alienus*, "belonging to another" (*alius*)]. An alien by English law is a person born out of the allegiance of the king. In this country he is one born out of the jurisdiction of the U. S., who has not been naturalized or made a citizen under their laws. By the common law the children of public ministers born abroad are citizens, for their fathers owe allegiance to no foreign power. By the laws of Congress, children of American fathers born abroad, where such fathers have resided in the U. S., are American citizens. (See CITIZEN.) It has been claimed that, independent of this statute, such children are American citizens. (The arguments against this view are stated with great cogency and learning by the venerable Horace Binney in an article upon "The Alienigenæ of the U. S.") Aliens are subject to certain disabilities affecting their exercise of political rights. After naturalization they are ineligible to the office of President and Vice-President of the U. S. The principal disability affecting aliens concerns the acquisition of the title to real estate. There are two general modes of acquisition—by purchase and by descent. An alien may acquire title by purchase (including conveyance and devise) in the absence of statutes to the contrary, and can hold it subject to a proceeding by the state termed "office found." This is in substance an inquiry through an authorized officer into the fact of alienage; and if that be found, the land is adjudged to belong to the state. An alien can convey no better title to a citizen than he himself possesses. This defect in the title can be cured by a private act of the State legislature. In the case of descent no title at all passes to the alien, and no inquest of office is necessary. A citizen brother can inherit from a brother, though their father be an alien, owing to the common-law rule that inheritances never ascend, and it is accordingly not necessary to trace title through the alien father. This disability is wholly removed in a number of the U. S., and modified in others. Where the disability is not removed, legislation is almost universal in favor of resident aliens, allowing them, if they intend to become citizens, to acquire land for a limited period, and to dispose of it and to transmit it to heirs. Aliens are capable of acquiring, holding, and transmitting personal property in the same manner as citizens, and may freely resort to courts of justice to maintain and protect their rights. Under the laws of Congress they are not, however, entitled to take out a copyright. Aliens have been distinguished in time of war into friends and enemies. An alien enemy cannot make a contract with a citizen. It is illegal in its inception, and cannot be enforced even after peace. Nor can such an alien prosecute actions of any kind while the war lasts, though, if there be no illegality in the claim, the right to sue revives in time of peace. An alien becomes a citizen through naturalization. The difficulties growing out of this subject have led to the negotiation of various treaties between the U. S. and foreign powers. (See NATURALIZATION.)

T. W. DWIGHT.

Align'ment [from the Fr. *aligner*, to "arrange in a line"], a military term, signifies the arrangement of men in line. The alignment of a camp is the rectilinear disposition of the tents. The word sometimes denotes the laying out or regulation of a street by a straight line.

Aliment. See FOOD, by EDWARD SMITH, M. D., LL.B., F. R. S.

Alimentary Canal, the cavity in the body of an animal in which food enters to be digested before it is conveyed by the nutritive vessels into the system. In some animals it is a simple cavity, with only one opening; in others it is a proper canal, with an outlet or anus distinct from the inlet or mouth, and is a continuous passage of variable dimensions from the mouth to the anus. The principal portions of the alimentary canal of Mammalia are the œsophagus, a duct or tube leading from the mouth to the stomach; the more expanded cavity of the stomach; the small intestines, which are long and convoluted; and the large intestines. The canal is lined throughout its whole length with mucous membrane. Its entire length in man is about thirty feet.

Al'imony [Lat. *alimonia*], in law, an allowance granted by a court to a wife from the husband's estate, either during a litigation between them or at its termination. Originally, it was only granted in suits for separation, but now by statute it is usual to make the allowance in proceedings for divorce dissolving the bonds of matrimony. In England the ecclesiastical court had jurisdiction of this subject until 1857, when it was vested in a court of divorce. In this country the jurisdiction is conferred in general on courts of equity. Alimony is of two sorts—*pendente lite*, and permanent. (1.) The object of the first is to enable the wife to carry on a litigation with her husband, or to sustain herself during its pendency. It is immaterial whether the proceedings be instituted by or against her. Should the wife have sufficient means of her own, no allowance of this kind will be made. The amount rests in the sound discretion of the court, and is subject to increase or diminution. (2.) *Permanent Alimony.*—This is a periodical allowance given from the husband's estate as the result of the litigation in the wife's favor. No allowance is made when the proceedings terminate unfavorably to her. The amount varies with the husband's wealth and position, and is commonly from one-third to one-half of his income. It is subject from time to time to variation by the action of the court, depending upon the circumstances of the case. The court has ample power to make its decree effectual, and may have recourse to the writ of *ne exeat* to prevent the husband's withdrawal from the State without proper security for its payment. Should the husband depart to another State, the parties might become "citizens of different States," within the view of the U. S. Constitution; so that she could enforce her claim to alimony in the Federal courts. The ordinary rule that the domicil of the wife follows that of the husband would not be applicable to this case, even though the case were one of judicial separation rather than of total divorce.

T. W. DWIGHT.

Alisma'ceæ [from the Gr. ἄλισμα, a "water-plant"], a natural order of endogenous plants, natives of temperate climates. They are herbaceous, and usually grow in swamps or shallow waters. Among the genera of this order are *Alis'ma* and *Sagitta'ria* (arrowhead).

Aliso is the name of a strong fortification erected by the Roman general Drusus, in the year 11 B. C., at the entrance of the Eliso into the Lupia (Lippe). It was the scene of several severe contests between the Romans and the Germans.

Al'ison (ARCHIBALD), a Scottish writer, born in Edinburgh Nov. 13, 1757, was educated at Oxford. He took orders in the Church of England in 1778, and became curate of Kenley, in Shropshire, in 1790. In 1800 he removed to Edinburgh, where he preached for many years. His chief works are "Essays on the Nature and Principles of Taste" (1784), and two volumes of sermons (1814). Died May 17, 1839.

Alison (Sir ARCHIBALD), BART., D. C. L., a son of the preceding, was born at Kenley, in Shropshire, Dec. 29, 1792. He graduated in the University of Edinburgh, studied law, and was called to the bar in 1814. In 1832 he published his "Principles of Criminal Law," a work of standard authority. His chief work is a "History of Europe during the French Revolution" (10 vols. 8vo, 1833–42), which comes down to 1815, and has had a great popularity. "Its merits," says the "Edinburgh Review" for Oct., 1842, "are minuteness and honesty—qualities which may well excuse a faulty style, gross political prejudices, and a fondness for exaggerated and frothy declamation." He wrote a continuation of this History to the year 1852, a "Life of John, duke of Marlborough" (1847). In politics he was ultra Conservative. Died May 23, 1867.

Alison (Sir ARCHIBALD, JR.), BART. See APPENDIX.

Alison (WILLIAM PULTENEY), M. D., a physiologist, a brother of the preceding, was born in Edinburgh in 1790. He became professor of the institutes of medicine at Edinburgh in 1828, and professor of the practice of medicine in 1832. He published "Outlines of Physiology and Pathology" (1833), and other works. Died in 1859.

Aliz'arine [from *al-izari*, the commercial name of madder in the Levant] is the coloring-matter of madder (*Rubia tinctorum*). Alizarine was discovered in 1824 by Robiquet and Colin, by treating madder with strong sulphuric acid, producing a black mass, which they called *charbon de garance*. On heating this, it yielded a sublimate of alizarine crystals.

Preparation.—Several processes have been employed for the extraction of alizarine, more or less pure, from madder. Kopp's plan, which has been applied on a larger scale by Schaaf and Lauth of Strasburg, consisted in treating the madder with an aqueous solution of sulphurous acid, by which both alizarine and purpurine, another coloring-matter, were dissolved. On adding 3 per cent. of sulphuric acid to the solution, and heating to 95° or 104° Fahrenheit, the purpurine was precipitated. In the filtrate from the purpurine the alizarine was precipitated in an impure state. This was extensively sold under the name of "green alizarine." From the washings a brown alizarine of inferior quality separated. The green alizarine was sometimes purified by dissolving it in rectified petroleum, withdrawing the alizarine by agitating with soda lye, and precipitating it by sulphuric acid. It was thus obtained comparatively pure in yellow flakes, which dried to a yellow powder. Another process for extracting alizarine was based upon the observation of Leitenberger that purpurine is soluble in water from 77° to 131° Fahrenheit, while alizarine requires a much higher temperature. Alizarine is largely sold to the calico-printers in the form of a yellowish-brown paste, under the name of "madder extract;" also in the form of a dry powder. It may be crystallized from solution in red prisms or by sublimation in yellow needles.

Properties.—It is but slightly soluble in water, except under pressure at temperature much above the boiling-point. One hundred parts of water dissolve

at 212°	Fahrenheit,	0.034 alizarine.
302°	"	0.035 "
392°	"	0.820 "
437°	"	1.700 "
482°	"	3.160 "

It is soluble in alcohol and in ether, forming yellow solutions. It is also soluble in wood-naphtha, benzol, bisulphide of carbon, turpentine, glycerine, and petroleum. In sulphuric acid it dissolves with a deep-red color, and is precipitated unchanged on adding water. It is soluble in caustic alkalies and alkaline carbonates, forming a violet solution, from which it is precipitated by acids. Akaline solutions of alizarine form, with soluble lime and baryta salts, precipitates of a beautiful purple color; with alumina salts, a red; with iron salts, a purple precipitate. If a piece of cotton cloth which has been printed with the common alumina and iron mordants is placed in water holding a little alizarine in suspension, it will be found on heating the whole that the cotton will become permanently dyed in shades of red and purple. Alizarine is a feeble acid, forming, as above shown, soluble salts with the alkaline metals, insoluble colored salts with most other metals. Turkey-red, madder-pink, and the various shades of purple and chocolate on calico, are compounds of alizarine with metallic bases.

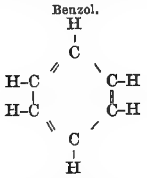
Origin of Alizarine.—Little if any alizarine exists in the living madder root, and after the root is gathered it is found that the alizarine increases in quantity by keeping for several years. It is now believed that the alizarine is produced from a substance called rubian or rubianic or ruberythrinic acid, a glucoside, by a peculiar fermentation induced by a peculiar madder ferment called erythrozone:

$$\underset{\text{Rubian.}}{C_{26}H_{32}O_{16}(?)} = \underset{\text{Alizarine.}}{C_{14}H_8O_4} + \underset{\text{Glucose.}}{2C_6H_{12}O_6}.$$

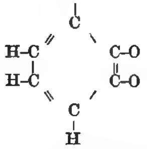
Rubian undergoes the same change under the influence of dilute acids.

Artificial Alizarine.—One of the greatest triumphs of modern chemistry was the artificial production of alizarine by Graebe and Liebermann in 1869. By a careful study of an extensive class of bodies, Graebe established the existence of a peculiar series of compounds called quinones, which contain the *phenyl nucleus*, and in which two atoms of oxygen are united together by a common bond, forming a dyad radical $(O_2)''$, which aids in binding together two adjacent carbon atoms. The molecular structure of the lowest quinone, that derived from quinic acid or from benzol, is shown in the following graphic formulæ:

Benzol.



Quinone.



In studying the quinones, Graebe noticed certain general characteristics, which he attributed to their peculiar molecular structure. Thus, two of the hydrogen atoms associated with the oxygen radical $(O_2)''$ may be replaced by HO, H_2N, or HSO_3, the product being an acid, an amide, or a sulpho-acid. The following table illustrates the most important relations in this connection of the quinones:

Primary Hydrocarbons.	Quinones.	Acids.
Benzol. C_6H_6.	Quinone. $C_6H_4=(O_2)''$.	Quinonic Acid. $(HO)_2=C_6H_2=(O_2)''$.
Naphthalene. $C_{10}H_8$.	Naphtho-quinone. $C_{10}H_6=(O_2)''$.	Naphtho-quinonic Acid. $(HO)_2=C_{10}H_4=(O_2)''$.

Five years before, Martins and Griess, while investigating some derivatives of naphthalene, discovered a body very similar but not identical with alizarine; and Graebe had obtained a body from a naphtho-quinone derivative which resembled alizarine in some respects. Graebe came therefore to the conclusion that alizarine belonged to the quinone series, and, associated with Liebermann, he began his investigation upon it. The starting-point was to ascertain the primary hydrocarbon from which the alizarine could be constructed. They therefore subjected alizarine from madder to the process devised by Bayer for the conversion of phenol into its hydrocarbon, benzol. They passed alizarine vapor over heated zinc-dust, and obtained the hydrocarbon anthracene, $C_{14}H_{10}$. It only remained to change the anthracene into its quinone, and then into its quinonic acid, to form the alizarine:

Anthracene, $C_{14}H_{10}$.
Anthraquinone, $C_{14}H_8=(O_2)''$.
Anthraquinonic acid or alizarine, $(HO)_2=C_{14}H_6=(O_2)''$.

A body, anthracenuse, had been prepared years before by Laurent and Anderson, which Graebe and Liebermann now recognized as the quinone of anthracene, $C_{14}H_8=(O_2)''$. They heated this with bromine, by which they replaced H_2 by B_2H_2, obtaining bibrom-anthraquinone, $C_{14}H_6Br_2=(O_2)''$. To replace the Br_2 by hydroxyl $(HO)_2$, they heated it with caustic potassa, KOH, and thus obtained the potassium salt of the new acid, from which the acid was precipitated by hydrochloric acid as a yellow powder indentical with the alizarine derived from madder. The practical importance of this discovery attracted to it the attention of numerous chemists, and simpler processes, avoiding the use of the expensive bromine, were soon devised. An abundant supply of anthracene is obtained from the refuse coal-tar of gas-works, and in a few months anthracene, which had never been seen except as a chemical curiosity, became a regular article of commerce. (See ANTHRACENE.)

The process now employed for making alizarine consists in converting the anthraquinone into a mono-sulpho acid and fusing the soda salt of this with caustic soda, with a small addition of potassic chlorate. In executing this process it is found that two di-sulpho acids are formed in large quantities, which yield with soda two new isomeric coloring-matters of great importance, $C_{14}H_8O_5$: flavo-purpurine from the *a* acid, which produces yellowish reds, and anthra- or iso-purpurine from the *b* acid, which produces pure fiery reds. Alizarine produces bluish reds. By separating the mono- and the two di-sulpho acids, each may be made to yield its own coloring-matter on fusion with soda, or by operating upon various mixtures of them dyestuffs producing the greatest variety of shades may be obtained.

The following new dyestuffs have been prepared from alizarine:

Alizarine carmine, which is the sodium salt of mono-sulpho alizarine and the two purpurines. It is used on wool as a substitute for cochineal.

Alizarine orange is nitro-alizarine.

Alizarine blue is produced by heating nitro-alizarine with glycerine and sulphuric acid.

Alizarine blue S. is a compound of the blue with acid sulphite of sodium.

Alizarine brown is formed by the action of sodium thiosulphate on nitro-alizarine. It gives olive-greens.

The annual consumption of madder in dyeing and calico-printing exceeded $10,000,000. Large tracts in Holland, Alsace, Italy, and the Levant were devoted to its culture. It not only supplied dyestuffs, but in Alsace it yielded a large proportion of the alcohol of commerce: the root containing sugar, which was extracted and subjected to fermentation.

This brilliant discovery of Graebe and Liebermann has effected a very serious change in the agricultural system of people as remote from each other as the shores of the North Sea and Asia Minor. Theoretically, 1 pound of alizarine would require 0.60 pound anthracene, which would be obtained from 30 pounds of coal-tar, requiring 660 pounds of coal. In practice, the yield is less than half this amount. There are now (1882) eight factories in Germany and one in England engaged in the manufacture of alizarine. The annual production is valued at $10,000,000. (For further details with regard to alizarine, consult "Die Farbestoffe," von P. SCHÜTZENBERGEN, uebersetzt von Dr. H. SCHRÖDER, Berlin, 1873; "The History of Alizarine," by W. H. PERKIN, I. Soc. Arts, 1879; "Die Chemie des Steinkohlentheers," von G. SCHULTZ, Braunschweig, 1882.) C. F. CHANDLER.

Al'kali [from the Arabic definite article *al*, and *kali*, the plant from which soda was first obtained], a chemical term applied to an important class of bases which combine with acids to form salts, turn vegetable yellows to red, and vegetable blues to green, and unite with oil or fat to form soap. The proper alkalies are potash, soda, lithia, cæsia, rubidia, and ammonia, which are extremely caustic. Potash is called vegetable alkali, soda is called mineral alkali, and ammonia, volatile alkali. Lime, magnesia, baryta, and strontia, having some properties of alkalies, are called *alkaline earths*. The alkalies and alkaline earths are metallic oxides, except AMMONIA (which see). When an alkali and an acid combine in due proportion they are said to neutralize each other; they really produce metallic salts:

$$\mathrm{KOH + HCl = KCl + H_2O}.$$
$$\mathrm{NaOH + HNO_3 = NaNO_3 + H_2O}.$$

(See Acids, by Prof. C. F. Chandler, Ph. D., LL.D.)

Alkalim'eter [from *alkali*, and the Gr. μέτρον, a "measure"], an instrument used to ascertain the proportion of pure carbonate of potash or of soda in a commercial sample of those articles, and to test the strength and purity of soda-ash, potash, etc. It consists of a graduated glass tube divided into 100 degrees (numbering from the top), and filled with diluted sulphuric acid, which is poured into a given quantity of the solution of the alkali until it is neutralized. If this process empties the tube to the eightieth degree, it shows that the article contains 80 per cent. of pure alkali. This process is called alkalimetry. The same instrument is also used to test the strength of acids, by filling the tube with a solution of alkali and reversing the process. (See Volumetric Analysis.)

Alkalimetry. See preceding article.

Al'kaloids [from *alkali*, and the Gr. εἶδος, "form"], an important class of substances of organic origin, having the qualities of alkalies more or less strongly marked, and being capable of forming salts with acids, like the inorganic bases. They are often substitution products of ammonia. They are divided into two classes—*natural* and *artificial*. The natural alkaloids are found in plants and animals. They are composed essentially of carbon, hydrogen, and nitrogen; besides which a great number contain oxygen. The alkaloids have generally an energetic action on the animal system, and hence are employed as medicine; in comparatively large doses they are often powerful poisons. They have generally a bitter taste, and form in many instances the active principles of the plants in which they are found. Such are morphine, found in opium; quinine and cinchonine, in cinchona bark; strychnine, in nux vomica; hyoscyamine, in henbane; atropine, in belladonna; caffeine or theine, in coffee and tea, etc.

The animal alkaloids are few, the more important being urea, found in the urine of the Mammalia; and kreatine and kreatinine, two of the constituents of the juice of flesh. The artificial alkaloids are those organic bases which are formed in the researches of chemists. Recently several of the natural alkaloids have been manufactured on a small scale without the intervention of the living plant or animal. Urea can be formed from the simplest form of dead organic nitrogenous matter. Coniine, the alkaloid of hemlock, has been prepared artificially. (See Amines, Urea, etc.)

Al'kanet (*Anchu'sa*), a genus of herbaceous plants found in Europe, belong to the natural order Boraginaceæ. They have five stamens. Some of the species are cultivated for the beauty of the flowers. The root of the *Anchusa tincto'ria* affords a resinous red coloring-matter, and is used to color pomades, lip-salves, hair-oils, etc.

Al-Katif', or **El-Chatif**, a town of Arabia, on the bay of the same name, which is part of the Gulf of Persia. It has a fort, a bazaar, and a citadel. Pop. about 6000.

Alkindi, or **Alchindus.** See Appendix.

Alkmaar', or **Alckmaer'**, an old and important fortified town of Holland, in the province of North Holland, 20 miles N. N. W. of Amsterdam, and 5 miles from the ocean. It is well built, and is traversed by several canals, by which it carries on an active trade in butter and cheese. It is said to be the greatest mart for cheese in the world. Here are manufactures of soap, leather, sail-cloth, etc. This town was defended with success against the Spaniards in a long siege which began in 1573. Pop. in 1879, 13,304.

Alkmaar, van (Henry), a Low-German poet who lived about 1475–1500. He was the author or translator of a very popular poem and satire entitled "Reinecke Fuchs" ("Reynard the Fox"), which he published in Low German at Lübeck in 1498. He professed that he translated this from the Walloon and the French, but no such original is extant.

Alkoran. See Koran, by Prof. Tayler Lewis, LL.D.

Al'lah, the Arabic name of the Supreme Being, the only true God, as distinguished from the deities worshipped by idolaters.

Al'lahâbâd' (*i. e.* "the city of God"), an ancient and holy city of Hindostan, the capital of the North-western Provinces, is at the confluence of the Ganges and the Jumna, 498 miles by rail N. by W. of Calcutta; lat. 25° 25' 26" N., lon. 81° 51' E. Many thousand pilgrims annually resort to this place to bathe in the sacred rivers which here unite. The houses of the natives are mostly mean. This city is important as a military point, and is advantageously situated as an emporium of trade on the East Indian Railway, and also on the Grand Trunk road. A large part of the city was reduced to ruins by the hostile operations between the mutinous Sepoys and the British in 1857. Pop. in 1881, 150,378.

Al'lan (David), a Scottish painter of domestic and humorous subjects, was born at Alloa Feb. 13, 1744, and was called the "Scottish Hogarth." He studied and worked for many years in Rome, whither he went in 1764. Among his works are "The Origin of Painting," which represents a Corinthian maiden drawing her lover's profile on the wall; and illustrations of Allan Ramsay's "Gentle Shepherd." Died Aug. 6, 1796.

Allan (Sir Hugh), born in Ayrshire, Scotland, in 1810, emigrated at an early age to Canada, where he became, in conjunction with his brother Andrew, proprietor of a line of steamships. In 1870 they had eighteen steamships plying between Montreal and Great Britain. He was one of the canal commissioners "inspecting the internal navigation" of Canada (1870–71), and in 1873 became prominent in support of Canadian Pacific Railway. D. Dec. 9, 1882.

Allan (Sir William), an eminent Scottish historical painter, born in Edinburgh in 1782. He worked some years in St. Petersburg, visited Circassia and Turkey, and returned to Edinburgh in 1814. He received 1000 guineas for his picture of "Circassian Captives." In 1835 he was elected academician of the Royal Academy of London, and in 1840 succeeded Wilkie as limner to Her Majesty for Scotland. Among his works are "The Death of Regent Murray," "Peter the Great Teaching Shipbuilding to his Subjects," "Knox Admonishing Queen Mary," and two pictures of the battle of Waterloo. Died Feb. 22, 1850.

Allan-Kardec (Hippolyte Léon Denizard). See Appendix.

Allan'toin ($\mathrm{C_4N_4H_6O_3}$), a colorless crystalline substance found in the allantoic fluid of the fœtal calf and in the urine of the sucking calf. It is produced artificially by boiling uric acid with lead dioxide and water.

Allan'tois [from the Gr. ἀλλᾶς, ἀλλᾶντος, a "sausage," and εἶδος, a "form"], a thin membranous sac developed during incubation in the eggs of birds and reptiles, and in the embryo of viviparous animals during gestation. (For its development and uses, see Embryology.)

Allard (Jean François), born in 1785, went to Egypt in 1815, and thence to Persia, where Abbas Mirza gave him the title of colonel, but with no command. For that reason he went to Lahore, where he gained the confidence of the maharajah of the Sikhs, who made him commander-in-chief of his army, which he organized according to European custom. He died in 1839.

Allatoo'na, on R. R., Bartow co., Ga. (see map of Georgia, ref. 2–F, for location of county), 40 miles N. W. of Atlanta. Gen. J. E. Johnston, when pursued by Gen. Sherman, made a stand in the strong position of Allatoona Pass, in May, 1864, until his flank was turned. The Union general Corse defended this place with success against the assault of a superior force in Oct., 1864, while Gen. Sherman, from the top of Kenesaw Mountain, signalled that he should hold out to the last.

Al'legan, R. R. junction, capital of Allegan co., Mich. (see map of Michigan, ref. 7–H, for location of county), on the Kalamazoo River, has foundries, the Holly waterworks, car-works, and many other manufactories propelled by water and steam, an academy, and the library of the Allegan literary and library association. Pop. in 1870, 2374; in 1880, 2305; in 1884, 2638.

Allega'ny, on R. R., Cattaraugus co., N. Y. (see map of New York, ref. 6–C, for location of county). It contains a Roman Catholic college and Franciscan convent, and has important manufactures. Pop. in 1870, 746; in 1880, 1049.

Allegha'ny, a river which rises in Potter co., Pa., makes a short circuit in New York, and returns into the former State. Flowing afterward in a S. S. W. direction through the hilly oil-regions, it unites with the Monongahela at Pittsburg, forming the Ohio. It is navigable for small steamboats 150 miles or more above Pittsburg, is over 400 miles long, and its waters are remarkably clear and pure. Among the principal towns on its banks are Warren, Franklin, and Kittanning.

Alleghany Mountains, or **Alleghanies**, a name sometimes used as synonymous with that of the Appalachian system of mountains. (See Appalachian Mountains.) In a more limited sense it is applied to parallel ranges which traverse Pennsylvania, Maryland, and Virginia, and form the most prominent features in the physical geography of those States. The general direction of these ridges is nearly N. E. and S. W., and their mean height about 2500 feet. Among their highest summits are the Peaks of Otter, in Virginia, rising to 3993 feet above the sea. These ridges are remarkable for the parallelism of their direction and the uniformity of their outline and altitude, and enclose several beautiful and fertile valleys. The rocks of the Alleghanies are the Silurian and Devonian limestones and sandstones, and the group of strata called the coal-measures.

Alleghany Springs, in Montgomery co., Va. (see map of Virginia, ref. 7–D, for location of county), 3 miles from Shawsville, on the Norfolk and Western R. R., and 77 miles S. W. of Lynchburg, are a popular retreat for invalids and others. The springs are highly saline, and produce laxative, tonic, or alterative effects, according to the method of use. They are especially recommended for dyspeptics. Eight miles distant are the sublime Puncheon Run Falls, and the scenery near is wild and picturesque.

Allegheny, city and important R. R. centre, Allegheny co., Pa. (see map of Pennsylvania, ref. 5–A, for location of county), separated from Pittsburg by the Allegheny River. Several fine bridges connect the two cities. *Manufactures.*—The census of 1880 showed 424 manufactories; capital $8,451,059; average number of hands employed, 6471; wages paid during the year, $2,652,774; value of products, $13,731,792. The city contains extensive iron and steel rolling-mills, locomotive-works, cotton and woollen mills, foundries, machine-shops, tanneries, flour-mills, salt-works, white-lead works, etc. There are in Allegheny 3 theological seminaries, numerous benevolent and reformatory institutions, the Western Penitentiary; a soldiers' monument, costing over $40,000; a beautiful park, embellished with costly fountains, statues, etc.; 2 beautiful cemeteries—Union Dale and St. Mary's; 1 public library, a fine market-house, and very extensive water-works. Pop. in 1870, 53,180; in 1880, 78,682.

Alle'giance [Fr. *allégeance*], in law, is the tie or obligation which binds a citizen or subject to a state. The common law distinguishes between natural and local allegiance. The former is that which a citizen owes to the state of which he is a member; the latter is due from a person who is not bound by the rules of natural allegiance, but who is temporarily subject to the laws of the state by which the allegiance is claimed. Under this theory a foreigner temporarily residing in a country is subject to its laws. Under such circumstances, should he conspire to overturn the government he may be guilty of treason. When he departs his allegiance is at an end. Natural allegiance, on the other hand, cannot be shaken off at the will of the citizen. Should he abandon the country to which he belongs, and engage in war on the part of a foreign state against it, he might, in strictness, if taken prisoner, be treated as a traitor. Such a treatment would, under some circumstances, be extremely harsh, as where the state had encouraged emigration, and the consequent assumption by an emigrant of relations naturally leading to a duty to take sides in a controversy with an adopted country. The doctrines of allegiance are of feudal origin, and it has been found difficult to reconcile them with the requirements of modern times. The U. S. in their legislation upon naturalization have proceeded upon the theory that a citizen of a foreign country might, at his will, shake off his allegiance and become a citizen here. The European nations have quite uniformly denied that there is any such general rule of public law, whatever may be the opinion of individual jurists. The perplexing and irritating questions thus raised have been for the most part recently disposed of by treaties between the U. S. and the leading foreign nations. (For these treaties see NATURALIZATION.) T. W. DWIGHT.

Al'legory [Gr. ἀλληγορία; Lat. *allegoria*], a figure of speech which may be termed a prolonged metaphor; a narrative in which abstract ideas are personified, as Bunyan's "Pilgrim's Progress," which furnishes one of the finest examples of allegory to be found in literature. Allegory is not confined to literature, but may also be employed in painting, sculpture, and pantomimic representations. It differs from symbol with respect to the relation between idea and form. In a symbol the form is naturally indicative of the idea, as when a lion rising from its couch is taken as a representative of the awakening spirit of democracy, while in an allegory idea and form are entirely disconnected, as when a city is represented by a female figure. Mere allegory without any power of symbolization is tiresome, and often stupid.

Allegret'to [a diminutive of the It. *allegro*, "lively"] is a musical term which denotes a movement or time quicker than *andante*, but not so quick as *allegro*.

Alle'gri (GREGORIO), an Italian composer of sacred music, born in Rome about 1580. He was a singer in the pope's chapel and a pupil of Nanini. His masterpiece is the "Miserere," which is annually performed in the pontifical chapel during Passion Week. Died in 1652.

Alle'gro (*i. e.* "lively," "cheerful"), in music, one of the principal degrees of movement; a term which signifies that the piece to which it is prefixed is to be performed in a brisk and lively manner. The word is sometimes used as a substantive, and a name of an entire musical composition.

Al'lein, or **Al'leine** (JOSEPH), an English non-conformist minister and writer, born at Devizes in 1634, was educated at Oxford. He was ejected from a curacy at Taunton in 1662, after which he was persecuted by imprisonment in Ilchester jail, and was fined for preaching. His death was hastened by ill-treatment, and he died Nov. 17, 1668. Among his works is an "Alarm to the Unconverted" (1672), which is highly esteemed.

Allein, or **Alleine** (RICHARD), an English non-conformist and Puritan, born in Somersetshire in 1611, educated at Oxford, was rector of Batcombe in that county, but was ejected in 1662. He published "Vindiciæ Pietatis" ("Vindication or Defence of Piety," 1663), and other works. Died Dec. 22, 1681.

Allen (CHARLES), LL.D., a jurist, was born at Worcester, Mass., Aug. 9, 1797, and was admitted to the bar in 1818; was a judge of various State courts of Massachusetts between 1842 and 1859, and chief-justice of the Massachusetts superior court (1859–67). From 1849 to 1853 he was a Free-Soil member of Congress. He was a delegate to the Peace Congress of 1861, and was long known as an influential lawyer and an able jurist. Died Aug. 6, 1869.

Allen (CHARLES). See APPENDIX.

Allen (DAVID OLIVER), D. D., an American divine, born at Barre, Mass., Sept. 14, 1799; graduated at Amherst College in 1823, and labored as a missionary in India from 1827 to 1853, in which latter year he returned to America. He published a "History of India" in 1856. Died July 17, 1863.

Allen (ELISHA H.), born at New Salem, Mass., Jan. 28, 1804; graduated at Williams College; was admitted to the bar; removed to Brattleboro', Vt., and in 1830 to Bangor, Me.; member of Maine legislature 1836–41 and 1846; in 1838 was speaker; member of Congress from Maine 1841–43; removed to Boston in 1847, and was elected to the Massachusetts legislature in 1849; U. S. consul at Honolulu, 1852–56; then became Hawaiian minister of finance, and from 1857 was chief-justice and chancellor of Sandwich Islands, holding that office twenty years, during which period he was several times minister plenipotentiary of Sandwich Islands to U. S. He was resident minister of Sandwich Islands at Washington from 1876 till his death, Jan. 1, 1883.

Allen (ELIZABETH AKERS), known as "Florence Percy," was born in Strong, Me., Oct. 9, 1832. Her first husband was the sculptor Akers. She is now the wife of E. M. Allen of New York. She published in 1867 a volume of poems of decided merit, and has contributed much to periodical literature.

Allen (ETHAN), GENERAL, born at Litchfield, Conn., Jan. 10, 1737. He became an owner of iron-works at Salisbury, Conn., and in 1766 removed to Vermont, where he became a leader in the popular resistance to the claims of New York. The province of New York declared Allen an outlaw, and offered £150 for his arrest. On the outbreak of the Revolution, Allen heartily joined the movement, and on the 10th of May, 1775, he surprised and captured the fort at Ticonderoga, summoning its astonished commandant to surrender "in the name of the great Jehovah and the Continental Congress." This capture gave the army a valuable supply of artillery and stores. He had but eighty-three men under him, among whom was Benedict Arnold. On the 25th of Sept., 1775, he attacked Montreal with a small force, but was captured and sent to England as a prisoner. He was treated with great cruelty, and was not exchanged till 1778. The British authorities tried in vain to bribe him to induce the Vermonters to join their cause, but he skilfully contrived by his negotiations to keep the British troops out of Vermont. He published pamphlets against the New York domination, a narrative of his captivity (1799), a "Vindication of Vermont" (1779), and "Allen's Theology, or the Oracles of Reason" (1784), an attack upon the Christian religion. He professed to believe in the transmigration of souls. Died near Burlington, Vt., Feb. 12, 1789. (See his life by HUGH MOORE (1834), and by H. W. DE PUY (1853).)

Allen (FREDERIC DE FOREST). See APPENDIX.

Allen (GEORGE). See APPENDIX.

Allen (HEMAN), LL.D., born at Poultney, Vt., Feb. 23, 1779, graduated at Dartmouth 1795, became a lawyer, was chief-justice of a Vermont State court (1811–14), member of Congress (1817–18), U. S. minister to Chili (1823–28), and held various other important positions. He was a nephew of Ethan Allen. Died April 9, 1852.

Allen (Henry), an enthusiast, born at Newport, R. I., June 14, 1748, founder of the "Allenites." He maintained that Adam and Eve before the fall had no corporeal bodies, and denied the resurrection of the body. He preached in Nova Scotia, and published some hymns and religious treatises. Died Feb. 2, 1784.

Allen (Ira), General, born in Cornwall, Conn., April 21, 1751, was a younger brother of Ethan Allen. Emigrating in 1772 to Vermont, he became a prominent and public-spirited citizen. While he was colonel of militia his regiment did good service at the battle of Bennington. He bore a prominent part in settling the early difficulties of Vermont with the neighboring States. In 1795 he went to France to purchase arms for his State, but was taken on the voyage home, carried to England, and there sustained with success an eight years' lawsuit on the charge of attempting to supply the Irish with arms. He was afterwards imprisoned in France. He wrote a "Natural and Political History of Vermont" (1798) and other works. Died Jan. 7, 1814.

Allen (Joel Asaph). See Appendix.

Allen (Joseph W.), an English landscape painter, born at Lambeth, in Surrey, in 1803. He was the principal scene-painter at the Olympic Theatre, and is said to have corrupted his style in landscape by the "brilliant effects" which are only adapted to the stage. He had previously painted rural scenery with success. Died Aug. 30, 1852.

Allen (Nathan), M. D., LL.D., of Lowell, Mass., born at Princeton, Mass., April 25, 1813, graduated at Amherst in 1836. He has published several valuable pamphlets on the laws of life and health, as well as the causes affecting the changes and increase of population.

Allen (Paul), born at Providence, R. I., Feb. 15, 1775, graduated at Brown University in 1796, studied law, and removed to Philadelphia, where he engaged in journalism, serving as editor and correspondent to various journals. He published a volume of poems (1801), "Lewis and Clarke's Travels" (1814), "Life of Alexander I." (1818), and other works. His "History of the Revolution" (1819) was written by John Neal and others. He was for a time insane. Died at Baltimore (where he was an editor of the "Morning Chronicle") Aug. 18, 1826.

Allen (Philip), born in Providence, R. I., Sept. 1, 1785, graduated at Brown University in 1803. He was an extensive cotton-manufacturer, and built the first Watt steam-engine ever made in Providence; was governor of Rhode Island (1851–53), and U. S. Senator (1853–59). Died Dec. 16, 1865.

Allen (Richard), first bishop of the African Methodist Episcopal Church in the U. S. He was originally a preacher in the Methodist Episcopal Church, and was ordained deacon by Bishop Asbury in 1799. He was elected bishop of the African Methodist Episcopal Church in 1816. Died in Philadelphia in 1831. (See Methodism.)

Allen (Richard L.), born in Hampden co., Mass., Oct., 1803. Was a merchant in Buffalo, N. Y., in 1834, residing later at "Allenwood," his farm, on the Niagara River. With his brother, A. B. Allen, he established the "American Agriculturist" in the city of New York, in 1842, which became a very successful paper. He was the author of the "American Farm Book," and the "Diseases of Domestic Animals" (1845). D. at Stockholm, Sweden, Sept. 22, 1869.

Allen (Robert), an American officer, born in 1812 in Ohio, graduated at West Point in 1836, and, July 20, 1866, assistant quartermaster-general (rank colonel), and brigadier-general U. S. volunteers, May 13, 1863. Served in the artillery till May 11, 1846, and subsequently in the quartermaster's department; on engineer duty in 1836, and in Florida war in 1837–38, in emigrating Cherokees to the West in 1838, in quelling the Canada border disturbances in 1840–41, in garrison in New York harbor in 1841–46, in the war with Mexico in 1846–48 on quartermaster duty, being present at the battles from Vera Cruz to the city of Mexico (brevet major), on quartermaster duty at New Orleans and New York in 1848–49, as chief quartermaster of Pacific division in 1849–52 and 1854–61. In the civil war served as chief quartermaster at St. Louis, Mo., in 1861–63, and at Louisville, Ky., 1863–66; from which points he directed the furnishing of transportation and supplies for the various armies operating in the Mississippi Valley (brevet lieutenant-colonel and brigadier-general July 4, 1864), and for several expeditions, including those against the North-west Indians; as chief quartermaster of the division of the Pacific in 1866–69, and senior assistant in quartermaster-general's office in Washington, D. C., 1869. Retired Mar. 2, 1878. George W. Cullum.

Allen (Samuel), a London merchant, born about 1635, was one of the proprietors of New Hampshire under Mason's patent, and was governor of the colony (1691–99). His claim involved him and his heirs in expensive litigation. Died May 5, 1705.

Allen (Solomon), an American patriot and preacher, born in Northampton, Mass., Feb. 23, 1751, was a brother of Moses, noticed above. He served as a major in the Revolutionary war. Died Jan. 20, 1821.

Allen (Stephen), born in New York City in 1767, became mayor of the same in 1821. He was distinguished for his public spirit and public services, being one of the persons who originated the enterprise of supplying New York with Croton water. He was a victim of the burning of the steamer Henry Clay in July, 1852.

Allen (Stephen), D. D., an eminent divine and educator of the Methodist Episcopal Church, was born in Maine in 1810, graduated at Bowdoin College in 1835, entered the ministry in the Maine Conference in 1839, and has devoted much of his life to education in his native State, particularly as principal of the Maine Wesleyan Seminary.

Allen (Thomas), an American patriot, born at Northampton, Mass., Jan. 17, 1743, was a brother of Moses, noticed above, and the father of William Allen (1784–1868). He was the first minister in Pittsfield, where he began to preach in 1764. In the Revolution he served as chaplain in the American army. Died Feb. 11, 1810.

Allen (Weld N.), U. S. N., born Mar. 27, 1837, in Maine, graduated at the Naval School in 1856, became a lieutenant in 1861, a lieutenant-commander in 1863, a commander in 1871, served during the summer of 1861 at Fort Dahlgren near Alexandria, and was for some weeks in command of that important post. In 1862 and 1863 served on board the gunboat Kanawha, and in 1864 commanded the steamer New London, Western Gulf blockading squadron. In 1865, while attached to the steam-sloop Tuscarora, Allen led the men of that vessel in the assault upon Fort Fisher, and was wounded in the left arm. Died Feb. 7, 1875. Foxhall A. Parker.

Allen (William), a lawyer, who was chief-justice of Pennsylvania before the Revolution, and a royalist after it began. He aided Dr. Franklin in founding the College of Philadelphia. Died in 1780.

Allen (William), F. R. S., an English chemist and philanthropist, born in London Aug. 29, 1770, was a friend of Sir H. Davy. In conjunction with W. H. Pepys he made researches on respiration, etc. He devoted much time to benevolent enterprises, and as a minister of the Society of Friends travelled in France, Germany, and Russia, in which latter country he had an interview with the emperor Alexander in 1822. In 1825 he founded two manual-labor schools at Lindfield, Sussex. Died Dec. 30, 1843.

Allen (William), D. D., b. at Pittsfield, Mass., Jan. 2, 1784; graduated at Harvard in 1802, was licensed to preach in 1804, in 1810 succeeded his father as pastor in Pittsfield, was chosen president of Dartmouth Univ. in 1817, and was president of Bowdoin College from 1820 to 1839. His last days were spent at Northampton, Mass., where he died July 16, 1868. He published numerous volumes, both of prose and of poetry. His best known work is an "American Biographical and Historical Dictionary" (1809; 3d ed. 1857).

Allen (William), governor of Ohio. See Appendix.

Allen (William F.), born in Windham co., Conn., July 28, 1808; studied law, and was an active lawyer for many years. He filled minor offices before he was elected (in 1842) to the assembly, of which he was also a member in 1843 and 1844. In 1847 he was elected a justice of the supreme court for the fifth judicial district of New York, and was re-elected in 1855. He held this office until Nov., 1867, when he was elected comptroller of the State of New York. While he held this position the law requiring a reorganization of the court of appeals went into effect, and he was chosen by the Democrats associate justice in that court, which office he held till his death, at Oswego, N. Y., June 3, 1878.

Allen (William Henry), a naval officer, born at Providence, R. I., Oct. 21, 1784. He served with distinction under Decatur when the latter captured the Macedonian, in Oct., 1812. Having obtained the command of the Argus, Captain Allen took several prizes from the English. He was mortally wounded in a battle between the Argus and the Pelican Aug. 14, 1813.

Allen (William Henry), M. D., LL.D., was born at Readfield, Me., Mar. 27, 1808, educated at Bowdoin College, Me., 1833, was professor of Latin and Greek in the Cazenovia Methodist Seminary, N. Y., from 1833 to 1835, professor of chemistry and natural philosophy in Dickinson College, Carlisle, Pa., from 1836 to 1846, professor of philosophy and English literature at the same institution from 1846 to the close of 1849, president of Girard College, Philadelphia, from 1850 to 1863, president of the Agricultural College of Pennsylvania during 1865 and 1866, and was reappointed president of Girard College in 1867, which office he sustained with eminent ability. In 1872 he was elected president of the American Bible Society. He was author of "A Manual of Devotion for Girard College Orphans," and of numerous and able addresses, reviews, etc. Died Aug. 29, 1882.

Allen (William Howard), an officer of the U. S. navy, was born at Hudson, N. Y., July 8, 1790. He commanded the Argus after William Henry Allen was mortally wounded, in 1813. Nov. 8, 1822, he was killed by pirates whom he attacked near Matanzas.

Allen (William Stickney), an American journalist, born at Newburyport, Mass., in 1805, was for nearly twelve years editor of the "Newburyport Herald." He removed in 1837 to Missouri, where he afterwards edited the "St. Louis Republican." Died June 16, 1868.

Al'lenstein, a Prussian town, province of East Prussia, situated on the Alle, 65 miles S. of Königsberg, Pop. in 1880, 7610.

Allentown, city, an important R. R. centre, capital of Lehigh co., Pa. (see map of Pennsylvania, ref. 5–I, for location of county), on the right bank of the Lehigh River, 60 miles N. by W. of Philadelphia. There are many blast-furnaces at this place, large rolling-mills, foundries and machine-shops, tanneries, shoe-manufactories, tube-works, woollen-mills, fire-brick works, etc. There is a fine court-house, and a prison costing $250,000. It is the seat of Muhlenberg College. Pop. in 1870, 13,884; in 1880, 18,063.

Al'ler, a river of Germany, an affluent of the Weser, rises near Magdeburg and flows north-westward. It is about 150 miles long.

Al'lerton (Isaac), one of the "Pilgrim Fathers," left London in 1608, and went to Holland. He came to New Plymouth in the Mayflower's first voyage. He was a man of some wealth, and was at first a man of influence, but was afterwards unpopular. He became a merchant of New Amsterdam (New York), residing at Marblehead, New Haven, and other points. The second of his three wives was Fear, a daughter of William Brewster. Died in 1659.

All-Hal'low, the old English name for All Saints' Day (the 1st of November).

Al'lia, or **A'lia,** according to Livy, a small stream which entered the Tiber 11 miles above Rome, was the scene of the battle in which Brennus and the Gauls defeated the Roman army, about 388 B. C. It has not been identified in modern times.

Alli'ance, R. R. junction, Stark co., O. (see map of Ohio, ref. 4–I, for location of county), containing many extensive manufactories of horse-rakes, reapers, pumps, terra-cotta ware, steam-hammers, tin-presses, besides rolling-mills, white-lead works, etc., etc. It has excellent public schools, a college, and good libraries. Pop. in 1870, 4063; in 1880, 4636.

Alliance, Holy. See Holy Alliance.

Al'libone (Samuel Austin), LL.D., an author, born in Philadelphia April 17, 1816. His principal work is a "Critical Dictionary of English Literature and Authors" (1859–70), also a "Dictionary of Poetical Quotations" (1872), etc. Became librarian of Lenox Library, New York, in 1880.

Al'lier, a river of France, is the most important affluent of the Loire. It rises in the S. of France, near the source of the Loire, flows nearly N., and enters that river at Nevers. Its entire length is about 260 miles.

Allier, a department of France, is bounded on the N. by Cher and Nièvre, on the E. by Saône-et-Loire, on the S. by Puy-de-Dôme, and on the W. by Creuse and Cher. Area, 2822 square miles. It is intersected by the Allier, and bounded on the N. E. by the Loire. The soil is fertile. The chief productions are wine, grain, timber, cattle, horses, and sheep. Iron, coal, and marble are found here. It is subdivided into 4 arrondissements, 28 cantons, and 321 communes. Chief town, Moulins. Pop. in 1881, 416,579.

Allies (Thomas William). See Appendix.

Alliga'tor [corrupted from the Sp. *el lagarto*, the "lizard"], a genus of American saurian reptiles (nearly allied to the crocodile) which abound in the rivers and swamps of the Southern U. S. They have broader heads, more numerous teeth, and more obtuse snouts than crocodiles. Various reptiles of this genus are called caymans in South America. They all hibernate in the winter or dry season, when they bury themselves in the mud. The alligator is about fourteen feet long, including the tail, which is a powerful weapon for defence. It is a fierce and voracious animal, and sometimes attacks and kills men both on water and land, but it cannot turn quickly on land. During the heat of the day it is often seen basking in the sun on the dry ground. Its back and sides are defended by hard mailed plates, which are proof against a rifle-ball. The alligator is an oviparous animal, its eggs being small, but numerous. The parent deposits them in the sand of the river-side, scratching a hole with her paws, and placing the eggs in a regular layer therein. She then covers these with sand, grass, mud, etc., and deposits another layer on top of them, and so on until she has laid from fifty to sixty eggs. These are hatched by the heat of the sun and the decaying vegetable matter. The name alligator is also frequently applied to the muggur of India. The common alligator of the Southern States is the *Alligator Mississippiensis*, but among the so-called alligators of Florida a true crocodile has been discovered.

Alligator Pear. See Avocado Pear.

Allio'li (Joseph Franz), a German Catholic theologian, born at Sulzbach Aug. 10, 1793. He became prof. of theology at Munich in 1826, resigned in 1835, and became soon after canon at Ratisbon. His German translation of the Bible (6th ed. 1839–45) was approved by the pope, and had a very wide circulation. He also published a "Manual of Biblical Antiquities" (1841). Died May 22, 1873.

Allison, on R. R., capital of Butler co., Ia. (see map of Iowa, ref. 3–H, for location of county). Pop. in 1885, 336.

Al'lison (Francis), D. D., a Presbyterian minister, born in Ireland in 1705, came to America in 1735. He was for many years vice-provost and professor in Philadelphia College. Died Nov. 28, 1777.

Allison (John), born Aug. 5, 1812, at Beaver, Beaver co., Pa., where he followed the hatter's trade; studied law, and took a leading part in the Whig party, and was elected to the State legislature in 1846, 1847, and 1849. From the legislature he went to Congress, serving in the sessions of 1852–54 and 1855–57. In 1856 he was a member of the convention of Pittsburg which instituted the Republican party, and in 1860 he headed the State delegation in the convention at Chicago which nominated Mr. Lincoln for President. On the outbreak of the civil war he was appointed major and paymaster in the army, and served to the close with great credit. He was appointed by Pres. Grant register of the U. S. treasury Apr. 1, 1869, and held that office till his death, at Washington, D. C., Mar. 23, 1878.

Allison (William B.), Dubuque, Ia., born at Perry, O., Mar., 1820; educated at Western Reserve College, O., studied law and practised in Ohio until his removal to Iowa in 1857, where he served on the governor's staff and aided in organizing volunteers at the commencement of the civil war of 1861–65; was representative in 38th, 39th, 40th, and 41st Congresses; was elected to U. S. Senate as a Republican, and has held that office since Mar. 4, 1873; his present term expires Mar. 3, 1891.

Allitera'tion [from the Lat. *ad*, "to," and *litera*, a "letter"], in composition, the frequent recurrence of the same letter, or of words beginning with the same letter, as "When friends were few and fortune frowned."

Al'lium [from the Gr. ἀλέομαι, to "avoid," because of its offensive smell], a genus of herbaceous plants of the natural order Liliaceæ, natives of the temperate and cold regions of the northern hemisphere, including the garlic, onion, leek, and chive. They have mostly bulbous roots, umbellate flowers, narrow and fistulose leaves, and a peculiar smell and taste called *alliaceous*.

Allix (Pierre). See Appendix.

Al'loa, a seaport and market-town of Scotland, in the county of Clackmannan, on the left (N.) bank of the Forth, and at the head of its frith, 28 miles W. N. W. of Edinburgh. It has a good harbor and an active trade. Glass, ale, whiskey, woollen goods, and leather are manufactured here, and coal is an important article of export. Steamboats ply daily between Alloa and Edinburgh. Pop. 9362.

Allob'roges, a nation of ancient Gaul, which occupied the territory now comprised in Dauphiny, Savoy, and Piedmont. They were allies or peaceable subjects of Rome.

Allocu'tion [Lat. *allocu'tio*, from *ad*, "to," and *lo'quor, locu'tus*, to "speak"], a formal address; a term used especially by the court of Rome, and applied to a speech which the pope addresses to the college of cardinals on some political or ecclesiastical subject. The pope often resorts to this method to define his position or explain his policy.

Allo'dium, or **Allo'dial Ten'ure,** in feudal law, freehold estate, land held by an individual in his own absolute right, and free from feudal tenure or obligation. There is no allodial land or property in England, the laws of which declare that the king is the original proprietor and lord paramount of all the land in the kingdom.

Allom′erism [from the Gr. ἄλλος, "different," and *μέρος*, a "portion" or "share"], a term denoting constancy of crystalline form under variation in the proportion of the constituents of a compound. Thus, an alloy of zinc and antimony containing 36 per cent. of the latter metal crystallizes in needles which do not vary in angular measurement, though the antimony be increased 20 per cent.

Allop′athy [from the Gr. ἄλλος, "other," "different," and *πάθος*, an "affection"], a supposed theory of medicine, according to which remedies are used whose effects are opposite to the symptoms of the diseases treated. The term allopathy was formed after that of homœopathy, and both terms were introduced by Hahnemann. The two terms are contrasted, the one teaching that medicines must produce a *similar affection* to the disease itself, the other a *different affection*. The idea of this method of medication is at least as old as Hippocrates, who used the expression, "*τὰ ἐναντία των ἐναντίων ἔστιν ἰήματα*"—"opposites are remedies of opposites." It has been contrasted in modern times especially with the maxim of Hahnemann, "*similia similibus curantur*," or "like cures like," which is the fundamental principle of homœopathy—an idea which is also advanced by Hippocrates. It is altogether an error to designate the prevalent and ancient science and practice of medicine as allopathy. The teachers and adherents of this science insist that its scope legitimately embraces all positive truth concerning disease and its treatment; no more to be narrowed down to an exclusive principle, such as that of allopathy, than astronomy can be made synonymous with the nebular theory, or zoology with the theory of development.

Allo′ri (Alessandro), a skilful Italian painter, born in Florence in 1535, excelled in the science of anatomy. Among his masterpieces are "The Last Judgment" and "Christ disputing with the Doctors." Died in 1607.

Allori (Cristofano), an eminent painter, a son of the preceding, was born at Florence in 1577. He was a good colorist, and excelled in portraits. Among his works, which are exquisitely finished, is a Magdalene. Died in 1621.

All'otta′va, in music, is a direction to play an octave higher or lower.

Allot′ment Sys′tem, or **Allotment of Land,** an expression commonly used in England in reference to small portions of land cultivated as gardens by peasants and other poor laborers, who hold the land as tenants. Allotment, as a legal term, may be defined as the grant or allowance of a portion of land too inconsiderable to be the subject of a formal conveyance.

Allot′ropy, or **Allot′ropism** [from the Gr. ἄλλος, "other," and *τροπή*, "conversion"], in chemistry, a term applied to the diversity of form and properties which some elements exhibit under certain circumstances, as, for example, when exposed to a great heat or to an electric discharge. Many chemists believe that every element is capable of existing under several allotropic modifications. Among the substances which afford examples of allotropy are sulphur, phosphorus, oxygen, and carbon. If the solid and brittle sulphur be heated to 480° F., and then poured into water, it ceases to be brittle and becomes very elastic. Sulphur in its ordinary state is slightly soluble in turpentine and some fixed oils, but in its elastic condition it becomes insoluble in those oils. Phosphorus affords a remarkable illustration of the same principle. In ordinary circumstances, when freshly prepared, it is a pale yellow solid, resembling wax. In this form it is extremely combustible, requiring to be kept under water to avoid taking fire spontaneously. But if this same substance be excluded from air and kept several days at a temperature of about 450° Fahrenheit, it becomes red, and ceases to be readily combustible, so that it need not be kept under water to prevent its taking fire. Oxygen, which in its common state has no odor, may, by an electric discharge through a glass tube or bottle containing air, be transformed into ozone, which has a peculiar odor and other new properties. (See Ozone.) The diamond and graphite are allotropic forms of carbon.

Allouez (Claude Jean), a Jesuit, born in France in 1620, went to Quebec in 1658 as missionary to the Algonkins, settled on Lake Superior in 1665, at Kaskaskia, Ill., in 1676, and visited numerous tribes in the North-west. Died in 1690. He was bitterly disliked by La Salle.

Allow′ances, Officers', are the payments made to officers in the British army for special duties. An officer commanding and paying a company receives a contingent allowance for the expense of repairing arms, etc. An officer sent on duty from one place to another has a travelling allowance of so much a mile. A somewhat similar system is observed in the U. S. army.

Al′loway-Kirk, an old ruined church in the parish of Ayr, near the mouth of the river Doon, is the scene of Burns's poem of "Tam O'Shanter." A monument has been erected here to the memory of Burns, who was born near the kirk.

Allox′an ($C_4N_2H_2O_4$), a white crystalline substance formed by the action of cold strong nitric acid on uric acid. It is converted by baric hydrate into alloxanic acid, $H_2.C_4N_2H_2O_5$.

Alloxan′tin ($C_8N_4H_4O_7.3Aq$), a colorless crystalline compound produced by the action of hot dilute nitric acid on uric acid; also by the action of deoxidizing agents, as H_2S, on alloxan.

Alloy′ [Fr. *alloyer*, to "mix" (as metals), probably from the Lat. *ad legem*—that is, "with legal tolerance;" Fr. *loi*, "law"], a mixture or compound of two or more metals fused together; sometimes a compound of precious metal with a metal of less value; thus, in coinage, the term alloy is applied to a baser metal mixed with gold or silver in order to make it harder. Chemists apply this term to all combinations obtained by fusing metals together; thus, brass is an alloy of copper and zinc; bronze is an alloy of copper and tin; pewter is an alloy of tin and lead. In many cases the metals do not unite in definite or invariable proportions. The density—or, in other words, the specific gravity—of an alloy is sometimes greater and sometimes less than the mean of its components. Most alloys have greater cohesion than either of the metals of which they are composed, so that a bar of an alloy will bear a greater longitudinal strain than a bar of either metal. British gold coin contains 11 parts of pure gold and 1 of copper; the law of the U. S. requires that in 1000 parts of coin there must be 900 parts of gold; and the intent of the law is, that the alloy shall be of copper only; but, as in parting silver from native gold it has been heretofore impossible to separate the whole, except at an expense too great to be economical, it has been permitted to allow the residual silver to be counted as part of the alloy, provided the proportion of silver be *not greater* than one-half. The more effectual processes introduced of late years into the U. S. assay offices have made it possible to make the parting nearly complete; and it is now provided that the silver shall not exceed *one-tenth* part of the whole alloy. A compound of mercury with another metal is an *amalgam*.

All Saints' Day, or **All Hallows** [Ang.-Sax. *all*, and *hâlig*, "holy"], a festival of the Roman Catholic, Anglican, Lutheran, and the various Oriental churches. Observed on the 1st of November, in honor of the saints in general.

All Souls' Day, a festival of the Roman Catholic Church, observed on the 2d of November, in order to alleviate the sufferings of the souls in purgatory.

All′spice, a common name of pimento, or Jamaica pepper, the dried berry of the *Euge′nia pimen′ta*, which is a native of the West Indies. It is called allspice because it is supposed to combine the flavor of several spices.

All′ston (Joseph), an American planter, born in 1778, became governor of South Carolina (1812–14). He married Theodosia, the only child of Aaron Burr. Died Sept. 10, 1816.

Allston (Robert F. W.), an American officer and governor, born April 21, 1801, in All Saints' parish, S. C., graduated at West Point in 1821, served as lieutenant of artillery on topographical duty till he resigned, Feb. 1, 1822, to become a rice-planter on the Great Pedee River; surveyor-general of South Carolina 1823–27, member of the house of representatives of South Carolina 1828–32, of the senate 1832–56, presiding 1847–56, deputy adjutant-general of South Carolina 1831–38, and governor of South Carolina 1856–58. He was much interested in agriculture and public education, and wrote valuable memoirs upon both subjects. Died April 7, 1864, on his plantation, near Georgetown, S. C. George W. Cullum.

Allston (Washington), an American painter of celebrity, both at home and abroad, born Nov. 5, 1779, on his father's plantation, at Waccamaw, S. C.; died at Cambridge, Mass., July 9, 1843. Being of delicate constitution, he was sent to school at Newport, R. I., at the age of seven. There he formed the acquaintance of Edward Malbone, the miniature painter, a kindred spirit, two years his senior, whose taste, enthusiasm, and unusual culture stimulated the lad's ambition and fixed the bent of his genius. On graduating from Harvard College in 1800, he went to Charleston, and at once began his art-life under the influence of his Newport friend, whom he found there. The opportunities for intelligent study of good masters were small at that time, but zeal and patience used them all. The young man scorned no helps, but copied the best he could find, and felt grateful, especially to Robert Edge Pine, whose portraits of General Gates, Charles Carroll, Baron Steuben, and Washington were much admired as examples of color. In 1801, Allston, accompanied by his friend Malbone, is in London, a student of the Royal Academy, whereof Benjamin West was president. West became his intimate friend, and so remained to the last. London opened to the young artist a new world of opportunity and sympathy. His three years there were full of improvement and delight. Then the Louvre in Paris offered to him its superb gallery, rich with gems of Italian art. This prepared him for Italy, where, principally in Rome, he spent four years in close companionship with Thorwaldsen the sculptor and Coleridge the poet. In 1809 he returned, richly freighted, to his native country, but soon went back to London with his wife, a sister of Dr. William E. Channing. There he produced his first great work, "The Dead Man Restored to Life by the Bones of Elisha." The picture obtained the prize from the British Association, and was afterwards purchased by the Pennsylvania Academy of Fine Arts. Allston's reputation was made. Other great paintings followed: "St. Peter Liberated by the Angel," "Uriel in the Centre of the Sun," "Jacob's Dream," with smaller things between—all eagerly sought by purchasers. But toil and confinement, and sorrow from the death of his wife, impaired his health; in 1818 he came to America again. The next twelve years were passed in Boston, where, in spite of a feeble body and a saddened mind, he painted the "Jeremiah," "Saul and the Witch of Endor," "Miriam," "Beatrice," and other pieces exquisite in color and feeling. In 1830, Allston married, as his second wife, a daughter of Chief-Justice Dana of Cambridge, Mass.; and at Cambridge he thenceforth lived, writing and painting, in great seclusion, but enjoying the society of a group of intimate and noble friends. To this period of his activity belong "Spalatro's Vision" and "Rosalie," the former one of his most weird, the latter one of his loveliest creations. The work which he meant should be his masterpiece, and on which he bestowed immense labor in the latter years of his life, "Belshazzar's Feast," was never finished. It was after a week of steady, severe labor on it that the artist gently expired from an attack of heart disease. The sketch, probably never intended by the painter to be exhibited, is in the Athenæum Gallery in Boston.

If Allston had not been a painter, he might have been distinguished as an author. The few writings from his pen that have been published indicate a rare penetration and refinement of mind. His novelette, "Monaldi," deserves to be still read and admired for its literary excellence. His poems were light and incidental productions, and have been forgotten. He prepared a course of lectures on art, which were published after his death.

Allston had the poetic temperament; his passion was for beauty—not for the sensuous beauty that charms the eye, so much as for the intellectual beauty that enchants the soul. Neither the landscape nor the human face interested him so much as the forms that stood before his imagination. He was of a thoughtful, interior, speculative cast of mind, meditative and dreamy. His sensibility to spiritual impressions was acute; he was a lover of the supernatural and the mysterious, with a love of the romantic. He never wholly outgrew his liking for ghost-stories, and the awful, the grand, the wild possessed an unfailing attraction for him to the end of his life. This peculiarity of his mind displays itself in the subjects of his greatest paintings—"Uriel," "Saul and the Witch of Endor," "The Vision of the Bloody Hand," "The Dead Man Coming to Life"—and not less in his last and most ambitious piece, "Belshazzar's Feast;" the great feature of which was the awful handwriting on the wall, glaring down on the scene of revelry, making the light of the candles dim and striking consternation into royal hearts. Conceptions like these transcend any artist's power of execution, and much of the disappointment with Allston's work arises probably from the sense of inadequacy of the performance. The grandeur is there, the impression of intellectual power is always conveyed, the spiritual influence of a subtle imagination is always felt; but the skill to tell satisfactorily the wonderful story is wanting. It is when he descends from such ambitious flights and paints a "Rosalie," a "Beatrice," a "Lorenzo and Jessica," that the exquisite quality of his art appears. These are creations of the fancy too, pure dreams of the poet, attempts to catch and portray what the eye cannot perceive, and only the most ethereal touch can feel. Their charm is indescribable. It is not in the composition, which is not always admirable, nor in the drawing, which is now and then deficient in freedom and grace, nor even in the color, rich and mellow as it is: it lies rather in the refined delicacy of sentiment which pervades the work, spiritualizing whatever the master touches. His most tremendous creations are touched with this subtle grace. They are never appalling or grotesque; they are always, in some aspects, lovely.

The technical excellence of Allston's art was its color. Leslie is quoted as saying that the harmony of tint in the "Uriel" suggested the best pictures of Paul Veronese; and the appellation given him in Rome, "the American Titian," proved that the artists there discovered in his canvas something more than the adroit use of pigments, something of the strange art of mingling them that in the great master was so inimitable. Artists could even rejoice in the melancholy incompleteness of the "Belshazzar," because it allowed them an opportunity to study the painter's method.

The personal qualities of Allston were exceedingly attractive. His high-toned moral integrity, his enthusiasm, his utter singleness of mind, his maidenly purity of heart, fascinated all who approached him. He was free from envy and jealousy and guile. Artists revered him. Horatio Greenough, a man of culture as well as an artist, said, "He was a father to me in what concerned my progress of every kind." And Washington Irving wrote of him: "To the last he appeared to retain all those elevated, refined, and gentle qualities which first endeared him to me—a man whose memory I hold in reverence and affection as one of the purest, noblest, and most intellectual beings that ever honored me with his friendship."

Allston was slight in form, and carried about him an air of refined dignity that at once attracted attention. His countenance wore an expression of serene abstraction. His brow was broad, his eye large; his white hair fell long upon his shoulders in his latter years. In the public street he seemed wrapped in thought till a friend spoke to him, and then he seemed the soul of love. Before his death, in 1839, his paintings, those that were in America, forty-two in number, were collected a short time for exhibition. The best of them are in private galleries; some of the very best are in England. Mr. Allston was chosen a member of the Royal Academy soon after his return from his first long residence in England. O. B. Frothingham.

Allu'vion [from the Lat. *ad*, "to," and *luo*, to "wash"], the soil imperceptibly formed by the constant washing of the waters along the banks of a river or the sea. (See Accretion.) It differs from "avulsion," as the latter is not gradual, but sudden and perceptible.

Allu'vium, a geological term, signifies gravel, sand, and other matter washed down by rivers and floods, and spread over land that is not permanently submerged. Such deposits, which belong to the post-tertiary formation, often accumulate at the mouths of large rivers and form deltas. (See Delta.) All the land of Lower Egypt is alluvial. It has been estimated that the Mississippi annually carries down a quantity of sediment sufficient to cover 268 square miles with a stratum one foot deep. Alluvial soil is frequently the most fertile part of the earth's surface.

Al'lyl, Ac'ryl, or **Propyle'nyl** (C_3H_5), the third term in the homologous series C_nH_{2n-1}. Oil of garlic is the sulphide of allyl $(C_3H_5)_2S$. Oil of mustard is the sulphocyanate of allyl, $C_3H_5.CNS$.

Al'lyn (Robert), D. D., an eminent clergyman and educated in the Methodist Episcopal Church, born at Ledyard, Conn., Jan. 25, 1817, graduated in 1841 at the Wesleyan University, Conn.; mathematical teacher in Wilbraham Academy, Mass., 1841–43, joined the New England Conference 1842, was elected principal at Wilbraham 1845, principal of the Providence Conference Academy 1848; commissioner of public instruction for Rhode Island 1854, served three terms in the Rhode Island legislature, appointed professor of ancient languages in Ohio University at Athens 1857, president of the Wesleyan Female College, Cincinnati, O., 1859, and president of McKen'dree College, Ill., 1863–73.

Al'ma, a small river of Russia, in the Crimea, flows W. and enters the sea about 20 miles N. of Sevastopol. On its banks the allied armies of England, France, and Turkey defeated the Russians on the 20th of Sept., 1854. The British forces consisted of 25,000 men and 60 guns, commanded by Lord Raglan. The French had 30,000 men and 68 guns, and also 7000 Turkish infantry, the French and Turkish forces being all under the command of Marshal St. Arnaud. The Russians had 36,000 men and 122 guns under Prince Menschikoff and were strongly posted on the left bank of the river, on the heights.

Alma, city, on R. R., capital of Wabaunsee co., Kan. (see map of Kansas, ref. 5-I, for location of county), in a township of same name, about 65 miles W. of Lawrence, contains a flouring-mill and saw-mill, and is at the junction of four creeks, each furnishing water-power. Pop. in 1885, 640.

Alma, on R. R., capital of Harlan co., Neb. (see map of Nebraska, ref. 7-I, for location of county). Pop. in 1880, 298; in 1885, 911.

Alma, city, county-seat of Buffalo co., Wis. (see map of Wisconsin, ref. 5–B, for location of county). It is on the Mississippi River, 60 miles N. of La Crosse, and within 4 miles of the celebrated Beef Slough Booms. It has manufactures of bricks, wagons, flour, etc. Pop. in 1870, 565; in 1880, 1244; in 1885, 1521.

Al'mack's, a suit of assembly-rooms in King street, St. James, London, was formerly celebrated as a fashionable place of resort for the aristocracy. Annual balls were given in these rooms, the managers of which were ladies of high rank, who conducted them with great exclusiveness. These rooms were built in 1765 by a person named Almack, an anagram of McCall, his original name. The desire of admission to balls and parties at Almack's was so eager that it is said votes in Parliament have been bought by tickets offered to wives and daughters of members.

Alma'da, de (Alvaro Vas), was a noted Portuguese soldier, and was made count of Avranches by Charles VI. of France. He was a faithful follower of Dom Pedro, regent of Portugal, and was killed in battle in 1449.

Almaden', or **Almaden' del Azo'gue** (*i. e.* "the mines of quicksilver"), a town of Spain, in the province of Ciudad Real, 50 miles S. W. of Ciudad Real. Here are mines of quicksilver (cinnabar), which are said to be the richest and most ancient in the world, producing annually about 2,000,000 pounds. They were worked by the ancient Spaniards, and afterwards by the Romans. Almaden has a practical school of mines and three hospitals. The mines were rented in the sixteenth century by the Fuggers, the famous bankers of Antwerp, and in 1843 the Rothschilds obtained the contract from the Spanish government. Pop. 8645.

Al'maden, Santa Clara co., Cal. (see map of California, ref. 4–B, for location of county), has mines of mercury and mineral springs. Pop. in 1870, 1647; in 1880, 2418.

Almaden Quicksilver-mines, The, of Santa Clara co., Cal., are named after those of Almaden in Spain, the latter being the most important in the known world. The Santa Clara mines are the New Almaden, Providence, Enriquita, and Guadalupe. The first mentioned is 14 miles from San José and 65 miles S. of San Francisco, in a region remarkable for its picturesque scenery. The ore (cinnabar) has from time immemorial been known to the Indians, who used it for making vermilion paint. Some Mexicans having bribed them to disclose the profound secret of its place, a company was formed in 1846, which began to work the mine. The presence of this deposit has been of incalculable benefit to California, since enormous quantities are employed in gold and silver mining. The metallic mercury is separated from the ore by a simple process of distillation.

Al'magest [from the Arabic *al*, "the," and the Gr. *μέγιστος*, "greatest"], a name given by the Arabs to Ptolemy's great work on astronomy, which was written in Greek, and translated in the ninth century into Arabic.

Alma'gro, a city of Spain, in the province of Ciudad Real, 14 miles S. E. of Ciudad Real. It is well built, has a town-hall, two hospitals, and one Latin school. Large quantities of lace are made here; also brandy, soap, and earthenware. Pop. 14,000.

Almagro, de (Diego), a Spanish soldier of fortune, and one of the conquerors of Peru, was a foundling, and was named after the city in which he was found in 1475. At an early age he went to America, where he is said to have enriched himself by plunder. Pizarro, Almagro, and Luque in 1525 united in an enterprise to conquer Peru, in which they were successful. (See Pizarro, Francisco.) In 1535, Almagro invaded Chili and gained some victories over the natives, but his progress was hindered by the enmity and perfidy of Pizarro. He returned from Chili in 1536, and took Cuzco, which Pizarro claimed as part of his possessions. In April, 1538, Almagro was defeated in battle and taken prisoner by Pizarro, who put him to death.

Almagro, de (Diego), a son of the preceding, was born about 1520. He became the leader of a party which was hostile to Pizarro, whom they assassinated in 1541. He then took the title of captain-general of Peru, but he was defeated in battle by the royal army under Vaca de Castro, and was executed in 1542.

Alma'li, a large town of Asiatic Turkey, in the S. part of Anatolia, on the river Myra, 25 miles from the Mediterranean Sea. It is beautifully situated in a valley, contains several factories and mills, and has a prosperous trade. The appearance of the town is uncommonly picturesque. Pop. about 20,000.

Al'ma Ma'ter (*i. e.* "fostering or propitious mother"), a name used to express the relationship of a university to its "foster-children" (alumni) who have been educated in it.

Al'manac, or **Almanack** [Arab. the "register"], an annual publication containing a calendar of the days and months of the year, the time of the sun's rising and setting, a notice of the eclipses of the sun and moon, and other astronomical phenomena. To these essential topics are often added predictions of the weather, and sometimes useful information of different kinds. The origin of almanacs is very ancient. They correspond in some respects to the Fasti of the Romans. The first printed almanac was that of George von Burback, resident at Vienna, in 1460. Regiomontanus began in 1474 a series of almanacs in their present completed form. In the sixteenth and seventeenth centuries they were often used as organs of political parties, were filled with the absurdities of astrology and vain prognostications, and were enlisted in the service of superstition and imposture. Among the most widely-known almanacs of the present time is the "Gotha Almanack," which was first published in German in 1763. It is also published in French. It contains statistics respecting all nations, with much political information.

The first American almanac was that of William Pierce, published at Cambridge, Mass., in 1639. In 1733, Franklin first published his celebrated "Poor Richard's Almanac." The "American Almanac" appeared from 1830 to 1861, and a new series from 1878 to 1886, and later. Over 100 almanacs are published in the U. S., embracing every possible subject, a number of which appear in the German.

A. R. Spofford.

Almanac, Nautical, an annual work devoted to astronomical phenomena and used in navigation. The "British Nautical Almanac" was planned by Maskelyne, and first published in 1767. A similar French work, entitled "Connaissance des Temps," was commenced by Picard in 1679, and has been continued to the present time. There is an excellent almanac published in Berlin under the title of *Ephemeris*. The "American Nautical Almanac," which first appeared in 1855, has a high reputation. It is published annually by the U. S. navy department through the nautical office. It is a large volume, published for the use of the navy, and sold at cost to others. (See Ephemeris, by Prof. J. H. C. Coffin, LL.D.)

Alman'sa, or **Alman'za,** a town of Spain, in the province of Albacete, 52 miles by rail E. of Albacete. It has manufactures of linen and cotton fabrics, brandy, leather, and soap. Near this town the French under the duke of Berwick defeated the British and Spanish armies, April 25, 1707. Pop. 7900.

Al-Mansoor' (Aboo Jaafar), the second caliph of the family of the Abbassides, was born in 712. He ruled from 754–775, persecuted the Christians in Syria and Egypt, founded Bagdad, and promoted arts and sciences.

Almas, a town of Hungary, in the county of Bacs, 16 miles W. N. W. of Maria-Theresienstadt. Pop. in 1880, 8000.

Al'meh, or **Al'mah,** written also **Almé** (plu. **Awâlim**), a name applied to the professional female singers and dancing-girls of Egypt. The singers are hired to perform in the harems of the rich. The common dancing-girls are a different and less respectable class, belonging to a tribe called Ghawazi. They perform lascivious pantomimes in the streets.

Almei'da, or **Almey'da,** a fortified town of Portugal, in Beira, and on the Coa, 83 miles N. E. of Coimbra. It is an important stronghold. Here Lord Wellington defeated the French general Massenà, Aug. 5, 1811. Pop. 6580.

Almeida, a town of Brazil, province of Espirito Santo, is on the ocean, about 20 miles N. of Victoria. It was founded by the Jesuits in 1580. Pop. about 4000.

Almeida, de (Don Francisco), a famous Portuguese commander and viceroy of India, was born in Lisbon about 1450. He was a son of the count of Abrantes. Having gained distinction in wars against the Moors, he was appointed viceroy of India in 1505. He built several forts on the Indian coast, and extended the dominion of Portugal by his conquests. In 1507, Albuquerque was sent to India with a commission to supersede Almeida, but the latter refused to resign. He gained a decisive victory over the Egyptian fleet near Diu in 1508, and resigned his office about the end of that year. As he was returning to Portugal, he was killed by some Caffers near the Cape of Good Hope Mar. 1, 1510.

Almeida-Garrett, de (João Baptista), a Portuguese poet and politician, born Feb. 4, 1799, minister of public education 1820–24, was compelled to leave the country several times, and was elected a member of the Cortes in 1836. Died in 1854. Among his works (16 vols., 1854–55), the most celebrated are the epic-lyrical poems "Camões" and "Adozinda," the satirical poem "Dona Branca," as well as several dramas.

Almeri'a, a province of Spain, forms the E. part of the former kingdom of Granada. It is bounded on the N. by Murcia, on the E. and S. by the Mediterranean, and on the W. by Granada. Area, 3299 square miles. It contains rich mines of silver and lead. Grain, silk, and wine are the chief productions. Capital, Almeria. Pop. 349,854.

Almeria, âl-mâ-ree'â, a city and port of Spain, on the Mediterranean, 104 miles E. of Málaga, is the capital of a province of the same name. Under the reign of the Moorish kings it was one of the richest and most important towns in the kingdom of Granada. It has a safe harbor, defended by two forts, and a fine cathedral. Wine, silk, cochineal, and other articles are exported from this port. It is pretty well built, the architecture of many of the houses still showing its Moorish origin, and has some fine squares. Pop. in 1877, 40,323.

Almodovar (Ildefonso Diaz de Ribera), Count. See Appendix.

Al'mohades [Arabic, *Al-Mowahidoon, i. e.* "unitarians," or advocates of the unity of God, as taught in its original purity by Mohammed], a Mohammedan dynasty that reigned in Spain and Northern Africa from 1129 to 1269. It was founded by Abu-Abdillah Mohammed, surnamed Al-Mahdi, "the director." The Almohades were the conquerors and successors of the Almoravides. The first Almohade who took the title of sultan was Abd-el-Mumen.

Almoji'a, a Spanish town in the province of Málaga, 10 miles N. W. of Málaga, is noted for its baths. Pop. 7041.

Almon (John), born at Liverpool about 1738; came to London in 1758; became a writer and publisher of political pamphlets for the opposition, having become personally known to its leaders by publications of his own; among them was a "Review of Mr. Pitt's Administration" (1761). Almon opened a bookseller's store in London in 1763 mainly for the publication and sale of political pamphlets. Died Dec. 12, 1805.

Almonacid', a town of Spain, in the province of Toledo, on the Tagus. Here the French under King Joseph defeated the Spaniards under Vanegas on Aug. 11, 1809.

Al'mond (*Amyg'dalus*), a genus of plants of the natural order Rosaceæ, composed of trees and shrubs nearly allied to the peach. The common almond (*Amyg'dalus communis*) is a tree from twenty-five to thirty feet high, a native of Barbary, but it now abounds in the south of Europe, from which great quantities of the fruit (kernels) are exported. Sweet almonds, which contain a large proportion of bland fixed oil, are an agreeable article of food. Bitter almonds contain a peculiar principle called *amygdalin,* and yield a poisonous oil. The leaves of the almond contain prussic acid. The dwarf almond tree is cultivated for the beauty of its flowers, which resemble the blossoms of the peach, but are generally double.

Almond'bury, a large village, township, and parish of England, in the West Riding of Yorkshire. The village is on the Calder, 36 miles S. W. of York, and has cotton and woollen mills. Pop. in 1881, 13,977.

Almon'de, van (Philippus), sometimes written **Allemon'da,** a Dutch admiral, born at Briel in 1646. He was the second in command under De Ruyter when the latter was killed in 1676, and contributed to the victory which Van Tromp gained over the Swedes in 1677. He accompanied William of Orange to England in 1688, and commanded the Dutch fleet which, aided by the English, defeated the French at La Hogue in 1692. Died in 1711.

Almonds, Oil of. Both sweet and bitter almonds yield by pressure a fixed oil, which is of a light-yellow color and odorless. It consists chiefly of olein; is soluble in 25 parts of alcohol. It is used in medicine, having a mild laxative property. It is sometimes given to newborn infants, mixed with syrup of roses. One hundred pounds of almonds yield about fifty pounds of oil. Bitter almonds, macerated with cold water and distilled, yield a volatile oil known as the "oil of bitter almonds," or hydride of benzoyl. This does not pre-exist in the almonds, but is produced, together with hydrocyanic or prussic acid, from the glucoside amygdalin under the influence of the ferment emulsin:

$$\overset{\text{Amygdalin.}}{C_{20}H_{27}NO_{11}} + \overset{\text{Water.}}{2H_2O} = \overset{\substack{\text{Hydride of}\\ \text{Benzoyl.}}}{C_7H_6O} + \overset{\substack{\text{Prussic}\\ \text{Acid.}}}{HCN} + \overset{\text{Glucose.}}{2C_6H_{12}O_6}$$

It is a colorless, limpid oil, smelling of bitter almonds. When freed from prussic acid it is not poisonous. It oxidizes to benzoic acid, $C_7H_6O_2$. It is regarded as the aldehyde of the benzoic group. It is also produced by the action of manganese dioxide and sulphuric acid on albumen, fibrine, caseine, and gelatine. It has been used to a considerable extent for flavoring confectionery and for scenting soap. For the former purpose the prussic acid, which it usually contains makes it dangerous. For the latter purpose it has been entirely superseded by the much cheaper nitrobenzol or essence of mirbane ($C_6H_5NO_2$), also called artificial oil of bitter almonds, which possesses the same odor.

Al'moner [Fr. *aumônier;* Lat. *eleemosyna'rius*], an officer whose duty is to distribute alms for a king or other person of rank, or for a monastery. The grand almoner of France was a functionary of high rank, and usually a cardinal. This office was abolished during the Revolution. In England there is a lord high almoner, who distributes the bounty of the queen twice a year. All monasteries, by the ancient canons, were to spend not less than a tenth part of their income in giving alms to the poor. All bishops were required to keep almoners.

Almon'te (Don Juan Nepomuceno), a Mexican general and statesman, born in 1804 of Indian descent, was attached to the embassy in London in 1824 and 1832, minister of war under Bustamente, and in 1841 minister plenipotentiary. He distinguished himself in the war against the U. S., was sent to Washington in 1853, and in 1857 to Paris. He went to Mexico with the French expedition in 1862, and was declared president in Juarez's place, but was not able to gain recognition. He entered the capital with the French army June 10, 1863, and was made president of the government junta. Died Mar. 22, 1869, in Paris.

Almo'ra, or **Almo'rah,** a town and important fortress of Northern Hindostan, is situated among the Himalayas, 85 miles N. of Bareilly, and at a height of 5337 feet above the sea. Almora is noted for the British victory ending the war with Nepal in 1815, and causing the annexation of Kumáon by the British. Pop. about 6000.

Al'moravides [a corruption of the Arabic *Almorabitun,* signifying those "bound" or "devoted" to the service of God], the name of a Moslem or Arabian dynasty that reigned in Northern Africa and Spain. It was founded by Adballah-Ibn-Yaseen about 1050, and continued to reign until 1145, when the last Almoravide sultan was conquered by the Almohades.

Alm'quist (Karl Jonas Ludwig), a Swedish poet and prose writer, born in 1793. He published histories, works on grammar, romances, epic poems, etc. Among his works are "Amorina," a romance, and a collection of poems entitled "Book of Thorn Roses" (*i. e.* "Sweet Briars"). Died Sept. 26, 1866.

Alms'houses, institutions for the reception and support of indigent and sick persons who are unable to maintain themselves. Almshouses (officially called "workhouses" in England and "poorhouses" in Scotland) have been long maintained in the latter country, in a few of the larger towns, at the public expense, but there was no general statutory provision to that effect until 1845. In England public provision was made for the poor in 1535, houses for their reception were established by statute in 1563, and the employment of the poor in compulsory labor was inaugurated in 1601. Workhouses in London were established in the reign of William and Mary, and the workhouse system has been since extended by numerous statutes. A similar system was introduced into Ireland in 1838. All paupers who are able to earn their subsistence are compelled to do so. On the continent of Europe outdoor relief is much more frequent, the helpless and homeless poor being cared for in the hospitals. In most of the U. S., almshouses are maintained by county or municipal authorities. In Massachusetts, almshouses, with farms attached, are maintained in nearly all the towns, though some of the smaller towns board their paupers in private families. The "State paupers" of Massachusetts, chiefly of foreign birth, who have no legal residence in any town, are maintained in the State almshouses, of which that at Tewksbury is the principal. Among the other celebrated institutions of this character may be mentioned that on Blackwell's Island, N. Y., that on Deer Island, near Boston, and the Philadelphia county almshouse, West Philadelphia, Pa. (See Pauperism.)

Al'mug Tree, a name found in the Old Testament, is supposed to denote a species of sandal-wood.

Almuñecar', a seaport-town of Spain, in the province of Granada, and on the Mediterranean, 33 miles S. of Granada. It exports fruits and other articles. Pop. about 6000.

Al'my (John J.), born in Rhode Island April 25, 1814, became in 1829 a midshipman in the U. S. navy, a lieutenant in 1841, served in the Mexican war and in the Nicaragua and Paraguay expeditions, became a commander in 1861, a captain in 1865, and a commodore in 1869. During the civil war he was an officer of the blockading squadron, and subsequently chief signal-officer of the navy. Became rear-admiral; retired April 24, 1877.

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Al'my (William), an American philanthropist, born Feb. 17, 1761, was a member of the Society of Friends. He lived at Providence, R. I., and amassed a large fortune in the cotton manufacture. He endowed a large boarding-school at Providence. Died Feb. 5, 1836.

Aln'wick, a market-town of England, in the county of Northumberland, on the river Alne, 32 miles N. of Newcastle. It is well built of stone, and has a town-hall, a theatre, a mechanics' institute, etc. There are remains of the old wall which formerly surrounded the town; one of the old gates is still to be seen. Pop. in 1881, 7440.

Alnwick Castle, the seat of the duke of Northumberland, adjoining the above town, is one of the most magnificent baronial castles in England. It is supposed to be 1200 years old or more, and has belonged to the Percy family since the reign of Edward II. In 1830 it was repaired at a cost of £200,000. Malcolm III., king of Scotland, while besieging this castle in 1093, was killed, with his eldest son, by the earl of Northumberland. William the Lion of Scotland, having laid siege to it in 1174, was defeated and made prisoner.

Al'oë, a genus of endogenous plants of the order Liliaceæ, natives of Africa and other warm regions, and chiefly valuable for their medicinal properties. The drug called aloes is obtained from several species, among which the *Aloe Socotrina,* found in the island of Socotra, affords the best quality. (See Aloes.)

Aloe, American. See Agave.

Al'oes, a stimulating, purgative drug having a bitter taste, is the inspissated juice or extract obtained from the leaves of several species of the aloe. It is imported from Bombay, Socotra, the Cape of Good Hope, the West Indies, etc. "Cape aloes" is obtained from the *Al'oe spica'ta;* "Socotrine aloes," from the *Al'oe Socotri'na;* and "Barbadoes aloes," from the *Al'oe vulga'ris.* Aloes is much used combined with other cathartics; from its stimulating effect upon the lower bowel it is unsuitable for those suffering from piles. Heated with nitric acid, aloes yields chrysammic acid. (See Wood and Bache's "Dispensatory.")

Aloes Wood, called also **Agila** or **Eagle Wood,** is the inner part of the trunk of the *Aquila'ria ova'ta* and the *Aquila'ria agal'lochum,* trees which are natives of tropical Asia. It is supposed to be the lign-aloes of the Bible. Aloes wood contains a fragrant resinous substance, which emits a pleasant odor when burned, and is highly prized as a medicine by the Orientals.

Al'ogi, a sect of religionists opposed to the Montanists, was formed about 160 A. D. They were styled Alogi, a name of double meaning, signifying their rejection of writings in which the Logos is mentioned, and also that they were without reason.

Aloï'adæ (*i. e.* "sons of Aloeus"), in Greek mythology, Otus and Ephialtes, two giants of extraordinary strength who attempted to storm Olympus, and were condemned to suffer in Tartarus.

Alom'pra, the founder of the reigning dynasty of Burmah, was born about 1700. He revolted against the king of Pegu in 1753, was victorious in several battles, and became master of Burmah, in which he founded Rangoon. Died May 15, 1760.

Alopecia. See Baldness.

Alo'ra, a city of Spain, in the province of Málaga, 17 miles N. W. of Málaga. Soap and oil are manufactured here. Pop. 6818.

Alosa. See Shad.

A'lost, or **Aalst,** an ancient walled town of Belgium, in East Flanders, on the navigable river Dender, 18 miles by rail W. N. W. of Brussels. It contains the church of St.-Martin, one of the largest and finest in Belgium, a town-hall, a college, and an academy of design. Here are cotton-mills, copper-foundries, distilleries, and manufactures of lace, leather, etc. Alost has an active trade, and exports hops, corn, and oil. It was formerly the capital of Austrian or imperial Flanders. Pop. in 1880, 20,679.

Aloysius (Saint) of Gonzaga. See Gonzaga.

Alpa'ca (the *Auche'nia pa'co,* supposed by several zoologists to be only a domesticated variety of the *guana'co*), a ruminant animal nearly allied to the lama, and belonging to the family Camelidæ, is a native of the mountains of Peru and Chili. It is rather smaller than the lama, and has a long neck, which it carries erect. Flocks of domesticated alpacas are kept by the Peruvians, who export great quantities of their wool. This wool, which varies in color, is remarkable for its length, fineness, silken texture, and a lustre almost metallic. It is longer and straighter than that of sheep. The most extensive manufactures of alpaca cloth are in England, which imports annually about 3,000,000 pounds of this wool. It first became an article of commerce in England in 1829. The alpaca has also been introduced into Australia, whence the wool was first obtained in 1859. A great part, however, of the so-called alpaca goods of commerce are made of the wool of the Cotswold, Leicester, and other long-wooled breeds of sheep.

Alpaca.

Alp-Arslân' (*i. e.* "strong lion"), written also **Alp-Arselan,** a famous Persian sultan of the Seljookide dynasty, was born in Turkistan in 1029. He ascended the throne in 1063, embraced Islamism, and became sole monarch of Persia from the river Tigris to the Oxus. Under the direction of his wise vizier, Nizâm-ul-Mulk, who was one of the most noted statesmen in early Mohammedan history, and ably assisted him in consolidating his empire and subduing contending factions, Persia enjoyed great prosperity, many colleges were founded, justice was well administered, and learning was promoted. In 1071, Alp-Arslân defeated and took prisoner Romanus Diogenes, emperor of Constantinople, whom he treated with great generosity and kindness. Alp-Arslân was assassinated Dec. 15, 1072.

Alpena, a city, the capital of Alpena co., Mich. (see map of Michigan, ref. 4–J, for location of county), at the head of Thunder Bay. It manufactures about 125,000,000 feet of lumber yearly, contains a large hemlock-extract factory, has an excellent harbor, and is situated about 210 miles N. by W. from Detroit on Lake Huron. Pop. in 1880, 6153; in 1884, 9196.

Alpes, Basses. See Basses-Alpes.

Alpes, Hautes. See Hautes-Alpes.

Alpes-Maritimes, a department forming the S. E. extremity of France, bordering on Italy. It is bounded on the N. and E. by Italy, on the S. by the Mediterranean Sea, and on the W. by Var and Basses-Alpes. Area, 1518 square miles. It is drained by the river Var. The surface is diversified by mountains and fertile valleys. This department includes the county of Nice, which was ceded by Italy to France in 1860; also the arrondissement of Grasse, detached from the department of Var. It is partly covered with forests of valuable timber. Among its staple products are grapes, olives, oranges, lemons, figs, and silk. The chief towns are Grasse, Antibes, Cannes, and Nice, which is the capital. It is divided into 3 arrondissements, 26 cantons, and 152 communes. Pop. in 1881, 226,621.

Al'pha and **O'mega,** the names of the first and last letters of the Greek alphabet, A, Ω. These words occur in the book of Revelation as a title of the Lord Jesus Christ. The two letters were used by the early Christians as symbols of faith, and were sometimes marked on coins, tombs, ornaments, etc.

Al'phabet, a word formed of the first two Greek letters (α, β, *alpha, beta*), and used to denote the entire series of letters (arranged in a certain order fixed by custom) with which any language is written. Nearly all the modern European tongues, deriving their letters, for the most part, from the ancient Romans, have, with slight exceptions, the same characters (though pronounced differently), arranged in precisely the same order as the Roman (or Latin) alphabet. The *ä* (*ae*), *ö* (*oe*), and *ü* (*ue*), occurring in the German, Danish (or Norwegian), Swedish, and Hungarian, but not found in the other languages, are to be considered as diphthongs, or at least as compound characters, rather than single letters. *W* is not found in the Italian, Spanish, or Portuguese alphabet, nor in French, except in words or names of foreign origin. *K* is scarcely used in French, Spanish, or Portuguese, except in a few words of foreign derivation. The Italians discard not only *w* and *k*, but also *x* and *y*. The ancient Romans used *k* and *y* in a very few words, but *w* was entirely unknown to them. It was originally written *vv*, whence the English name of the letter, *u* and *v*, like *i* and *j*, having formerly been equivalent to each other.

The order of the letters is the same in the alphabets of most of the European languages; in the Greek, however, the letters, though nearly corresponding in power, and often similar in form, to those of the Roman alphabet, are arranged very differently, *g* (γ) being the third and *z* (ζ) the sixth in the order of the letters; and *x* (ξ), instead of being almost at the end, as in our alphabet, is near the middle, not to mention other differences. In Russian, Hebrew, Arabic, and Sanscrit the order of the alphabet varies still more from the Roman, while many of the letters differ not only in form, but in power, from those of the languages of Western Europe.

Not only the origin of letters, but also the successive steps or stages by which they were brought to their present perfection, is involved in great obscurity. According to a commonly-received theory, all writing was in the first instance *ideographic* (from the Gr. εἰδέα, an "image," and γράφω, to "write" or "paint"), that is, representing images or scenes directly to the eye (and hence called picture-writing), instead of being *phonetic*, *i. e.* representing sounds or words which are merely the signs of ideas. Picture-writing, which even a few years since prevailed very extensively among our aboriginal tribes, was doubtless one of the earliest arts known to the human race. To convey, for example, the idea that one man had killed another, they would represent the figure of a dead man stretched upon the ground, and another man standing by erect, with some deadly weapon in his hand. Since, however, this kind of writing would only be adapted to represent images or scenes, and not thoughts, as mankind advanced in culture and required a more perfect instrument for communicating their ideas, phonetic writing, representing sounds by means of signs (which we term letters), was at length invented. But between the primeval ideographic writing and the fully-developed phonetic method there was, we have every reason to believe, an intermediate stage—namely, symbolic writing. Thus, the ancient Egyptians represented, it is said, a siege by a scaling-ladder, a battle by two hands holding a bow and shield, etc. In the progressive steps towards a perfect system of writing by phonetic signs, it seems probable that those signs were at first used to represent entire syllables. But such a system would obviously require many different characters, rendering it extremely complicated and difficult to learn. To obviate this difficulty, signs were used to represent the simple elementary sounds produced by the human voice.

There is reason to believe that the forms of the letters were first suggested by some animal or object whose name had as its initial sound that which was to be represented by the letter. Thus, in Hebrew, the word *âleph*, an "ox," has for its initial syllable the sound of the first letter, and this letter was originally represented by the mere outline of the head of an ox; so also *bêth*, a "house," having *b* for its initial sound, that letter was formed after a rude picture, in outline, of a house; and so on. (For a presentation of the most remarkable alphabets, see the notices of the various languages under their respective heads, as ARABIC, GREEK, HEBREW, etc., etc.) J. THOMAS.

Alphæ'us (in John xix. 25 called **Clopas**), the father of the apostle James the Less, and also possibly of Jude.

Alpharetta, Ga. See APPENDIX.

Al'phen, van (HIERONYMUS), a popular Dutch poet and jurist, born at Gouda in 1746. He became treasurer-general of the United Provinces. He produced, besides other works, "Poems and Meditations" (1777), "Short Poems for Children" (1781), which are highly commended, and an admired imaginative poem on "The Starry Heavens" ("De Starrenhemel," 1783). Died in 1803.

Alphe'us, or **Alphei'us** [Gr. Ἀλφειός], the modern Rouphia, a celebrated river of Greece, in the Morea. It rises in the S. E. part of Arcadia, on the frontier of Laconia, flows westward through Arcadia and Elis by Olympia, and empties into the Ionian Sea after a course of about 100 miles. The Alpheus, like some other rivers in Arcadia, disappears more than once in the cavernous limestone mountains, and appears again after flowing some distance underground. In the commencement of its course it is now called the *Sarânda*. Below Pegæ, the Alpheus receives the Helisson, and below Heræa the Ladon, after which it is called the Rouphia. In the upper part of its course the Alpheus is generally called the *River of Karitena*. Below the Ladon the Alpheus receives the Erymanthus. A temple and grove of Artemis Alpheionia were at the mouth of the Alpheus, which river is wide and shallow from the pass of Lavdha to the sea.

Alpheus, in classic mythology, a river-god and a son of Oceanus. According to the poetical legend, he loved the nymph Arethusa, who fled from him to the island of Ortygia, and was transformed into a fountain. Alpheus pursued her under the sea and was united to the fountain.

Alphonso. See ALFONSO.

Alpine Club, a society for the promotion of Alpine discovery, was formed in England in 1858. Three members of this club, Mr. Hudson, Lord Francis Douglas, and Mr. Haddo, perished with their guide in the descent of the Matterhorn in July, 1865. Other Alpine clubs were formed in Austria, Switzerland, Italy, and Germany. In 1873 an American Alpine club was formed.

Alpine Plants are those plants, usually of a somewhat arctic character, which are found in elevations approaching perpetual snow in the Alps and in other regions in different parts of the world. On the Andes, near the equator, at an elevation of from 12,000 to 15,000 feet above the sea, many kinds of plants are found resembling in their general appearance those which occur in Switzerland at an elevation of 6000 feet; and these, again, resemble, or are even identical with, the species which in Lapland grow upon hills of very little elevation, or which are found at the level of the sea. Similar plants occur also in all lofty mountain-ranges at elevations varying greatly within narrow geographical limits. When the alpine plants of Central Europe are spoken of, those are meant which grow at an average height of 6000 feet, marking what, in the language of science, is called a *zone*. This on the Riesengebirge falls as low as 4000 feet, and rises in the Southern Alps and Pyrenees to 9000 feet, and even higher. Although rich in forms peculiarly its own, this zone contains many plants which are likewise found on much lower hills. But the number of these diminishes as the elevation increases. Hence the spaces clear of snow in the highest regions possess a characteristic flora, the plants of which are distinguished by a diminutive habit, and an inclination to form a thick turf, frequently also by a covering of wool, whilst their stems are often partly or altogether woody, and their flowers are in many instances remarkably large, of brilliant colors, and very odoriferous. In the Alps, gentians, saxifrages, rhododendrons, and various species of primrose abound. With the phanerogamous plants are associated a number of delicate ferns and exceedingly beautiful mosses. Many alpine plants are limited to a very small district.

Alpi'nus, or **Alpin** (PROSPER), M. D. [It. *Pros'pero Alpi'ni*], a celebrated Italian botanist, born at Marostica, in the Venetian state, Nov. 23, 1553. Having passed several years in Egypt, he published in Latin a work "On the Plants of Egypt" (1591), and obtained a chair of botany at Padua in 1593. He made important contributions to the science of botany. Among his works is one "On Exotic Plants." Died Feb. 5, 1617.

Alp'nach, or **Alp'nacht,** a Swiss village in the canton of Unterwalden, at the foot of Mount Pilatus, 8 miles S. S. W. of Lucerne. Here was the famous *slide of Alpnach*, a wooden trough or railway on which timber was moved down with great velocity from a height of 2500 feet. Pop. 1630.

Alps [Lat. *Al'pes;* Fr. *Alpes;* Ger. *Al'pen;* etymology uncertain], the most remarkable system of mountains in Europe in regard to both extent and elevation, may be said to extend from the Mediterranean between Marseilles and Nice irregularly eastward to near 18° E. lon. and 45° 30′ N. lat. They form a crescent-shaped chain, and stretching across the country cover a part of France, the greater part of Switzerland, and a considerable portion of Northern Italy and Austria. They culminate in Mont Blanc, and form the watershed or dividing line between the rivers that flow into the Mediterranean and those which discharge their waters into the German Ocean and Black Sea. Several important rivers of Europe take their rise in Alpine valleys; the largest are the Rhine and the Rhone. This system of mountains is included between the parallels of 44° and 48° N. lat. and 6° 40′ and 18° E.

lon., and covers an area of about 95,700 square miles. It is estimated that the Alps, with their various windings, have an extent from W. to E. of about 700 miles, and a breadth varying from 50 to 200 miles. The bases of the northern and the southern sides are encircled by an extensive series of lakes, those on the former side being from 1200 to 1500, and those on the latter from 600 to 700, feet above the level of the sea, while in the interior some are found at an elevation of 6000 feet. The average height of the central chain is 10,000 feet, being in the region of perpetual snow, while several hundred peaks rise above it to 12,000 and 15,000 feet. From these snowy heights descend the destructive avalanches. In the numerous valleys of these lofty regions are collected the immense quantities of snow which form the long streams of ice called glaciers. (See GLACIERS, by J. BALL, F. R. S.) The Alps are generally divided into three parts, which are distinguished as the East, the West, and the Middle Alps. I. WEST ALPS.—The principal ranges included within these are: 1. The Maritime Alps, commencing not far from Genoa, extend westerly along the coast of the Mediterranean to near Barcelonette in France, and attain in their highest part an elevation of nearly 10,000 feet. 2. The Cottian Alps, culminating in Monte Viso, 12,600 feet high. 3. The Graian Alps, forming the boundary between Savoy and Piedmont, and rising in Mont Iseran to an elevation of 13,272 feet, and in Mont Cenis to 11,785 feet. II. MIDDLE ALPS, *Central Chain.*—1. The Pennine Alps between the plains of Lombardy and the valley of the Rhone. Their most lofty peaks are—Mont Blanc, 15,781 feet high, and Monte Rosa, 15,217 feet high. 2. The Helvetian Alps, extending from the pass of the Simplon along St. Gothard (10,000 feet) to the pass of Splügen. 3. The Rhætian Alps, between the Inn, the Adda, and the Upper Adige. *Northern Chain.*—1. Bernese Alps, between the Rôhne and the Aar. The highest summits are Finsteraarhorn, 14,026 feet, Jungfrau, 13,672 feet, and Schreckhorn, 13,393 feet high. *Southern Chain.*—1. Oertler Alps, between the Adda and the Adige, the highest peak being Oertlerspitze, 12,823 feet high. 2. The Tridentine Alps, between the Adige and the Piave. III. EAST ALPS.—The principal chains of these are: 1. The Noric Alps, highest summit Gross-Glockner, 12,957 feet high. 2. The Carnic Alps. 3. The Julian Alps. 4. The Dinaric Alps. Generally speaking, the Alps are lowest where the system is broadest, and highest where the system is narrowest.

The passes over the Alps are called, in French, *cols.* They are about sixteen in number, and now most of them can safely be travelled over by carriages. One of the most noteworthy is the Great St. Bernard, connecting the valley of the Rhône with Piedmont. It was crossed by Napoleon in 1800. Its highest summit is about 8170 feet. The Little St. Bernard connects Geneva, Savoy, and Piedmont. This is the pass by which some suppose Hannibal to have crossed into Italy. Its highest point is about 7190 feet above the level of the sea, and is now but little used. The Splügen Pass, connecting the sources of the Rhine with the Adda, was used by the Romans in their intercourse with the countries bordering on the Danube and the Rhine, by the Germans in the Middle Ages, as well as by modern tourists. In some places bridges, terraces, and long galleries are constructed of stone to afford protection against the avalanche and whirlwinds. The latter are not only destructive in themselves, but frequently set the former in motion. The Alps, with the exception of Switzerland, are rich in minerals, and offer one of the finest fields in the world for the geologist. It has been shown that the highest central mass, the primary Alps, consists chiefly of the crystalline rocks, gneiss and mica-slate, with a small proportion of granite. Representatives of the carboniferous and Jurassic formation appear among the Central Alps. In the Pennine, Graian, and Rhætian Alps are found large masses of serpentine. Quartz-porphyry is found in the N. of Piedmont and in the upper valley of the Adige; and in the E. of Piedmont, on the N. and S. sides of the chief range, extensive deposits of clay-slate and grauwacke, mixed with transition limestone, occur. Precious stones are found in considerable numbers. Among these is the well-known rock-crystal of St. Gothard. Most of the mining and smelting is done in the eastern part of the Alps; gold and silver are found in Tyrol, Salzburg, and Carinthia; copper exists in the French Alps, in Tyrol, and in Styria. The amount of iron and lead extracted from the mines of Carinthia and Styria is about 745,000 hundredweight per annum. Large quantities of quicksilver are extracted from the mines in Carniola. Salt exists in almost every part. Coal is found in abundance in Switzerland and Savoy, and hot springs are numerous. Many animals inhabit the Alps. Among them are the chamois, the ibex, marmots, wolves, bears, lynxes, wild-cats, and various species of birds. Of the domestic animals, goats and oxen abound, but horses, sheep, dogs, etc. are found in small numbers. Fish are found in some of the lakes at an elevation of 6000 feet. The inhabitants of the Alps are industrious and simple-hearted, but the spirit and manners of the neighboring plains have penetrated the larger valleys; the true Alpine life has passed away, and the simplicity and characteristic industry of the Alpine farms are now preserved only in the higher valleys. REVISED BY A. GUYOT.

Alpujar'ras, a mountain region or range of Spain, in Granada, between the Sierra Nevada and the Mediterranean. The direction of the range is nearly parallel to the sea-coast. The highest peaks rise to the altitude of about 7000 feet. Rich pastures abound on the slopes and in the valleys of the northern side of the range.

Alrau'nen, or **Alru'næ,** a name given by the ancient Germans to certain prophetic women who were employed in sacrificing victims, and were supposed to have magical or supernatural skill. Also applied to small images carved out of mandrake roots, and exhibiting a rude imitation of the human form. These were venerated or superstitiously prized by the Germans and other northern nations.

Alsace and **Alsace-Lorraine.** See ELSASS and ELSASS-LOTHRINGEN.

Alsa'tia, a name formerly given to Whitefriars, London, which was used as a sanctuary by criminals in the early part of the seventeenth century. This privilege, owing to disgraceful abuses of it, was abolished by an act passed in 1697. (See WHITEFRIARS.)

Alsatia. See ELSASS and ELSASS-LOTHRINGEN.

Al Se'gno, in music, a notice to a performer that he must return and commence again that part of the movement to which the sign 𝄋 is prefixed.

Al'sen, an island belonging to the Prussian province of Sleswick-Holstein, in the Baltic, near the coast of Sleswick, is 18 miles long, and has an area of 106 square miles. It is remarkable for its picturesque and beautiful scenery, is very fertile, and produces excellent apples. Christian II. of Denmark, who was deposed in 1523, was imprisoned here for nearly seventeen years. Pop. 22,500.

Al Sirat' (literally, the "road" or "passage"), a bridge as narrow as the edge of a razor, supposed by the Mohammedans to extend from this world over hell to paradise.

Al'sop (CHARLES RICHARD), born in 1802, graduated at Yale in 1821, became a lawyer of Middletown, Conn., was mayor of that city (1843–46), and State senator in 1855, besides holding other responsible positions. Died Mar. 5, 1865.

Alsop (RICHARD), born at Middletown, Conn., Jan. 23, 1761, was versed in Greek, Latin, French, and other languages. In conjunction with Theodore Dwight and others, he edited the "Echo," a satirical publication, the first number of which was issued at Hartford in 1791. He published a "Monody on the Death of Washington" (1800), and translated from the Spanish Molina's "Natural and Civil History of Chili." Died Aug. 21, 1815.

Als'ton (CHARLES), born at Eddlewood, Scotland, in 1683, became a noted professor of botany and *materia medica* in Edinburgh University about 1740. Died in 1760.

Al'ston (JOHN), celebrated as the introducer of an improved system of printing books for the blind with embossed or raised Roman capital letters, was a merchant of Glasgow, Scotland, who died in 1846. He was long a director of an asylum for the blind in that city.

Alston (WILLIS), a native of North Carolina, represented a district of that State in Congress from 1803 to 1815, and from 1825 to 1831. He was chairman of the committee of ways and means during the war of 1812–14. Died April 10, 1837.—His father, WILLIS ALSTON, was a member of Congress 1799–1803.

Alstrœme'ria, or **Al'strœmer's Lily,** a genus of plants of the order Amaryllidaceæ, natives of Peru and Chili. Several species of this genus have beautiful flowers, and are cultivated in gardens. The tubers of the *Alstrœmeria Salsilla* are cultivated for food in the West Indies.

Al'strömer, or **Alstrœmer** (KLAUDIUS or KLAS), a Swedish naturalist, was born at Alingsås Aug. 9, 1736. He was a pupil of Linnæus, who named in his honor a genus of plants, Alstrœmeria. He travelled in Spain and other countries, and published a "Discourse on the Breeding of Fine-woolled Sheep" (1770). Died Mar. 5, 1796.

Alt, in music, a term applied to the high notes of the scale.

Alt, or **Al'ten,** a German word signifying "old," forms the prefix of numerous names in Central Europe, as "Alt-Ofen" ("Old Ofen").

Altai', or **Al'ta Yeen Ooo'la** (*i. e.* "the golden mountain"), the name of a system or range of mountains of Central Asia, near the S. border of Siberia. They extend from the sources of the Irtish to Lake Baikal. One range, called the Little Altai, forms the boundary between Siberia and Chinese Tartary. According to some authorities, the Altai proper extends from 84° to 100° E. lon., and lies between 48° and 54° N. lat. The Obi and other large rivers rise in the Altai Mountains, and flow northward. On the west the range terminates in the Katoonsk or Katoonya mountains, a small isolated group, in which Mount Bielookha or Beluka rises to the height of 11,063 feet. Their flanks in many places are covered with magnificent forests of cedar. A large portion of this system of mountains is covered with perpetual snow. Rich mines of gold, silver, and copper have been opened in them. Porphyry and several kinds of precious stones are also found.

Altamaha′, a river of Georgia, formed by the union of the Oconee and Ocmulgee in the central part of the State. Flowing south-eastward through sandy plains, it enters the Atlantic 12 miles below Darien, after a course of about 140 miles. It is navigable for vessels of thirty tons.

Altamont, capital of Grundy co., Tenn. (see map of Tennessee, ref. 7–G, for location of county), about 120 miles S. W. of Knoxville. Pop. in 1880, 110.

Altamu′ra, a handsome town of Southern Italy, in the province of Bari, at the foot of the Apennines, 33 miles S. W. of Bari. It is defended by a castle, and has a fine cathedral. It was formerly the seat of a university. Here is the site of the ancient *Lupatia*. Pop. in 1881, 19,933.

Al′tar [Lat. *alta′re*], a table or elevated place on which the ancient Jews and pagans offered sacrifices. The first altar mentioned in history was built by Noah immediately after the Flood. Altars were sometimes erected as memorials of some great event by the religious personages of sacred history. The ancient Greeks and Romans used a great number of altars, each of which was dedicated to some particular deity. They were constructed of different materials and in various forms. The name is also applied to a part of the furniture of Christian churches. The altar of Episcopalian churches is the communion-table. In the Prayer Book of Edward VI. (1549), the word altar was retained in the communion service, but "table" was substituted a few years later for the word altar. The Lutheran Church retains the altar. An altar was a sanctuary both among the Jews and the heathen for those who fled to it for refuge.

Alt′dorf, or **Al′torf,** a town of Bavaria, on the river Schwarzbach, 13 miles E. S. E. of Nuremberg, had a university from 1623 to 1809. Pop. in 1880, 3293.

Altdorf (Switzerland). See Altorf.

Alt′dorfer (Albrecht), an eminent German painter and engraver, a pupil of Albert Dürer, born at Altdorf, in Bavaria, in 1480. He is called by the French "Le Petit Albert" (in allusion, doubtless, to the great Albert Dürer). His works are characterized by a romantic spirit. A painting of the victory of Alexander over Darius is called his masterpiece. He left many engravings on copper and on wood. Died in 1538.

Alte′a, a seaport-town of Spain, in the province of Alicante, on the Mediterranean, 38 miles N. E. of Alicante. Pop. 5193.

Al′tena, a town of Prussia, in Westphalia, on the Lenne, 18 miles S. E. of Dortmund. It has manufactures of iron and steel. Pop. in 1880, 8787.

Altenburg, Saxe, German duchy of. See Saxe-Altenburg.

Al′tenburg, a walled town of Germany, capital of Saxe-Altenburg, is 24 miles by rail S. S. E. of Leipsic. It is the seat of the higher courts, and contains seven churches, one theatre, and several hospitals. Linen goods, brandy, porcelain, and optical instruments are made here. Pop. in 1880, 26,241.

Altenes′sen, a town of Prussia, in the Rhine province, has some iron-works. Pop. 10,099.

Al′tengaard′, a seaport-town of Norway, capital of the province of Finmark, on the Alten, at the head of a fiord, 53 miles S. S. W. of Hammerfest. It is often visited by Russian vessels.

Al′ten-Oet′ting, or **Alt′ötting,** a small town of Bavaria, near the river Inn, 42 miles S. W. of Passau. It is visited by great numbers of Roman Catholic pilgrims, who are attracted thither by an image of the Virgin Mary, called the "Black Virgin." Several German emperors held their court here in the Middle Ages. Pop. in 1880, 3168.

Al′tenstein, a castle in Saxe-Meiningen, Germany, near the watering-place Liebenstein. Near this castle is the beech tree where Luther was captured and taken to the Wartburg on May 4, 1521.

Alt′enstein, von (Karl), Baron, a Prussian minister of state, born at Anspach Oct, 7, 1770. In 1815, he rendered important services to Germany by the recovery of works of art and literature which the French had removed to Paris. He was appointed minister of public instruction and worship in 1817, and held that office for many years. Died May 14, 1840.

Al′teratives [from the Lat. *al′tero, altera′tum,* to "change"], a term applied to medicines which are often irritant or poisonous in full doses, but which almost imperceptibly alter disordered secretions, acting specially on certain glands, or upon absorption in general, when given repeatedly in small doses. Thus, mercury is an irritant capable of producing salivation and other distressing symptoms; but if small doses are given at intervals, they produce alteration in disordered actions, which may result in an improvement in the nutrient functions, and they may effect these changes without otherwise affecting the constitution or inducing salivation. So iodine, also an irritant in large doses, and poisonous in some forms, is most useful, when given in proper doses, in correcting a scrofulous condition, promoting the absorption of tumors, etc. Preparations of arsenic are powerful alteratives in some cases of skin-disease. So also are the decoctions of certain plants, which, taken in large quantities of water, operate partly by their solvent properties, and partly by their stimulant effect on the organs of the body. Properly speaking, any medicine is an alterative which, when given either in large or small quantities, has the power of gradually correcting or modifying a diseased condition. The term "alterative" is less used than formerly, and physicians differ as to the propriety of using drugs of this class.

Al′ter E′go ("my other self"), a term used in the former kingdom of Naples to signify the king's deputy, who was authorized to perform the functions of royalty during the compulsory absence of the king.

Alter′nate [Lat. *alterna′tus,* from *alter′no, alterna′tum,* to "interchange"] **Generation,** in biology, is that modification of generation in which the young do not resemble the parent, but the grandparent, or even some more remote ancestor, so that the successive series of individuals seem to represent two or more different species alternately reproduced. The salpa, a floating gelatinous molluscoid animal, is an example; it may be found as a solitary individual, pregnant with numerous minute salpæ of a more simple structure, which continue after birth to be united together in the form of a long chain floating on the sea. In each individual of this chain there is generally developed an egg from which is hatched a solitary salpa, of the form and organization of its grandparent (*i. e.* the parent of the chain of aggregate salpæ); thus the species is represented by an alternation of simple and aggregate salpæ. (See Parthenogenesis and Cestoid Worms.)

Althæ′a [Gr. *ἀλθαία,* from *ἄλθω,* to "heal"], a genus of plants of the natural order Malvaceæ, natives of Europe and naturalized in the U. S. It includes the hollyhock (*Althæ′a ro′sea*) and marshmallow (*Althæ′a officina′lis*), which is used in medicine as a demulcent or emollient. Althæa, or shrubby althæa, is also a common name of the *Hibis′cus Syri′acus.*

Althen (Ehan or Jean), a Persian who gained distinction by introducing Turkey madder into France, born in 1711, taken captivo by the Arabs in his youth, and sold as a slave in Smyrna, whence he escaped to France with seeds of madder, 1761. He made successful experiments in the cultivation of that plant, which was afterwards extensively cultivated and became very profitable. Died in 1774.

Althorp, Lord. See Spencer.

Altin′ Nor, or **Altyn′ Nor** (*i. e.* "sea of gold"), or **Teletskoi,** a lake of Siberia, in the S. part, is about 320 miles S. of Tomsk, and is traversed by one of the head-streams of the Obi. It is about 48 miles long and 8 miles in average width.

Al′titude [Lat. *altitu′do,* from *al′tus,* "high"], a scientific synonym for height. In astronomy, it signifies the height of a star or other body above the horizon—that is, the angle of elevation of a celestial body. This altitude is expressed in degrees, the greatest possible altitude being 90 degrees. It is measured in observatories by means of a telescope attached to a graduated circle, which is fixed vertically. The altitude of a triangle is measured by a straight line drawn from the vertex perpendicular to the base; that of a cone by a straight line drawn from the vertex perpendicular to the plane of the base.

Alt′mühl, a river of Bavaria, rises near the village of Hornau, flows S. E. and E. and enters the Danube at Kelheim, after a course of 100 miles. The Ludwigs Canal connects this river with the Regnitz, and opens communication between the Danube and the Rhine.

Al′to, in music, the counter-tenor part, or that immediately below the treble; the deepest and lowest kind of musical voice in females and boys.

Altobel′lo (Francesco Antonio), born at Bitonto, Italy, in the seventeenth century, was a historical painter, excelled in invention and composition, and was located at Naples, Italy.

Altoma′re (Donato Antonio), a noted Neapolitan physician and medical writer, often called, in Latin, **Dona′tus ab Altomari,** was driven from Naples by persecution, but was restored by the mediation of Pope Paul IV. His principal work, "Ars Medica" (1553), has been many times reprinted. Died about 1566.

Altomün′ster, a place of pilgrimage in Northern Bavaria, has a nunnery which was founded by the Scotchman Saint Alto in the eighth century. Pop. about 1000.

Al′ton (Richard), Count of, born in Ireland in 1732, became a general in the Austrian service, and commanded in the Low Countries at the commencement of the rebellion in 1789. He was obliged to evacuate Brussels, and died in 1790 during his retreat toward Vienna.

Al′ton, city, an important R. R. centre and port of entry in Madison co., Ill. (see map of Illinois, ref. 8–D, for location of county), on the Mississippi River, 21 miles above St. Louis and 3 miles above the mouth of the Missouri. It stands on a high limestone bluff. The city has important manufactures. Large quantities of grain, hay, fruit, stone, and lime are shipped here. It has a female seminary and a large Roman Catholic cathedral, an excellent system of public schools, a large number of factories, foundries, glassworks, etc., and is connected by horse railroad with Upper Alton, 2 miles distant. Upper Alton is the seat of Shurtleff College. Pop. in 1870, 8665; in 1880, 8975.

Alton, capital of Oregon co., Mo. (see map of Missouri, ref. 8–H, for location of county), about 150 miles S. S. W. of St. Louis. Pop. in 1870, 76; in 1880, 127.

Al′ton, d′ (Joseph Wilhelm Eduard), was born at Aquileja, an old town of Austria near the Gulf of Venice, in 1772. He studied natural history and the fine arts and travelled in various countries, including England and France; wrote "Natural History of the Horse" and "Comparative Osteology." He was professor of archæology and the history of art in the University of Bonn from about 1821 until his death in 1840.

Al′tona, the most populous and important city of the Prussian province of Sleswick-Holstein, is on the right bank of the Elbe, immediately adjoining Hamburg. It is connected by railroad with Kiel, and has an extensive trade by the navigation of the Elbe. Many of the merchants of Hamburg reside in Altona, which contains an observatory, a gymnasium, and a library of 12,000 volumes or more. Here are important manufactures of tobacco, soap, chemicals, leather, ropes, etc. Altona is a free port, accessible to large vessels. Pop. in 1880, 91,047.

Alton Bay, N. H., on Lake Winnipiseogee, and at the terminus of the Dover and Winnipiseogee R. R., 96 miles from Boston, is a place of summer resort. It is connected by steamer with Centre Harbor.

Alton-Shee, d′ (Edmond), Comte, a French democrat, born in 1810. He promoted the revolution of Feb., 1848, after which he acted with the socialists and radical reformers.

Altoo′na, city, on R. R., in Blair co., Pa. (see map of Pennsylvania, ref. 5–D, for location of county), 237 miles W. of Philadelphia, and 117 E. of Pittsburg, at the E. base of the Alleghany Mountains, which the railroad here crosses. It contains the extensive machine-shops of the Pennsylvania R. R., in which locomotives and cars are manufactured, and in which over 2000 men are employed; large individual car-works, several extensive planing mills, one large rolling-mill, partly in the city, extensive water-works, costing over $300,000, and a mechanics' library, containing about 3000 volumes. Pop. in 1870, 10,610; in 1880, 19,710.

Alt′orf, or **Alt′dorf,** a town of Switzerland, the capital of the canton of Uri, is near the S. extremity of the Lake of Lucerne, and at the foot of the Grunberg. Here is an old tower said to mark the place where William Tell shot the apple off his son's head. Pop. 2724.

Al′to-Rilie′vo (*i. e.* "high relief"), a term used in sculpture to designate the mode of representing objects by figures which stand completely out from the ground, being attached to it only in a few places, and in others worked almost entirely round like single statues. This branch of art was brought to the highest perfection by Phidias in the metopæ of the Parthenon, which are now in the British Museum. Figures which have only a slight projection from the ground are said to be in basso-rilievo (or bas-relief).

Altran′städt, a town of Saxony, at which Charles XII. of Sweden concluded a treaty with Augustus, elector of Saxony, in 1706. A treaty was also signed here in 1714 between the emperor Charles VI. of Germany and Louis XIV. of France.

Altri′ces, a name given by Sundevall in 1826 to those birds whose young are callow and incapable of taking care of themselves.

Al′tringham, a market-town of England, in Cheshire, is on the Cheshire Midland R. R. and on Bowden Downs, 8 miles by rail S. W. of Manchester. It has some cotton-factories and is a resort for invalids, because of the salubrity of the air. Pop. in 1881, 11,249.

Alturas, capital of Modoc co., Cal. (see map of California, ref. 1–C, for location of county). Pop. in 1880, 148.

Alt′wasser, a town and watering-place of Prussia, in the province of Silesia. It has iron-foundries, coal-mines, and porcelain-factories. Pop. 6985.

Al′udels (plu.), [a word of Arabic origin], pear-shaped glass or earthen vessels used as receivers in the distillation of certain substances, especially mercury and hydrochloric acid. They are generally arranged in the form of a chain on an inclined surface.

Al′um [Lat. *alu′men*]. Common alum is a double salt of great importance, the chemical name of which is "sulphate of alumina and potash." It occurs in colorless octahedral crystals, having a sweet astringent taste. It is a powerful styptic, and is applied sometimes as a mild caustic. Its formula is $KOSO_3 + Al_2O_33SO_3 + 24HO$ (or, by the new notation, $K_2Al_24SO_4.24H_2O$). Alum is largely manufactured, and is much used in preparing skins, as a mordant in calico-printing, and in glazing paper, and occasionally for the adulteration of bread.

Ammonia alum, $(NH_4)_2Al_24SO_4.24H_2O$, containing ammonium in place of potassium, has of late largely replaced potash alum in the arts, owing to the low cost of the ammonic sulphate prepared from gas liquor. The term alum is now applied to a class of isomorphous double sulphates containing a monad sulphate, a trivalent sulphate, and 24 molecules of water. The monad metals which are known to form alums are potassium, sodium, lithium, cæsium, rubidium, thallium, and silver, and also ammonium, etc.; the trivalent metals aluminium, iron, chromium, manganese. Next to the alums above mentioned, the most common is potassic-chrome alum, $K_2Cr4SO_424H_2O$. Ammonio-ferric alum is used in medicine and the arts.

Al′um Bagh, a fort in Oude, about 4 miles from Lucknow, was originally a palace surrounded by a fine garden and a park. During the mutiny of 1857 it was used as a fort by the Sepoys, from whom it was taken by the British under Outram and Havelock. It was afterwards defended with success by Sir James Outram and a garrison of 3500 men against the Sepoys.

Alu′mina, the oxide of aluminium, is the most abundant of all the earths, and is the principal constituent of clay. In 100 pounds of alumina there are 52.94 of aluminium and 47.06 of oxygen. Its symbol is Al_2O_3. In its common state this earth is a soft white powder, without taste, and in the crystalline form it occurs as sapphire and ruby, two of the hardest and most valuable of the precious stones. An impure alumina, which is found in the islands of the Grecian Archipelago, Asia Minor, and Chester, Mass., is the emery used as a polishing-powder for glass and metals, on account of its hardness. The clay of arable land is mostly produced by the disintegration of felspar, which is a compound of alumina, potash, and silica. Alumina has two properties which render it of great importance in the useful arts: one is that its silicate forms with water a plastic material adapted for pottery; the other is its strong affinity for coloring and extractive matter, by which it is useful as a mordant in printing calico and in dyeing.

Alumin′ium, or **Alu′minum,** a white metal which is the base of alumina, was discovered by Wöhler in 1828. Its symbol is Al; its equivalent is 13.7 (by the new notation, 27.4). Aluminium is ductile, tenacious, and very malleable, and remarkable for its sonorousness and levity. The specific gravity of aluminium when fused is only 2.56, but when it has been hammered or rolled it is 2.67. As this metal is not found in nature in a separate or metallic state, it was formerly very rare, and cost as much as gold, but the price has been reduced to ten dollars a pound or less. It is now obtained from a mineral called cryolite, which is a double fluoride of aluminium and sodium, and is imported in large quantities from Greenland. When this cryolite is mixed with an excess of soda and heated, the metal is readily separated. It is also obtained from bauxite, a mineral found near Les Baux, Provence, in the department of Bouches-du-Rhône. It is not oxidized by exposure to air and moisture, and is not tarnished by sulphuretted hydrogen. Fused with copper, it forms useful alloys resembling fine brass, though much more beautiful, and specially adapted for gun-metal. An alloy with silver is also much used.

Alum'nus, plu. **Alumni** (fem. sing. **Alum'na,** plu. **Alumnæ**), a Latin word signifying a "foster-child," is applied in modern times to the graduates of a university or college, in order to express the relation between them and their Alma Mater (which see). In Germany there were recently institutions called *alumnat*, founded for the gratuitous education of poor boys, termed alumni.

Alum Root, a name of two species of plants, natives of the U. S., the *Gera'nium macula'tum* and the *Heuche'ra America'na*. Their roots are astringent, and are used in medicine. The latter is found in rocky woodlands from Connecticut to Wisconsin and southward.

Alum Shale, Alum Slate, or **Alum Schist,** consists of clay, combined with much iron pyrites and some bituminous or carbonaceous matter. From it the alum of commerce is obtained by a double decomposition, induced by burning the alum schist slowly until its condition is sufficiently changed, leaching, and then adding sulphate of potash or ammonia to the solution.

Al'unite, or **Alum-stone,** a mineral found in various localities, which was formerly largely used for the preparation of Roman alum. It is a basic sulphate of aluminium and potassium, $K_2Al_64SO_4.6H_2O$.

Alu'nogen, a mineral which has the composition of a simple sulphate of aluminium, $Al_2.3SO_4.18H_2O$.

Alu'ta, called also **Alt,** a rapid river of Transylvania, rises in the Carpathian Mountains, flows southward through Wallachia, and enters the Danube at Nicopolis. Length, 341 miles.

Al'va, or **Al'ba** (Fernando Alvarez de Toledo), Duke of, a celebrated Spanish general, was born of a noble Castilian family in 1508. He entered the army in his youth, and accompanied Charles V. in his campaign against the Turks in 1530. In 1547 he gained a decisive victory over the German Protestants at Mühlberg. In 1555–56, as commander-in-chief of the army of Philip II., he defeated the French and papal forces in Italy. As a general he was inclined to pursue a Fabian policy. He was distinguished for cool determination and remorseless cruelty. In 1567 he was sent by Philip II. to the Netherlands with an army of about 10,000 veterans, to suppress the revolt of the Protestants. He established the "Council of Blood," beheaded Count Egmont after a mockery of a trial, and commenced a reign of terror and sanguinary persecutions of persons suspected of heresy. To defend the country against this bloody despotism, William, prince of Orange, raised an army in 1568, but the duke of Alva avoided a battle, and by delay compelled William to retire from the contest, because he could not pay his troops. Although Alva defeated or outgeneralled the Dutch patriots in war, he utterly failed to subdue or pacify them, and he was recalled in 1573. He boasted that he had put to death 18,000 persons in the Netherlands, besides those killed in battle. In 1580 he invaded and conquered Portugal. Died Jan. 12, 1583. (See Prescott, "Philip II.," vol. ii.; Motley, "History of the Dutch Republic.")

Alvara'do (Alonzo), a Spanish officer who served under Cortez in Mexico. After its conquest he went to Peru, held high command under Pizarro, and was defeated and taken prisoner by Almagro in 1537. Alvarado was lieutenant-general in the army which subdued Gonzalo Pizarro's rebellion in 1548.

Alvara'do, de (Pedro), a Spanish general and adventurer, born at Badajos, went to America in 1518. He served with distinction under Cortez in the conquest of Mexico, and in 1520 was selected by Cortez to command in the city of Mexico during the absence of his chief, who marched against Narvaez. He conducted a successful expedition against Tehuantepec and Guatemala in 1523, and was appointed governor of Guatemala. After a voyage to Spain, he led an army across the Andes into the province of Quito, which he found already occupied by Pizarro. This chief induced Alvarado to retire by the payment of a large sum of money. Alvarado was killed in a fight with some natives in 1541.

Al'varez (Francisco), a Portuguese priest, born at Coimbra, went to Abyssinia in 1515 in company with the Portuguese ambassador, Duarte Galvam. He passed about six years in that country, which he explored, and returned to Portugal in 1527. An interesting account of his travels was published in 1540, entitled a "True Account of the Country of Prester John." Died about 1540.

Alvarez (Don José), an eminent Spanish sculptor, born at Priego, in the province of Córdova, in 1768. He gained a prize in 1799, after which he pursued his studies in Paris. He removed to Rome, where he passed many years, and was intimate with Canova. Among his works are "Orpheus Sleeping," "Antilochus and Memnon," and "Grupo Colosal de Zaragoza," which represents a scene in the defence of Saragossa. He was appointed court-sculptor to Ferdinand VII. Died at Madrid in 1827.

Alvarez (Juan), a Mexican general, born in 1790. He was a leader of the insurgents who took arms against Santa Anna in the spring of 1854, and drove him from power in Aug., 1855. Alvarez became president of Mexico in October, but he resigned in December of the same year. During the French invasion of 1863–66 he was one of the most determined opponents of Maximilian and his party. Died in 1863.

Al'verson (James Lawrence), LL.D., born at Seneca, N. Y., in 1816, graduated at Wesleyan University in 1838, was a successful teacher in the institutions at Elmira, Cazenovia, and Lima, N. Y., and was professor of mathematics in Genesee College (1849–64). Died Sept. 12, 1864.

Al'vinczy, or **Al'vinzy, von** (Joseph), Baron, an Austrian general, born in Transylvania Feb. 1, 1735. He served with distinction in the Seven Years' war, and obtained the rank of lieutenant-field-marshal in 1789. In the summer of 1796 he took command of an army of about 55,000 men sent to oppose Bonaparte in Italy. He entered Italy from Carinthia, fought an indecisive action at Bassano, and was defeated at Arcola in Nov., 1796, and at Rivoli in Jan., 1797, soon after which he was superseded in the command. Died Sept. 25, 1810.

Al'vord (Benjamin), A. M., an American officer, born Aug. 18, 1813, at Rutland, Vt., graduated at West Point 1833, paymaster-general U. S. A. Jan. 1, 1872, and brigadier-general U. S. volunteers April 15, 1862. He served chiefly at frontier posts 1833–54, in Florida war 1835–37 and 1841–42, engaged at Camp Izard, Olaklikaha, Thlonotosassa, and Big Cypress Swamp, as assistant professor at the Military Academy 1837–39, in Cherokee nation 1839–40, adjutant Fourth Infantry 1840, in military occupation of Texas 1845–46, in the war with Mexico 1846–47, engaged at Palo Alto and Resaca de la Palma (brevet captain), Paso Ovejas, National Bridge, Cerro Gordo (Aug. 15), Las Animas (brevet major), and Huamantla, and, upon being transferred from the infantry to the pay department, as chief paymaster of the department of Oregon 1854–62. In the civil war was in command, as brigadier-general of volunteers, of the district of Oregon. Brevet lieutenant-colonel, colonel, and brigadier-general U. S. A. Aug. 9, 1865, for faithful and meritorious services; then became paymaster in New York City 1865–67, and chief paymaster of the district of Omaha and Nebraska 1867–72; paymaster-general U. S. A., head-quarters at Washington, D. C., 1876–80. Author of a memoir on the "Tangencies of Circles and of Spheres," 1855, "The Interpretation of Imaginary Roots in Questions of Maxima and Minima," 1860, and of numerous essays and reviews, 1833–73. Retired June 8, 1880. D. at Washington, D. C., Oct. 17, 1884. George W. Cullum.

Alvord (Thomas Gold). See Appendix.

Alyat'tes [Gr. Ἀλυάττης], a king of Lydia, who ascended the throne about 618 B. C., was the father of Crœsus. During a battle between him and Cyaxares of Media an eclipse of the sun occurred, and made such an impression that they ceased fighting and made a treaty of peace. Some astronomers identify this eclipse with that of 610 B. C. Died about 560 B. C.

Al'zei, an old city of Germany, in the grand duchy of Hesse, on the Selz, 19 miles S. of Mayence. It has a realschule. Alzei and the vicinity is the scene of the events of the Nibelungenlied. Pop. in 1880, 5415.

Al'zog (Johannes Baptist), a German Catholic theologian, born at Ohlau, in Silesia, in 1808, became in 1853 professor of ecclesiastical history at Freiburg. His "Manual of Universal Church History" ("Handbuch der Universalkirchengeschichte," 1840; 9th ed. 1872) has been translated into the principal European languages. D. Feb. 28, 1878.

Amade'us [It. *Amede'o* or *Amade'o*], the name of nine counts and dukes of Savoy, the first of whom was a son of Count Humbert, and lived in the eleventh century. —Amadeus V., count of Savoy, a son of Count Thomas II., was born in 1249. He succeeded his uncle Philip in 1285, increased his dominions by marriage, and was the first prince of Savoy that made any considerable figure in history. Died in 1323.—Amadeus VI., of Savoy, was born in 1334, and became count in 1343. He was an able and successful ruler, defeated the French in battle in 1354, and added a part of Piedmont to his dominions. Died in 1383.

Amadeus VIII., duke of Savoy, a grandson of the preceding, was born in 1383, and succeeded his father in 1391. He received the title of duke from the emperor

Sigismund in 1416. In 1434 he resigned his power to his son Louis, and retired to the monastery of Ripaille. Having a high reputation for wisdom, he was chosen pope by the Council of Bâle in 1439, and took the name of Felix V. As Eugenius IV., who had been deposed by that council, was still recognized as pope by a strong party, a schism ensued in the Church. Felix V. resigned the papacy in 1448, and died in 1451.

Amade'us [It. *Amede'o ;* Fr. *Amédée*], king of Spain, a son of Victor Emmanuel, king of Italy, was born May 30, 1845. He received the title of duke of Aosta, and married, in May, 1867, Marie Victoire Charlotte, a daughter of the prince dal Pozzo della Cisterna. On the 16th of Nov., 1870, the Spanish Cortes, by a vote of 191 against 98, elected him king of Spain, the throne of which had been vacant for two years. It had been offered to several foreign princes, who declined. Amadeus accepted it, and arrived at Madrid Jan. 2, 1871. Feb. 11, 1873, he abdicated the throne and the republic was proclaimed.

Am'adis of Gaul, or **Am'adis de Gaul'a,** a celebrated hero of romance, was called a son of the fabulous King Perion of France. The story of his adventures, entitled "Amadis de Gaula," was written by Vasco de Lobeira, a Portuguese, in the fourteenth century. This work, which has been translated into several languages, is commonly admitted to be the best of all the romances of chivalry. There were other fictitious heroes of romance, called Amadis of Greece and Amadis of Trebizond.

Am'adou ("German tinder"), a name given to several species of fungus called agarics, growing on oak and ash trees in Europe. The hard amadou (*Polyp'orus ignia'rius*) and the soft amadou (*Polyp'orus fomenta'rius*) are used for tinder, and applied to wounds as styptics. Some varieties are prepared for tinder by charging them with saltpetre.

A'mager, a small island of Denmark, adjoining the harbor of Copenhagen, is partly occupied by a suburb of that city. Area, 22 square miles. Here are gardens which supply that capital with vegetables, and a large chemical factory. Pop. 9000, besides suburb Christianshafen.

Amalaric. See APPENDIX.

Amala'rius, abbot of Hornbuch, near Metz, wrote "Liber Officialis" about 820; wrote also "De ordine antiphonarii," or "De ordine psalmorum." Died in 837.

Amala'rius Fortunatus, archbishop of Treves, was sent by Charlemagne in 811 A. D. to diffuse Christianity among the Saxons, and established the first church at Hamburg. Died in 814 A. D.

Amalasontha. See APPENDIX.

Am'alek, a grandson of Esau and one of the chieftains of Edom (Gen. xxxvi. 12, 16). A remnant of his posterity existed in the time of Hezekiah (1 Chron. iv. 43).

Amal'ekites, a nomadic and warlike people, occupying, at the time of the Exodus, the Sinaitic peninsula and the wilderness between Egypt and Palestine. Opposing the march of the Israelites, they were signally defeated at Rephidim. Centuries later, they were severely punished by Saul, and finally destroyed by David.

Amal'fi, an ancient and decayed city and seaport of Southern Italy, on the Gulf of Salerno, 25 miles S. E. of Naples. During the several centuries of the Middle Ages it was a great commercial emporium and the capital of a republic. It is the seat of an archbishop. Its situation is rocky and very picturesque. Amalfi was the birthplace of Masaniello and of Flavio Gioja, called the inventor of the mariner's compass. Pop. 4186.

Amal'gam [perhaps from the Gr. μάλαγμα, a "poultice"], a combination or alloy of mercury with another metal. Some amalgams are definite chemical compounds. Glass plates are converted into mirrors or looking-glasses by covering one surface with an amalgam of tin. Gold and silver are dissolved in mercury, and form amalgams which are used in the processes of gilding and plating various objects.

Amalgama'tion, the act or process of combining mercury with another metal, applied especially to the process of separating gold and silver from the quartz rock in which they are found imbedded. The quartz is first crushed, and then shaken in a barrel or machine in contact with mercury, which unites with and collects the small particles of gold or silver. The precious metal is afterwards easily separated from the amalgam by the application of heat.

Ama'lie, or **Ame'lia** (ANNA), duchess of Saxe-Weimar, a daughter of the duke of Brunswick-Wolfenbüttel, was born Oct. 24, 1739. She was married in 1756 to Ernest, duke of Saxe-Weimar, who died in 1758. She was a generous patron of men of genius, and attracted to her court the greatest German authors, including Goethe, Wieland, Schiller, and Herder. She died April 10, 1807.

Amalie (MARIE FRIEDRIKE AUGUSTE), duchess of Saxony, a sister of Frederick Augustus II., was born in 1794. She wrote a number of dramas performed with success, among which are "The Marriage Ring," "The Coronation Day," and "Falsehood and Truth." Died Sept. 18, 1870.

Amalrich of Bena. See APPENDIX.

Amalthe'a, or **Amaltheia** [Gr. Ἀμαλθεία], in classic mythology, the name of the nurse of Jupiter. This nurse was supposed to have been a goat, the horn of which, broken off by Jupiter, was endowed by him with magical power, and became famous as the cornucopiæ, or the "horn of plenty."

Ama'ma (SIXTI'NUS), born at Franeker, Netherlands, in 1593, was a Protestant biblical philologist, and professor of Oriental languages at Franeker 1618–29, and was author of a critical work on the historical books of the Old Testament and some Latin treatises. Died in 1629.

Amana Society (HOMESTEAD P. O. and STATION), Iowa co., Iowa (see map of Iowa, ref. 5–I, for location of county), on R. R., 20 miles N. W. of Iowa City, is a large religious co-operative German colony, owning about 28,800 acres and producing large crops of grain, fruit, etc. It has 7 villages, fine public schools, 2 large woollen and 2 flour mills, several starch-factories, etc. Pop. about 3000.

Amani'ta [Gr. ἀμανῖται], a genus of fungi nearly allied to *Agar'icus*, from which is derived a poisonous principle called *amanitine*. The *Amani'ta musca'ria*, a native of Europe, is very poisonous, and is used to kill flies.

Amapa'la, a city and seaport of Honduras, is situated on Tigre, the most important island of the Bay of Fonseca, which contains a number of excellent harbors. The chief articles of export are tobacco, hides, precious woods, and indigo. Pop. about 1000.

Amar (J. P.), a French Jacobin notorious for his cruelty, was born at Grenoble in 1750. He became a member of the Convention in 1792, voted for the death of the king, and in Oct., 1793, presented to the Convention a report which condemned to death twenty-two Girondists. He contributed to the ruin of Robespierre on the 9th Thermidor, 1794. Died in Paris in 1816.

Am'aranth [Lat. *amaran'thus ;* Gr. ἀμάραντος, *i. e.* "unwithering," from α, priv., and μαραίνω, to "wither"], a flower which does not wither or fade; also the poetical name of an imaginary flower, considered as an emblem of immortality; a genus of plants of the order Amaranthaceæ, has in some species richly colored flowers, that are scarious, persistent, and not liable to wither. The *Amaran'thus cauda'tus* ("prince's feather"), "love-lies-bleeding," and other exotic species are cultivated in the gardens of the U. S. Several other unsightly species are naturalized as weeds.

Amarantha'ceæ [from *Amaran'thus* or *Amaran'tus,* one of the genera], a natural order of plants comprising about 300 species, which are mostly natives of tropical countries. They are herbaceous or fruticose, with simple leaves, and dry persistent flowers in heads or spikes. This order includes, besides the genus *Amaranthus*, the *Gomphrena globosa* (globe amaranth), the purple flowers of which retain their beauty for several years.

Am'arapoo'ra, or **Ummerapoora,** a fortified city of Burmah, on the Irrawadi River, about 8 miles N. E. of Ava. It was formerly the capital of Burmah, and had a population of about 170,000, but after the seat of government was removed in 1819 it rapidly declined. The houses are mostly built of bamboo. Pop. in 1870, estimated at 90,000.

Am'ara-Sing'ha, or **-Sin'ha,** an eminent Hindoo poet and grammarian, of unknown period, is supposed by some to have lived about 50 B. C. He belonged to the sect of Buddhists, and wrote works which were all destroyed by the Brahmans, except his "Amara Kosha," which is a vocabulary of about 10,000 Sanscrit words.

Ama'ri (MICHELE), an Italian historian, born at Palermo in 1806. His chief work is "The War of the Sicilian Vespers" (2 vols., 1842), which was very popular, but was proscribed by the government. He escaped to France, and acted a prominent part in the revolution of Sicily in 1848. After the defeat of the Italian patriots in 1849 he became a resident of Paris. During the dictatorship of Garibaldi, in 1859, he was minister of foreign affairs; subsequently he became a member of the Italian senate, and in 1863 minister of public instruction. He resigned in 1864. Among his other works are a "History of the Mussulmans of Sicily" (1853–72, 3 vols.), and "I Diplomi Arabi del Archivo Fiorentino" (1863). D. at Palermo, Sept. 20, 1870.

Amaryllida'ceæ (so called from *Amaryl'lis*, one of its genera), a natural order of endogenous herbaceous plants, which generally have beautiful flowers and bulbous roots. The species of this order are very numerous, and most abundant in tropical regions, especially near the Cape of Good Hope. It comprises the *Amaryllis*, the *Narcissus*, the *Fourcroya*, the *Nerine*, the *Coburgia*, the *Agave*, *Snowdrop*, etc. The U. S. have several genera.

Amaryl'lis (gen. **Amaryl'lidis**), a genus of bulbous-rooted plants of the natural order Amaryllidaceæ. They have beautiful flowers, with six stamens. The *Amaryl'lis formosis'sima* and *Amaryl'lis amab'ilis* are cultivated in gardens, and much admired. The Atamasco lily (*Amaryllis Atamasco*) is a native of the U. S.

Ama'sia, Amasieh, or **Amasiyah,** a city of Asia Minor, on the Yeshil-Irmak, 355 miles E. of Constantinople. It contains nearly 4000 houses, many of which are of stone, a strong citadel, and a fine mosque. Silk is produced here and is exported. Strabo was a native of Amasia, which was formerly the capital of the kings of PONTUS (which see). Pop. between 20,000 and 25,000.

Ama'sis, a famous king of Egypt, who succeeded Apries about 570 B. C., was more friendly to the Greeks and other foreigners than his predecessors. Under his reign Egypt enjoyed peace and prosperity. He built magnificent monuments at Memphis, his capital. Died about 525 B. C., and was succeeded by his son, Psammenitus.

Amat (FELIX DE TORRES). See APPENDIX.

Am'athus [Gr. Ἀμαθοῦς], an ancient city of Cyprus, especially addicted to the worship of Venus, who was hence called Amathusia.

Ama'ti (ANDREA), an Italian who lived at Cremona about 1550, made excellent violins, which are equal or superior to any made in the present time.—ANTONIO, a son of the preceding, was born about 1565. He was a celebrated maker of violins. Died 1635.—NICOLÒ, ANTONIO (1550–1635), and GERONIMO, all excelled in the art, but Nicolò, junior (born Sept. 3, 1596, died Aug. 12, 1684), excelled the rest of the family in the number and quality of his violins.

Amatitlan', or **Amatitan',** a town of Central America, in Guatemala, 19 miles S. W. of the city of Guatemala, and near the lake of the same name; lat. 14° 28′ 39″ N., lon. 90° 37′ 50″ W. The houses are made of mud, and are only one story high. Wells of boiling hot water occur in this vicinity. The chief business of this town is the production of cochineal. Pop. in 1880, 3993.

Ama'to, d' (GIOVANNI ANTONIO), an Italian historical painter and theologian, called THE ELDER, was born at Naples in 1475. He painted religious subjects, and no others, in a style which resembled that of Perugino. Among his works is a "Dispute on the Sacrament." Died in 1555.—His nephew of the same name, surnamed THE YOUNGER, born at Naples in 1535, was an able painter. He excelled in coloring. Died in 1598.

Amauro'sis [Gr. ἀμαύρωσις, from ἀμαυρόω, to "darken"], a term formerly much employed to designate total or partial blindness dependent upon diseases of the optic nerve, either at its origin, in its course, or in the retina; the last-mentioned seat of the disease being by far the most frequent. If the local disease be temporary or functional, the sight will probably be regained, but in the majority of cases there is no such hope. It may arise from many causes, one of the most remarkable of these being the existence of Bright's disease; and in cases resulting from this cause there is an organic change in the structure of the retina, readily discernible by the aid of the ophthalmoscope. Amaurosis sometimes comes on at once, but is generally gradual in its attack. The treatment varies with the extremely various pathological conditions. Active treatment is seldom called for, and no item in the cure of this disease is more important than strict attention to the hygienic condition.

Amau'ry (or **Amal'ric**) **I.** [Lat *Amalri'cus*], king of Jerusalem, a son of Baldwin II., was born in 1135. He began to reign at the death of his brother, Baldwin III., in 1162 or 1163. In 1168 he invaded Egypt, from which he was soon forced to retreat by Saladin, who in turn invaded Amaury's dominions in 1170. Died July 11, 1173.

Amaury II., sometimes called **Amaury de Lusignan,** became king of Cyprus as heir of his brother Guy, and took the title of king of Jerusalem in 1194. His dominions were occupied by the victorious Saracens, so that his reign was only nominal. Died in 1205.

Amaxichi, the capital of the Ionian island of Santa Maura (or Leucadia), is on its E. coast. It has a lighthouse, and a harbor adapted for small vessels. It is the residence of a Greek archbishop. Pop. about 4000. Earthquakes often occur here. The remains of cyclopean walls are found in the vicinity.

Amazi'ah, king of Judah, succeeded his father Joash about 837 B. C. He waged war with success against the Edomites, and reigned twenty-eight or twenty-nine years. He was killed by conspirators in 809 B. C.

Am'azon, Marañon', or **Orellana,** a South American river, and the largest river on the globe, rises among the Andes in Peru. It is formed by the union of several large head-streams called the Beni, Apurimac, Ucayale, and Tunguragua, which last is the most western branch, and is sometimes called the Upper Marañon. Geographers have not unanimously decided which of these is the main stream. The Apurimac, the most southern of all the branches, rises about lat. 15° S.

According to the statements of recent explorers, this river is known under three different names in different parts of its course; from its mouth to the mouth of the Rio Negro it is called the Amazon or Amazonas; from the mouth of the Rio Negro, through Ecuador, to Tabatinga, on the borders of Ecuador, it is known as the Solimoës or Solimoens; and from Tabatinga to its source in the Andes, it is called the Marañon. The Amazon, from its junction with the Napo in Ecuador, has a nearly due eastern course, varying therefrom not more than two or three degrees throughout its whole length; it is therefore almost wholly in the same latitude, which is not the case with any other river of large size on the globe. It is also entirely within the tropics, and only about three or four degrees from the equator, but the climate is not so hot and sickly as might, from this, be supposed, the average temperature being 84°, and the extremes 72° and 92°. The waters of the river, owing to the white clay which they contain, are turbid and of a milky color. Those, however, which rise in the woody plains have their waters black or of a dark amber color, and in some cases of a deep green, being dyed by the vegetable matter found so abundantly along their banks. This mighty stream, flowing through Ecuador and the boundless forests of Brazil, and increased to an immense volume by the great tributaries that enter it from the right and from the left, empties itself into the Atlantic Ocean under the equator. Its whole length is about 3500 miles, and the area of the countries which it drains is estimated at 2,264,000 square miles or more. It is said to be four miles wide at the mouth of the Japura, more than 1000 miles from the sea. The navigation of the Upper Amazon is obstructed by cataracts. One of the most interesting facts, indeed, connected with the Amazon, is the smallness of its fall; at a distance of 3000 miles from its mouth the elevation is only 210 feet; the descent is therefore considerably less than an inch to the mile. According to Lieut. Herndon, the river and its Ucayale branch are navigable for a distance of about 3300 miles from the ocean. The Tunguragua is likewise navigable for many miles above the mouth of the Ucayale. Vessels can also pass from the Amazon, through the Rio Negro and the Casiquiare, into the Orinoco. It is estimated that the Amazon and its affluents open to the ocean 10,000 miles of interior navigation for large vessels. The tide ascends it over 400 miles, and about the time of full moon the great tidal wave which passes round the globe from E. to W. rushes into the mouth of the river with such violence that it raises the water nearly fifteen feet high. This wave, which is very dangerous to small vessels, is called *bore* in English and *pororoco* by the natives. The river abounds, in some parts, in turtles, whose eggs yield a valuable oil. The principal affluents from the right are the Ucayale, the Yurua, the Purus, the Madeira, the Tapajos, and the Tocantins. Those that enter it from the left are the Napo, the Putumayo, the Japura, and the Rio Negro. During the rainy season the Amazon overflows its banks and submerges a large extent of country. It is well supplied with fish, and flows through a region of great fertility, which is densely covered with primeval and almost impassable forests, in which jaguars, panthers, pumas, monkeys, tapirs, and other wild animals abound. The river encloses numerous large islands, besides that named Joannes or Marajo, which is 150 miles in diameter. This island divides the mouth of the river into two channels, one of which is nearly 100 miles wide. The mouth of the Amazon was discovered by Yanez Pinçon in 1500, but the first European who explored the river was Orellana, in 1539. Among the recent voyages of exploration are those of Lieutenant Herndon in the employ of the U. S. government, in 1850, of the Brazilian government in 1862–64, and of Prof. Agassiz, who discovered 1163 new species of fish, in 1867. Since 1867 the river has been opened for trade to all nations. The dense forest that covers the whole valley of the Amazon is a remarkable feature. (See HERNDON and GIBBON, "Exploration of the River Amazon," 2 vols., 1853–54; AGASSIZ, "A Journey in Brazil," 1867; and the publications of ORTON, HARTT, C. B. MARKHAM, WALLACE, MYERS, and HASSAUREK.) A. J. SCHEM.

Amazo'nas, or **Al'to Amazo'nas,** a province in

Northern Brazil, is bounded on the N. by Dutch and British Guiana and Venezuela, on the E. by the province of Para, on the S. by Bolivia and Matto Grosso, and on the W. by the United States of Colombia, Ecuador, and Peru. Area, 753,439 square miles. It consists chiefly of forests, inhabited by independent tribes of Indians. The most important rivers in this province are the Amazon, which is called the Solimoens above Manaos, the Negro, Putumayo, and Madeira. The entire civilized population amounts to 57,610. Capital, Barra do Rio Negro (Manaos).

Amazonas, a department of Peru, is bounded on the N. by Ecuador, on the E. by Loreto, on the S. by Junin, and on the W. by Caxamarca and Libertad. The soil is fertile, but, owing to the thinness of the population, very little is done to cultivate it. Straw hats of a superior quality are made here and exported. Chief town, Chachapoyas. Area, 14,129 square miles. Pop. 34,245.

Am′azons [Lat. *Ama′zones;* Gr. Ἀμαζόνες, perhaps meaning "without breasts;" they are said to have cut off the right breast, which interfered with their aim in archery], female warriors; a semi-fabulous nation of martial women which was celebrated by the ancient Greek poets. According to tradition, they lived in Asia Minor, and fought against the Greeks at the siege of Troy, where they were commanded by their queen, Penthesile′a. Another queen of the Amazons, named Thalestris, is said to have made amorous overtures to Alexander the Great. The battles of the Amazons were favorite subjects with ancient Greek painters and sculptors.

Ambale′ma, a town in the United States of Colombia, in the state of Cundinamarca, on the Magdalena, about 50 miles W. of Bogotá. Excellent tobacco is produced in the neighborhood. Pop. about 9700.

Ambal′la, a city in the East Indies, in the Northwestern Provinces. Pop. about 22,000. Here a treaty was concluded between the governor-general of India, Lord Mayo, and the emir Shere Ali of Afghanistan in 1869.

Ambarva′lia [derived from a Latin term, *ambi′re ar′va, i. e.* to "go round the fields"], applied to a religious festival observed by the ancient Romans in the month of May, in order to propitiate Ceres and invoke her blessing on the coming harvest. It was so called from the victims being carried round the fields by the priests.

Ambas′sador, or **Embassador** [Fr. *ambassadeur;* It. *ambasciato′re;* originally, a "servant" or "minister"], a diplomatic minister of the highest order, sent by a prince or nation to the court of another power to manage special affairs of state. He is expected not only to be the agent of his government, but to represent the power and dignity of his sovereign or his country. By the law of nations he and his suite are entitled to peculiar privileges and immunities. They, as well as other diplomatic agents, are exempt from the control of the municipal laws of the country in which they perform their duties, and are not amenable to punishment for acts which are only *mala prohibita* (*i. e.* "evils or offences [merely] prohibited by statute"), and not *mala per se* (*i. e.* "things evil or criminal in themselves"). They are usually exempt from direct taxation, and are allowed to import goods without paying customhouse duties. The word ambassador is recognized as an official title of the highest rank of diplomatic service of the U. S. (See INTERNATIONAL LAW No. I., by PRES. T. D. WOOLSEY, S. T. D., LL.D.)

Amba′to, a town of Ecuador, 65 miles S. S. W. of Quito, has an active trade in grain, sugar, and cochineal. It was destroyed in 1698 by an eruption of Cotopaxi, but was soon rebuilt. Pop. estimated at 13,000.

Am′ber [Lat. *suc′cinum;* Fr. *ambre;* Gr. ἤλεκτρον], a fossil resin, usually of a pale-yellow color, sometimes nearly transparent. It is found in many parts of the world in deposits of cretaceous or more recent age, and is now known to be the resinous exudation from several species of extinct coniferous trees, of which one, called *Pinites succinifer*, is supposed to have produced the greater part. Over 800 species of insects have been found preserved in amber, and leaves or other fragments of 163 species of plants. Amber is extensively used for ornaments, and especially for the mouthpieces of pipes, the consumption being greatest in Eastern Europe, Turkey, Persia, etc. Fine pieces of it are worth more than their weight in gold. The largest mass known is in the Cabinet at Berlin; its weight is eighteen pounds, and it is valued at $30,000. Most of the amber of commerce is obtained from the shores of the Baltic, between Königsberg and Memel. Small pieces are frequently found in the green sand of Gay Head and New Jersey, and in the cretaceous coals of the far West. Amber was highly prized and much used by the ancients. It was one of the chief articles of commerce among nations. It was the special object of many of the voyages of the Phœnicians, and it was an article of exchange long anterior to the dawn of history, as we know by its frequent occurrence in the remains of the lake-dwellings of Switzerland.

Amber exhales a fragrant odor when burned, and was formerly in high repute as a medicine. An acid obtained from it (succinic) is a useful agent in chemical operations. When rubbed, amber becomes strongly electro-negative, and the first exhibition of electric force which received intelligent attention was the attraction exerted on light bodies by amber. This force, at first supposed to be possessed by amber alone, took the name of that substance, ἤλεκτρον, from which "electricity" is derived. The ancient Britons employed it for ornament.

Am′berg, a walled town of Bavaria, on the river Vils, 39 miles E. of Nuremberg, was formerly the capital of the Upper Palatinate. It is well built, and has a gymnasium, a normal school, and a large public library; also a royal manufactory of muskets, and several breweries and potteries. The French Republican army under Jourdan was defeated near this town by the archduke Charles, commanding the Austrians, in 1796. Pop. in 1880, 14,583.

Am′bergris [from the Fr. *ambregris, i. e.* "gray amber"], a peculiar perfume, a gray substance found floating on the sea or lying on the sea-coast, and in the intestines of the spermaceti whale (*Physe′ter macroceph′alus*). It is supposed to be a morbid secretion of this animal. When heated or dissolved in alcohol it emits a peculiar and agreeable odor, not easily described or imitated, and exceedingly diffusive. It has also the remarkable power of increasing the odor of other perfumes. The price of it is about five dollars an ounce. It affords about 85 per cent. of a peculiar fatty and crystalline substance called *ambrein*. The specific gravity of ambergris is about 0.8.

Ambergris (so called from the ambergris found on its shores), a barren island in the Gulf of Mexico, belonging to Yucatan, is 30 miles long from N. E. to S. W., and 3 miles wide.

Ambert, a town of France, in the department of Puy-de-Dôme, on the river Dore, 37 miles S. E. of Clermont. It has extensive manufactures of paper and silk ribbons. Pop. in 1881, 7727.

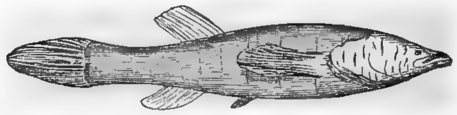
Ambidex′ter [from the Lat. *am′bo*, "both," and *dex′ter*, "right-handed"], a person who uses both hands with equal facility. The proportion of such persons in the world is small. The term is sometimes applied to a double-dealer, and to a juror who takes a bribe from each party in a lawsuit.

Ambi′orix, a famous Gallic chief who ruled over the Belgic tribe of Eburones, and waged war against Julius Cæsar. By insidious measures and stratagem he gained a decisive victory over the Roman generals Sabinus and Cotta, whose army he annihilated in 54 B. C., during the absence of their commander. He was afterwards signally defeated by Cæsar. (See CÆSAR's "Gallic War," book v.)

Am′bitus [from the Lat. *am′bio, ambitum*, "go round"], a term used by the ancient Romans to designate the going about and soliciting votes by candidates for office. The practice of offering one's self as a candidate in an open and honorable way was called *am′bitus popula′ris.* Another kind, which was common, but disreputable, consisted in cajolery, bribery, etc.

Ambleteuse, a decayed seaport of France, on the English Channel, 6 miles N. of Boulogne, and about 25 miles from the English coast. Here James II. of England landed after his abdication in 1689, and here Napoleon I. erected a granite column in honor of the grand army in 1805.

Amblyop′sis [from the Gr. ἀμβλύς, "blunt," "dulled," and ὄψις, "vision"], the term applied to a genus of blind fish. One species of this genus (*Amblyop′sis spelæ′us*) is found in the great Mammoth Cave of Kentucky. The eyes of this fish, though seemingly absent, exist in a rudimentary state, enclosed beneath the epidermis. The amblyopsis is quite small, the largest specimens averaging from four and a half to five inches in length. The body is nearly white, and partly covered with scales. Prof. Cope, describing the habits of these fish, says, "They are easily taken by the hand or net if perfect silence be preserved, for they are unconscious of the presence of an enemy except through the sense of hearing. This sense is, however, evidently very acute, for at any noise they turn suddenly



Amblyopsis spelæus.

downward and hide beneath stones, etc. on the bottom." Their food consists in a great part of the crayfish found in the cave, but they sometimes feed on other fish, in the pursuit of which they show remarkable activity, thus proving that the tactile sense is well developed. According to Prof. Cope, the amblyopsis belongs to the order Haplomi, its nearest kindred being minnows, pickerels, and herrings. The *Amblyopsis spelæus* is not confined to this cave alone, but has also been found in two or more places north of the Ohio. (See an interesting account of the Blind Fishes of the Mammoth Cave in the "American Naturalist" for Jan., 1872.)

Am'bo [Gr. ἄμβων], a reading-desk or pulpit which was common in ancient Christian churches, and is still found in Oriental churches. The Gospels and Epistles were read from the ambo.

Amboina. See Amboyna.

Amboise (anc. *Ambacia*), an old town of France, in the department Indre-et-Loire, on the railway from Orleans to Tours, 14 miles by rail E. N. E. of Tours. It is celebrated as the place of imprisonment of Abd-el-Kader from 1848–52. Here the "Conjuration d'Amboise," a conspiracy of the Huguenots against the Guises, was formed in 1560. It has been the residence of several of the kings of France. Pop. in 1881, 4167.

Amboise, d' (Georges), Cardinal, a French statesman, born at Chaumont-sur-Loire in 1460. He became archbishop of Rouen in 1493, and a faithful adherent of the duke of Orleans, who, on ascending the throne as Louis XII. in 1498, chose him for his prime minister. He became a cardinal in 1499. He was an able administrator and a prudent counsellor. He retained power until his death, Mar. 25, 1510.

Am'boy, city and R. R. junction, Lee co., Ill. (see map of Illinois, ref. 2–E, for location of county), 94 miles almost due W. of Chicago. It has a fine public hall, four free-school buildings, flouring-mills, grain-elevators, and the Illinois Central shops, employing over 400 hands. It was laid out in 1854. Pop. in 1870, 2825; in 1880, 2448.

Amboy'na, or **Amboi'na** [Malay, *Amboon'* or *Ambun*], the most important, though not the largest, of the Moluccas or Spice Islands, situated E. of Booro, in lat. 3° 46' S., lon. about 128° E. It is about 30 miles long, and has an area of 282 square miles. The surface is mountainous, and granite rock occurs on the summits of some of the mountains. The staple production is cloves, the trade in which was once monopolized by the Dutch. About 500,000 pounds of cloves is the average quantity annually produced here. The aborigines of the island are called Horaforas, but the most of the population are Malays, and the inhabitants are mostly Christians or Mohammedans. The Portuguese were the first Europeans that visited Amboyna (1512), and they obtained peaceable possession in 1580; it was taken by the Dutch in 1605. A British settlement was made here about 1615, which was destroyed by the Dutch in 1623. The island was taken by the British in 1796, and restored in 1802; retaken by the British in 1810, and restored again in 1814. Pop. 50,000.

Amboyna, the capital of the Dutch government of Amboyna, is on the island of the same name, and is defended by Fort Victoria. It is regularly built, has a public garden and a good harbor. Pop. about 13,000.

Ambra'cia, a town of ancient Greece, on the site of the modern Arta, was the capital of Epirus during the reign of King Pyrrhus, who was killed 272 B. C.

Am'briz, a small native kingdom on the W. coast of Africa. Its capital is Quebranza. The port of Ambriz, about 70 miles N. of Loando, at the mouth of the Ambriz River, has considerable trade.

Am'bros (August Wilhelm), a German composer, born Nov. 17, 1816, became in 1869 professor of music in the University of Prague. Among his works are overtures to "Genofeva" and "Othello," and a "History of Music" ("Geschichte der Musik," 1862–68). D. June 28, 1876.

Am'brose [Lat. *Ambro'sius*], Saint, one of the Latin Fathers of the Church, was born in Gaul about 340 A. D. He was a son of the Roman prefect of Gaul, and is supposed to have been born at Treves. Having studied law, he was appointed governor of Liguria and Milan about 370, and distinguished himself in that position by his wisdom and moderation. On the death of the bishop of Milan, in 374 A. D., a violent contest ensued between the Catholics and Arians about the choice of his successor. By general consent, Ambrose, who was not obnoxious to either party, was elected bishop, although he had never been a priest. He accepted the office with reluctance, and performed its duties with great ability and zeal. He favored the Catholics and earnestly opposed Arianism, but he does not appear to have been a violent persecutor. On several occasions he manifested moral courage by denouncing the sins and checking the arrogance of temporal rulers and potentates. The emperor Theodosius the Great having ordered a massacre of the Thessalonians in 390, Ambrose forbade him to enter the church, and extorted from him the performance of a public penance. Died in 397 A. D. He was the author of a method of singing called the "Ambrosian Chant," and left numerous religious works and letters. He is commended by Villemain as "a man who, amidst the turbulence and instability of the empire, never had a foible or a stain on his character, and whose magnanimity was adequate to all trials."

Ambro'sia [from the Gr. ἄμβροτος, "immortal"], in classic mythology, "the food of the gods," which was supposed to confer immortal youth. According to a poetical legend, it was sometimes given to mortals who were favorites of the gods, and was used by Jupiter and Venus to anoint their hair. Ambrosia is also the name of a genus of weeds, one species of which, common in the U. S., is known by the name of hogweed or Roman wormwood.

Ambro'sian Chant, the choral music of the early Christian Church, derived its name from Saint Ambrose, bishop of Milan, who introduced it into the Western Church about 386 A. D. The style of singing was Greek; the musical notation was, no doubt, borrowed from the Greek, and adapted to the church services to relieve their monotony. The Ambrosian chant is the foundation of church music.

Ambrosian Library, a library founded at Milan in 1609 by Cardinal Federigo Borromeo, and named in honor of Saint Ambrose, the patron saint of that city. It contains over 150,000 printed volumes and 15,000 manuscripts, including some rare palimpsests discovered by Angelo Mai, and a MS. of Vergil enriched by marginal notes of Petrarch.

Ambula'cra [from the Lat. *am'bulo*, to "walk"], a name of the peculiar organs of locomotion of the starfish and sea-urchin; the narrow longitudinal portions of the shell of the sea-urchin (*Echinus*), which are perforated by small orifices, giving passage to tentacular suckers.

Am'bulance [probably from the Lat. *am'bulo*, to "walk" or "move slowly," because a gentle motion was necessary for the wounded], a military term applied in France to a movable hospital which is attached to each division of an army, and furnished with apparatus for the relief of the sick and wounded. It was invented or improved by Baron Larrey, and is only intended to afford help of a more or less temporary kind. The name is now commonly given to a covered vehicle by means of which wounded men are removed from the field of battle. Improvements were made in the construction of ambulances by the Americans in the civil war of 1861–65, the excellence of which was recognized by their use during the Franco-German war of 1870.

Ambulance Corps, a body of men employed in the British army in the Crimean war to drive ambulances and attend the sick and wounded. The experiment was not successful, and the ambulance corps was superseded by the land transport corps. In the late civil war of the U. S. the officers and men of the ambulance corps were detailed from the line.

Amelan'chier, a genus of plants of the natural order Rosaceæ, comprises a small number of species, natives of Europe and North America. The *Amelanchier Canadensis*, called June-berry or service-berry, is a shrub or small tree which bears a pleasant fruit, and is sometimes cultivated in the U. S.

Ame'lia (anc. *Ame'ria*), a town of Italy, situated 22 miles south-west of Spoleto, has a cathedral and is a bishop's see. *Ameria* was one of the oldest cities of ancient Umbria, and has well-preserved cyclopean walls. Pop. about 5000.

Amelia Court-house, on R. R., capital of Amelia co., Va. (see map of Virginia, ref. 6–G, for location of county), is situated 36 miles W. S. W. of Richmond. Pop. not in census of 1880.

Amelia Island, in the Atlantic, is a part of Nassau county, which forms the N. E. extremity of Florida. It is 16 miles long and 4 miles wide. Amelia Island light, in lat. 30° 40' 23" N., lon. 81° 28' 20" W., is at the N. end of the island. The lighthouse is built of brick, 58 feet high, and shows a flashing white light 112 feet above the level of the sea.

Amelot de la Houssaye (Abraham Nicolas). See Appendix.

Amelotte (Denis). See Appendix.

Amen' [Heb. אמן, signifying "So be it," or "Let it be irrevocably fixed;" Gr. 'Αμήν, "verily," "of a truth"] has been adopted in the service of the Christian Church as a response and an expression of assent at the end of a prayer. In some passages of the New Testament at the beginning of an emphatic declaration, it is translated "verily."

Amende Honorable, in French law, a form of infamous penalty to which criminals who offended against public decency or morality were condemned. The simple *amende honorable* consisted of a confession in open court made by a bareheaded and kneeling criminal. The *amende honorable in figuris* was made by a culprit kneeling in his shirt, with a torch in his hand and a rope round his neck. In modern speech the term is applied to a public recantation or apology.

Amend′ment, in law, is the correction of an error committed in any process, or the alteration of the record or of any pleadings in a civil or criminal cause. The deficiency of means of amendment in pleading at common law led to the statutes of amendments and jeofails.

AMENDMENT, in legislation, is an alteration in the words of any bill, motion, or resolution. Any member may move an amendment to a bill or resolution after it has been read twice, and it is usual to take a vote on the amendment first, and next on the main question. An opponent of a bill has a right to move an amendment to it by a motion to strike out all after the enacting clause, and to substitute a contrary principle. Either house of Parliament (or Congress) has a right to amend a bill which has been approved by the other, but such amendments must receive the assent of both houses before the bill can become a law. The term amendment is also applied to an alteration of the Constitution of the U. S. To render an amendment valid it must be first proposed by two-thirds of both houses of Congress, and must be ratified by the legislatures of three-fourths of the several States. The most recent of these changes in the organic law is the Fifteenth Amendment, which ordains that no man shall be disfranchised on account of color or race. (See CONSTITUTION.)

Ame′nia, on R. R., Duchess co., N. Y. (see map of New York, ref. 6–J, for location of county), 85½ miles N. N. E. of New York. It has five iron-mines, a condensed-milk factory, and a seminary. Pop. in 1880, 393.

Amenites. See OMISH.

Ameno′phis (or **Am′enoph**) [Gr. 'Αμενῶφις], **I.,** a powerful king of Egypt, the second of the ten kings of the eighteenth dynasty, began to reign about 1500 B. C.

Amenophis (or **Amenoph**) **II.,** the sixth king of the eighteenth dynasty, is regarded by some authors as identical with Memnon, who fought against the Greeks at the siege of Troy. (See MEMNON.)

Amenophis III. was a grandson of the preceding, and the eighth king of the eighteenth dynasty. He came to the throne about 1400 B. C. His reign was long, and greatly promoted the prosperity of Egypt, which he adorned with many noble monuments. He is supposed to have built the palace of Luxor (El-Ukser) at Thebes, which was his capital. His military exploits are recorded on the obelisk which now stands in the Place de la Concorde in Paris. According to Bunsen, Amenoph III. was the king whom the Greeks called Memnon.

Amen′ta (NICCOLO), born at Naples, Italy, in 1659, was a poet, lawyer, and philologist, and composed popular comedies. Among them are "Constanza," "Il Forca," and "La Carlotta." He wrote also "Della Lingua nobile d'Italia." Died in 1719.

Amenta′ceæ [from the Lat. *amenta′ceus*, "having an amentum"], a name given by Jussieu to a natural order of exogenous trees or shrubs having their flowers arranged in amenta or catkins. It included the birch, willow, alder, and other common trees. By recent botanists this order has been broken up into the Betulaceæ, Salicaceæ, and others.

Amen′tum [a Latin word meaning a "thong"] is applied in botany to a kind of inflorescence (also called catkin) which occurs in the willow, poplar, and birch. It differs from a spike in being deciduous.

A′merbach (BASIL), son of BONIFACE (noticed below), was born at Bâle, Switzerland, in 1534. He succeeded his father as professor in the University of Bâle, and left some manuscript works on law. Died in 1591.

A′merbach (BONIFACE), son of JOHANN, was born at Bâle, Switzerland, in 1495; taught civil law at the University of Bâle for twenty years, and was intimate with Erasmus, who appointed him his residuary legatee. With his brothers he corrected an edition of St. Jerome (1516–26). Died in 1562.

A′merbach (JOHANN), born in Reutlingen, Swabia, was a famous printer of Bâle, Switzerland, in the fifteenth century. He was the first to use the Roman type instead of Gothic and Italian, and published the first edition of the complete works of St. Augustine, on which he spared no labor or expense. He was rich, learned, and pious, and had previously published the works of St. Ambrose, and afterward undertook to prepare those of St. Jerome, which were published after his death under the direction of his sons. Died 1515.

A′merbach, or **Amerpach** (VITUS, or VEIT), was born in Wendingen, Bavaria; studied philosophy, law, and divinity at Wittenberg, and accepted the doctrines of Luther. He renounced Protestant doctrines when he returned to Bavaria, and was again received into the Catholic Church. He became professor of philosophy at Ingolstadt, and died about 1577, aged seventy. He wrote "On the Soul" and "Six Books of Natural Philosophy," etc.

Amerce′ment, or **Amerciament,** is a pecuniary punishment which is imposed at the discretion of the judge or court. Fines differ from amercements by growing expressly from some statute, while amercements are such as are arbitrarily imposed.

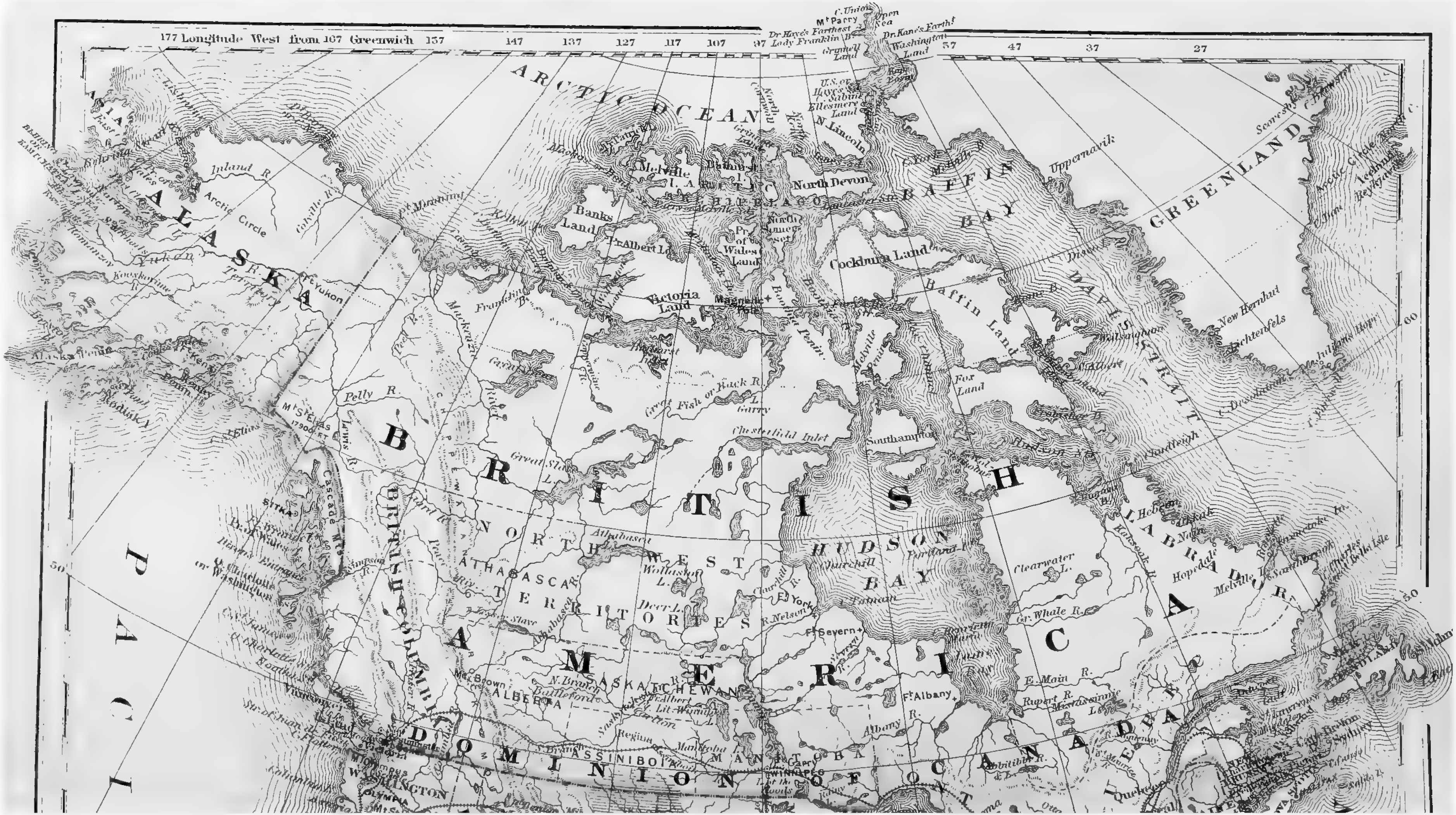
Ame′ria, one of the most ancient cities of Umbria, and also one of the most important, was located about 15 miles S. of Tuder and 7 W. of Narnia, between the Tiber and the Nar and a few miles above their junction. It is said to have been founded in 1135 B. C., but this date is not historical. Its territory extended to the Tiber and abounded in osiers and fruit trees. Its lands were divided by Augustus among his veterans. The modern town of *Amelia* retains the ancient site and parts of the ancient wall. It is the see of a bishop, and has a pop. of about 5000.

Amer′ica [so named from Amerigo Vespucci, who discovered a portion of the continent in 1499] is one of the four great recognized divisions of the globe, which was first practically made known to Europeans by Columbus in 1492, although parts of it were visited by the Northmen in the eleventh century, but they made no permanent settlements.

Situation and Area.—America appears to be separated into two continents, North and South America, connected by the Isthmus of Panama or Darien. It stretches from Boothia Felix, lat. 71° 55′ N., to Cape Horn, 56° S. In its widest parts it measures over 3000 miles, the extreme E. point being Cape St. Charles, in lat. 55° N., and the farthest W., Point Parina, lon. 81° W. from Greenwich. The narrowest part at the isthmus is 28 miles. The N. boundary is the Arctic Ocean; the E., through its whole extent, the Atlantic; the Southern Ocean washes its coast on the

[Compiled (with addition of later censuses) from BEHM and WAGNER, "Bevolkerung der Erde," 6th issue, Gotha, 1880.]

NAMES OF COUNTRIES.	Square miles.	Population.
North America	**8,405,495**	**64,301,838**
Bermuda Islands	19	13,812
Canada, Dominion of	3,204,381	4,352,080
Greenland	837,523	10,000
Mexico	741,598	9,389,461
Newfoundland	42,718	161,374
St. Pierre and Miquelon	91	5,338
United States	3,579,165	50,155,773
Do. Indians	....	214,000
Central America	**179,677**	**2,534,586**
Costa Rica	19,979	185,000
Guatemala	46,760	1,190,754
Honduras, British	7,560	24,710
Honduras, Independent	46,505	351,700
Nicaragua	51,647	300,000
Salvador	7,226	482,422
West Indies	**94,279**	**4,412,703**
Spanish possessions	49,465	2,061,500
British possessions	13,317	1,126,062
San Domingo	20,591	250,000
Haiti	9,229	550,000
French possessions	1,103	345,035
Dutch possessions	436	42,506
Danish possessions	138	37,600
South America	**6,420,029**	**28,168,397**
Argentine Republic	827,117	2,400,000
Bolivia	500,740	2,325,000
Brazil	3,218,166	11,108,291
Chili	124,084	2,400,000
Colombia	289,056	2,774,000
Ecuador	248,312	1,146,000
Guiana, British	85,400	240,500
Guiana, French	46,865	36,760
Guiana, Dutch	46,058	68,351
Paraguay	91,980	293,844
Patagonia	350,781	93,000
Peru	72,413	3,050,000
Uruguay	72,151	447,000
Venezuela	439,119	1,784,197
Falkland Islands	4,837	1,394
Galapagos Islands	2,950	60
Total America	**15,099,480**	**99,417,524**


177 Longitude West from 167 Greenwich 157
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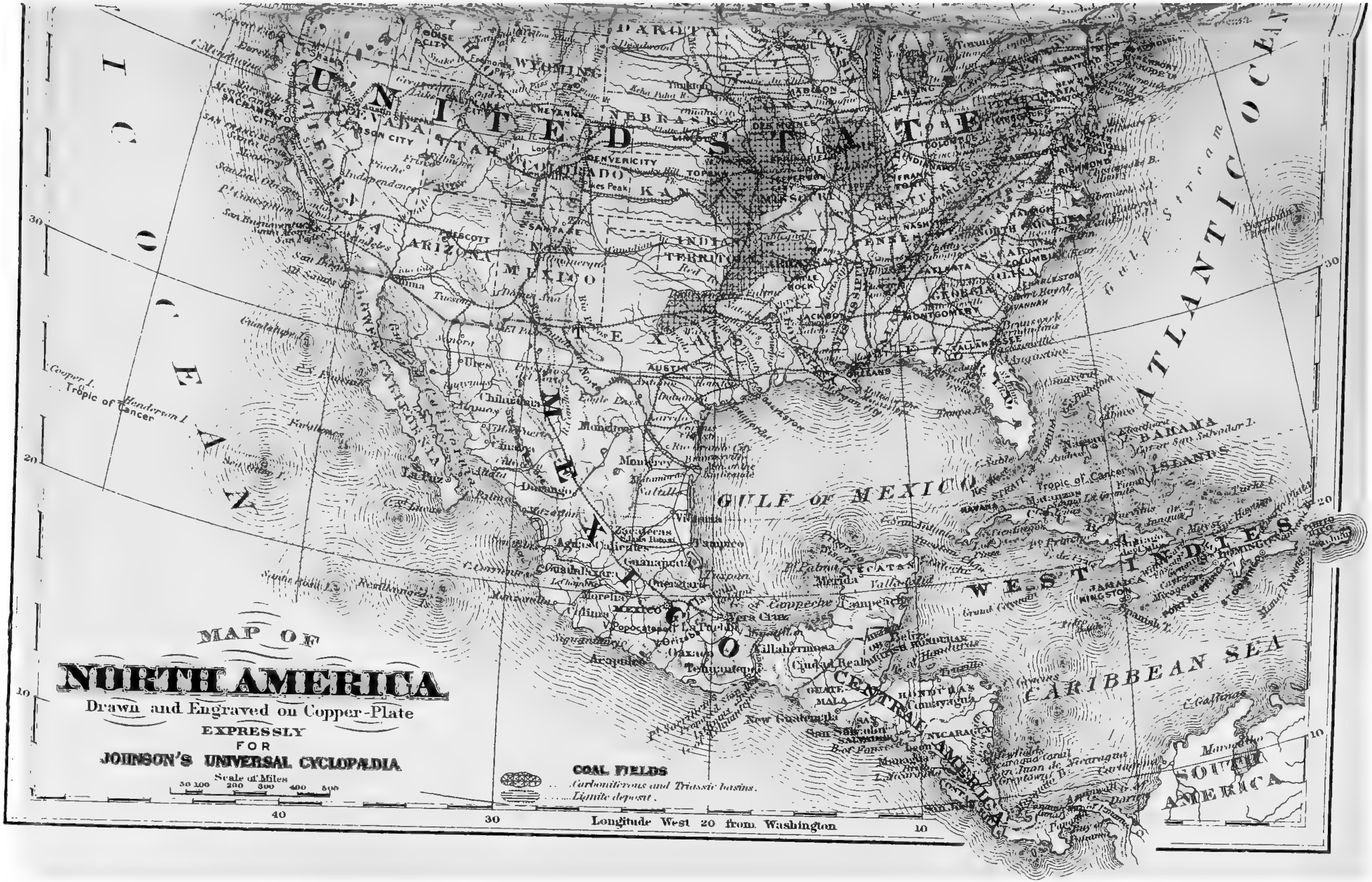
27
ARCTIC OCEAN
GREENLAND
BAFFIN BAY
DAVIS STRAIT
ALASKA
Arctic Circle
Yukon
Ft. Yukon
Banks Land
Melville I.
North Devon
Cockburn Land
Baffin Land
Victoria Land
Boothia Penin.
Fox Land
Southampton I.
Chesterfield Inlet
Great Fish or Back R.
Great Slave L.
Athabasca L.
Wollaston L.
Deer L.
Clearwater L.
Gr. Whale R.
E. Main R.
Rupert R.
Ft. Albany
Albany R.
Ft. Severn
York
R. Nelson
Churchill
Pelly R.
Lewis R.
Mt. St. Elias 17900 FT.
Sitka
Cascade Mts.
Upernavik
New Herrnhut
Lichtenfels
Hopedale
Nain
Hebron
Kaksoak R.
BRITISH AMERICA
NORTH WEST TERRITORIES
ATHABASCA
HUDSON BAY
LABRADOR
BRITISH COLUMBIA
ALBERTA
SASKATCHEWAN
ASSINIBOIA
MANITOBA
Regina
Winnipeg
Battleford
DOMINION OF CANADA
WASHINGTON
Olympia
Victoria
Quebec
PACI



MAP OF
NORTH AMERICA
Drawn and Engraved on Copper-Plate
EXPRESSLY
FOR
JOHNSON'S UNIVERSAL CYCLOPÆDIA

Scale of Miles
30 100 200 300 400 500

COAL FIELDS
Carboniferous and Triassic basins.
Lignite deposit.

S., and its W. shores are bounded by the Pacific. America is about four times as large as Europe, and one-third larger than Africa. While rather less than Asia in area, it embraces about three-tenths of the land on the earth. In physical features it surpasses all other regions of the globe in the length and volume of its rivers, the area of its lakes, the extent of its valleys, and the number of its mountain-ranges (inferior in height to the Himalayas alone), while its active volcanoes embrace more than two-thirds of those known to exist. The continent stretches over about 126° of lat.—8280 miles—being much longer than any other. The area and political divisions are outlined in the preceding table, based upon the latest and most reliable authorities.

I. North America extends from the Arctic Ocean to the Gulf of Mexico and Central America on the S. With the general outline of a triangle, it is deeply indented by inlets, bays, and gulfs, and has a length of about 13,700 miles on the Atlantic, 10,500 on the Pacific, and 3500 on the Arctic; total, 27,700 miles of coast-line. The continent approaches closely to Asia on the N. W. at Behring's Strait, 48 miles wide. In the N. E., Greenland is separated from the continent by Baffin Bay and Davis Strait.

Physical Features.—North America may be roughly stated as presenting—1. In the N. a vast series of plains, bleak and barren and crowded with lakes, extending from about lat. 50° N. to the Frozen Ocean; 2. The region E. of the Appalachian range, consisting of lands mostly of low elevation and diversified soil; 3. The central valley of the Mississippi, reaching from the Alleghanies to the Rocky Mountains, and embracing in its E. region the richest agricultural portion of North America, in its W. the arid and sandy plains of the Great American Desert; 4. The W. plateau, stretching from the Rocky Mountain range to the Pacific, a region rich in minerals, with a varied soil and a generally equable climate; 5. The elevated table-lands of Mexico, with their extensive mountain-ranges, and narrow coast-line of lowlands on the E. and W.

Mountains.—The great characteristic ranges of mountains in North America, creating marked divisions of its watersheds, and with broad valleys between, are the Rocky Mountain range in the W. and the Appalachian (sometimes called the Alleghanies) in the E. The Rocky Mountains may be said to begin in British American territory, above lat. 60° N., stretching in a southern direction through Montana, Idaho, Wyoming, and Colorado until they meet the Sierra Madre range, which runs from New Mexico through the greater part of the Mexican republic. The highest Rocky Mountain peaks are the Holy Cross, Pike's, Long's, and Torrey's peaks, rising to a height of between 14,000 and 14,400 feet. They are, however, overtopped by Mount Whitney, in the Sierra Nevada range, California, 14,887 feet high. Numerous collateral ranges frequently classed as part of the Rocky Mountain system run in directions generally parallel. These comprise the Cascade Mountains in Oregon and Washington, the Coast range and Sierra Nevada in California, the Wasatch Mountains in Utica, the Wind River Mountains and the Black Hills in Wyoming and Dakota. The Cascade range extends along the coast as far N. as Alaska, its loftiest peak, Mount St. Elias, about 60° N., being 19,500 feet high. Southward the mountain-ranges of Mexico have the volcanic peaks of Orizaba, 17,879 feet, and Popocatapetl, 17,784 feet. The Appalachian system stretches from Western North Carolina northward in Virginia and Pennsylvania, terminating in isolated mountains of lesser elevation and the White Mountain range in the New England States. The highest summit of the White Mountains is Mount Washington, 6288 feet. The highest peak in this range is Mitchell's Peak, in the Black Mountains of N. Carolina, 6607 feet.

Rivers.—A marked feature of North America is its navigable rivers, affording means of interior communication to an extent unequalled on the other continents. The Mississippi alone, with its branches, supplies more miles of inland navigation than all Europe possesses. The distance from the mouth of the Mississippi to the farthest point navigable on the head-waters of the Missouri is 3900 miles, and this great river with its tributaries drains sixteen States and five Territories. The St. Lawrence affords a water transit (including the lakes with which it communicates) of 2200 miles. The Mackenzie River in the N. flows through British territory into the Arctic Ocean, and the Saskatchawan into Hudson Bay, while Frazer's River runs through British Columbia to the Pacific. The Yukon, of Alaska, is more than 2500 miles long. The Columbia rises in the Rocky Mountains, flows through Washington and Oregon, and reaches the Pacific. The Hudson, navigable for 150 miles above New York, is always crowded with commerce. The Rio Grande del Norte flows into the Gulf of Mexico, and the Colorado into the Gulf of California.

Lakes and Bays.—The inland seas of North America comprise Lakes Superior, 31,400 square miles; Erie, 10,000; Ontario, 7300; Huron, 23,800; and Michigan, 25,600. Lake Champlain lies between New York and Vermont. All these are great avenues of commerce, while Lakes Winnipeg, Athabasca, Great Slave, and Great Bear, lying in the bleak regions of the N., are little navigated. Many lesser lakes are scattered through the Northern U. S. The Gulf of Mexico washes the southern boundary of the U. S.; the Gulf of California is on the W. coast. Baffin Bay and Hudson Bay are large and almost land-locked bodies of water to the N. of Canada; and these, with the Gulf of St. Lawrence, form the most notable of the bays which indent the coast, but the smaller ones are almost innumerable.

Geology and Minerals.—It is impossible to analyze the diversified geological structure of the continent in a brief space. The Palæozoic rocks cover the greater portion, consisting of Silurian, Devonian, and carboniferous strata, the latter furnishing great coal-fields in Pennsylvania and other border-lands of the Appalachian chain, in Illinois, Michigan, and in British America. Glacial drift and boulders are scattered profusely over many regions N. of about 40°. The Atlantic coast develops the cretaceous and tertiary strata, with gneiss beneath it, the latter covered partially by new red sandstone on the E. slope of the Alleghanies. Large areas of cretaceous, triassic, and oölitic rocks are found in the W., and in California the secondary strata and tertiary beds are most prominent. British America abounds in the Laurentian and Huronian rocks, being the most ancient yet found, and these extend S. to the Adirondac region in New York. The Rocky Mountains exhibit volcanic rocks and the upheaved strata of granite, slates, and carboniferous rocks. The great plateau running from Mexico to British America, W. of the Rocky Mountains, and bisected by the cañons of the Colorado to the depth of several thousand feet, exhibits specimens of almost all the geological structures. North America has within the present generation been the richest part of the globe in the production of gold and silver. From the quartz veins and surface deposits in the Sierra Nevada have been taken more than $1,000,000,000 of gold since 1848. The veins of silver in Nevada, Colorado, and Utah have yielded $450,000,000 since their discovery in 1859. Mexico is also rich in silver. Copper is largely mined on the shores of Lake Superior in Michigan, and in Mexico. The upper Mississippi affords lead-ore in abundance. Quicksilver is found in California and Mexico. Iron abounds, salt is distributed widely, and the immense coal-beds, both bituminous and anthracite, afford a practically inexhaustible supply of fuel.

Climate.—All the climates of the globe may be found in North America. The New England regions are colder than the W. in the same parallels of latitude, and 10 or 12° lower than the same latitude in Western Europe. Vast regions N. of the lakes are almost uninhabitable from the intense cold, while in the Southern States and parts of Mexico the climate of the torrid zone prevails during a part of the year. The mean range of temperature for the year is as follows in the regions named: Alaska, 42° F.; Alabama, 66°; Massachusetts, 46°; Washington (city), 56°; Greenland, 13°; Mexico (city), 61°; Nova Scotia, 44°; Quebec, 40°; California, 55°; Minnesota, 42°; Florida, 70°. Extremes of temperature and sudden changes occur in most regions remote from the seaboard. The rainfall is variable. Parts of Mexico and California are dry almost throughout the year. The trade-winds blowing from the Gulf of Mexico carry the moisture of the torrid zone up the Mississippi valley, while the great plains directly E. of the Rocky Mountains present an almost rainless region.

Soil and Productions.—With the exception of the arid region near the Rocky Mountains, the stony or sandy or exhausted lands along the Atlantic coast, and the vast bleak regions lying below the Arctic Ocean, the soil of North America is singularly fertile. The rich alluvium on the banks of the Ohio, Mississippi, and other rivers, is almost inexhaustible. The Western prairies and the wooded regions of the Northern and Southern States have a productive soil. The table-land of Mexico, with parts of California and the Great American Desert, are without forests. Canada is rich in timber; so are some parts of the Northwestern and Southern States. The most valuable forest trees are the oak, maple, hickory, chestnut, pine, ash, beech, poplar, black walnut, tulip, and white cedar. Indian corn, or maize, is the most important grain-crop; wheat, oats, rye, and barley come next. The hay-crop is of great value; so are potatoes. Cotton ranks among the most important products. Large quantities of tobacco, rice, and sugar-cane are produced, although their area of production is limited. Fruit trees, including the apple, pear, peach, orange, etc., are widely raised. The grape is becoming an important crop.

Zoology.—The animals of North America include every important species known in Europe, and there are remains of several extinct mammals and birds. The bisons, or buffaloes, are fast disappearing. The deer family embraces several varieties—reindeer in the Arctic region, the moose in Maine and British America, and the *Cervus Americanus* among the forests and mountains of several States. Other wild animals are the bear, panther, lynx, wild-cat, wolf, dog, fox, beaver, otter, raccoon, badger, opossum, antelope, squirrel, muskrat, hedgehog, hare, weasel, and gopher. Among domesticated animals, horses, sheep, cattle, and swine are abundant. The birds of North America, elsewhere described, number about 700 species, embracing the turkey, pheasant, buzzard, hawk, pigeon, eagle, vulture, owl, grouse, quail, wild goose, swan, duck, pelican, lark, thrush, mocking-bird, robin, woodpecker, parrot, humming-bird, grosbeak, whip-poor-will, kingfisher, bluebird, jay, oriole, cedar-bird, etc. Serpents are numerous, the rattlesnake being the most venomous. Alligators abound in the Southern rivers, and turtles, toads, and frogs everywhere. Fish are abundant and valuable, including salmon, shad, cod, mackerel, sturgeon, trout, white-fish, herring, sheepshead, bass, perch, blue-fish, etc.

Population and Language.—What may have been the origin of the aborigines of North America is a problem still unsolved. There yet remain of the indigenous races between four and five millions, mostly in Mexico. The Esquimaux appear to be a distinct race. All the native races are copper-colored, though of a different tinge, with black straight hair. They are in general a stationary, unprogressive race. The number of languages spoken nearly equals that of all the rest of the globe (about 450), and all attempts to trace these confused dialects to Eastern originals are more fanciful than scientific. The natives of Alaska are supposed to be of different origin from the other American Indians. The African race, originally introduced as slaves, now number 6,600,000, mostly in the Southern States. The white population number about 75,000,000, of whom nearly two-thirds inhabit the U. S. They are mostly of the Germanic branch of the Caucasian race, those of Latin descent being chiefly in Mexico. The Anglo-Saxon element peoples over two-thirds of the settled regions, and the English language is that of nearly nine-tenths of the population, the one considerable exception being the Mexican use of the Spanish tongue.

Religion, Education, etc.—Protestant Christianity is the more prevalent religious belief in North America. Methodism outnumbers any other, the Baptist coming next, and the Presbyterian third, followed by the Congregational and the Episcopal. The Roman Catholic worship is widely prevalent in the U. S., and in Canada embraces more than one-third of the population. In Mexico the great majority are Catholics. Mormonism has a foothold in Utah alone. Education is widely diffused in the U. S. and Canada. The percentage of illiteracy, however, embraces one-fifth of the population of ten years and upward. In Mexico there is a large ignorant native population.

Discovery and Settlement.—As has already been said, Northmen landed in Greenland early in the eleventh century, and undoubtedly went as far S. as what is now Rhode Island. Columbus reached the West India Islands in 1492, and subsequently discovered the mainland of South America. The mainland of North America was probably first touched by John Cabot in 1497. In 1500 the Portuguese Cortereal touched at Labrador; in 1513, Balboa crossed the Isthmus of Darien and found the South Sea; in 1519, Cortez invaded Mexico, and finished its conquest in 1521; in 1535, Cartier sailed through the Gulf of St. Lawrence; in 1537, Cortez discovered California, and took possession of it in the name of Spain; in 1578, New Albion was discovered by Sir Francis Drake; in 1587, John Davis found the Cumberland Islands and Davis Strait; in 1604, De Monts made the first settlement in Acadie (Nova Scotia). The first permanent English settlement in North America was made in 1607 at Jamestown, Va. In 1608 the French founded Quebec; in 1611, Newfoundland was colonized by the English, and the Dutch settled on the Hudson; in 1614, New York was founded; in 1618, Baffin sailed N. to lat. 78°, and named Baffin Bay. In 1620 took place the settlement at Plymouth of the first English colony in New England. In 1682, William Penn founded a colony in Pennsylvania, and in the same year La Salle took possession of Louisiana in the name of France; in 1683, Georgia was colonized by the English.

History.—The most marked historical events in the history of North America have been—1. The transfer of most of the French colonies to Great Britain after the French war of 1756–63, by the treaty of Paris, in the latter year; 2. The American Revolution, ending in the independence of British rule of the U. S., 1775–83; 3. The independence of Mexico of Spanish rule, accomplished in 1821. The subsequent history of the various countries: the U. S., Mexico, and the British colonies, will be found under their respective headings.

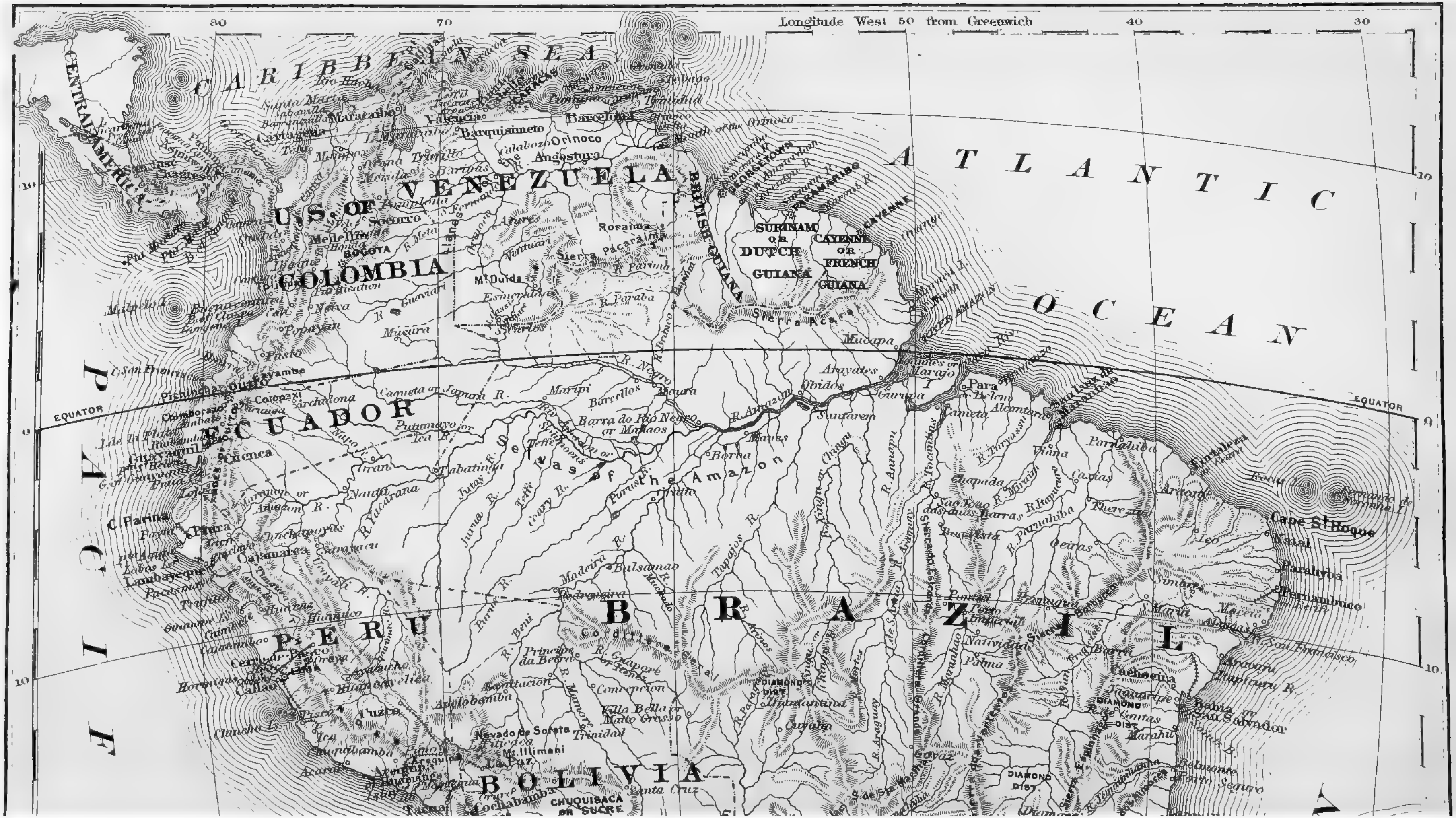
II. Central America.—The region S. of Mexico, and uniting North and South America between lat. 7° and 18° N., is a mountainous district interspersed with plains, as in Nicaragua, and table-lands, as in Honduras. Central America has some mountains 15,000 feet high, and its volcanic regions are extensive. Its geology exhibits crystalline rocks with gold, silver, and lead, hitherto little worked. The products embrace all the tropical plants and fruits. The forests are extensive, abounding in birds, conspicuous among which are the toucan and the humming-bird. The rivers are all small, the San Juan, the outlet of Lake Nicaragua (which has an area of 3400 square miles), being the principal one. The most important bays are the Gulf of Honduras on the Caribbean Sea, the Bay of Panama, the gulfs of Fonseca and Nicoya, on the Pacific coast. The inhabitants are more than half native Indians, one-third Mestizoes (or mixed whites and Indians), and the remainder whites. Columbus was the first to visit the mainland of Central America in 1502, and in 1523 it was conquered by Alvarado, continuing three centuries under Spanish rule, and becoming a federal republic in 1823. In 1833 this government dissolved, and five republics—Costa Rica, Guatemala, Honduras, Nicaragua, and Salvador—were formed.

III. The West Indies, so called from the belief of the early discoverers that the countries found in the fifteenth century were the western regions of India. They embrace about 900 islands, lying E. of the coast of North and Central America. The name of Antilles is made to embrace all the West Indies except the Bahamas. Another designation divides the West Indies into the Leeward Islands, comprising those N. of lat. 15°, and the Windward Islands, embracing those S. of that parallel. The Windward Islands, or a part of them, were also named the Caribbees, and the sea which they separate from the Atlantic is called the Caribbean. The geological structure of these islands indicates either coral-formation or volcanic origin. The whole submerged region is subject to earthquakes. The rocky coast of most of the islands abounds in reefs, although there are some good harbors. The Bahama Islands embrace the northernmost chain, stretching S. E. from a point near the coast of Florida. On one of this group Columbus made his first landing. The entire West Indies embrace about 95,000 square miles with about 4,000,000 inhabitants. About half the area and population belong to Spain. Great Britain holds the dominant share in the remainder, while France, Denmark, and the Netherlands have possessions in this archipelago.

IV. South America.—This portion of the American continent is of triangular form, measuring 4550 miles from N. to S., and 3200 miles at its greatest breadth. Three-fourths of it lie between the tropics. The great physical features of South America are—1. The valley of the Orinoco in the N., marked by extensive plains called llanos, resembling the prairies of North America in the absence of trees and the tall herbage; 2. The basin of the Amazon, just S. of the equatorial region, draining a country of 2,000,000 square miles covered with forests and teeming with animal and vegetable life; 3. The southern plains or pampas of Buenos Ayres, watered by the Plata and other streams, covered with high grass, affording food for herds of cattle and horses; 4. The Brazilian country, of a mingled mountainous and valley formation, well wooded in the E., and with steppes or plains in the interior; 5. The shores of the Pacific, a narrow strip of lowland between the mountain-ranges and the ocean, from 50 to 150 miles broad and 4000 miles long.

Mountains.—Ranges of mountains are scattered over the whole area of South America. The Andes form a mountain-chain with an average height of 11,000 feet, extending from the extreme south-western coast to the Isthmus of Panama. Between the ridges lie lofty plains or valleys, and transverse chains run from the Andes eastward across the continent, inclosing the three great natural depressions that form the basins of the Orinoco, Amazon, and Plata. The cordillera (mountain-chain) of the W. coast is 700 miles long, with a mean height of 4000 feet and summits of 15,000 feet. The cordillera of the Orinoco, dividing the waters of that river from the basin of the Amazon, is forest-clad, with a mean height of 4000 feet, the chain being 1500 miles long. The Brazilian mountains are of moderate elevation, the highest peak being Itatiaya, 8900 feet. The highest peak in the Andes is 24,800 feet. There are more than twenty active volcanoes among the Andes of South America, ranging from 13,000 to 23,000 feet.

Rivers and Lakes.—The Amazon, with its great tributaries, forms a body of water estimated to be greater than that of all the rivers of Asia, and the Plata is believed to discharge a greater volume of water than all the African


Longitude West 50 from Greenwich
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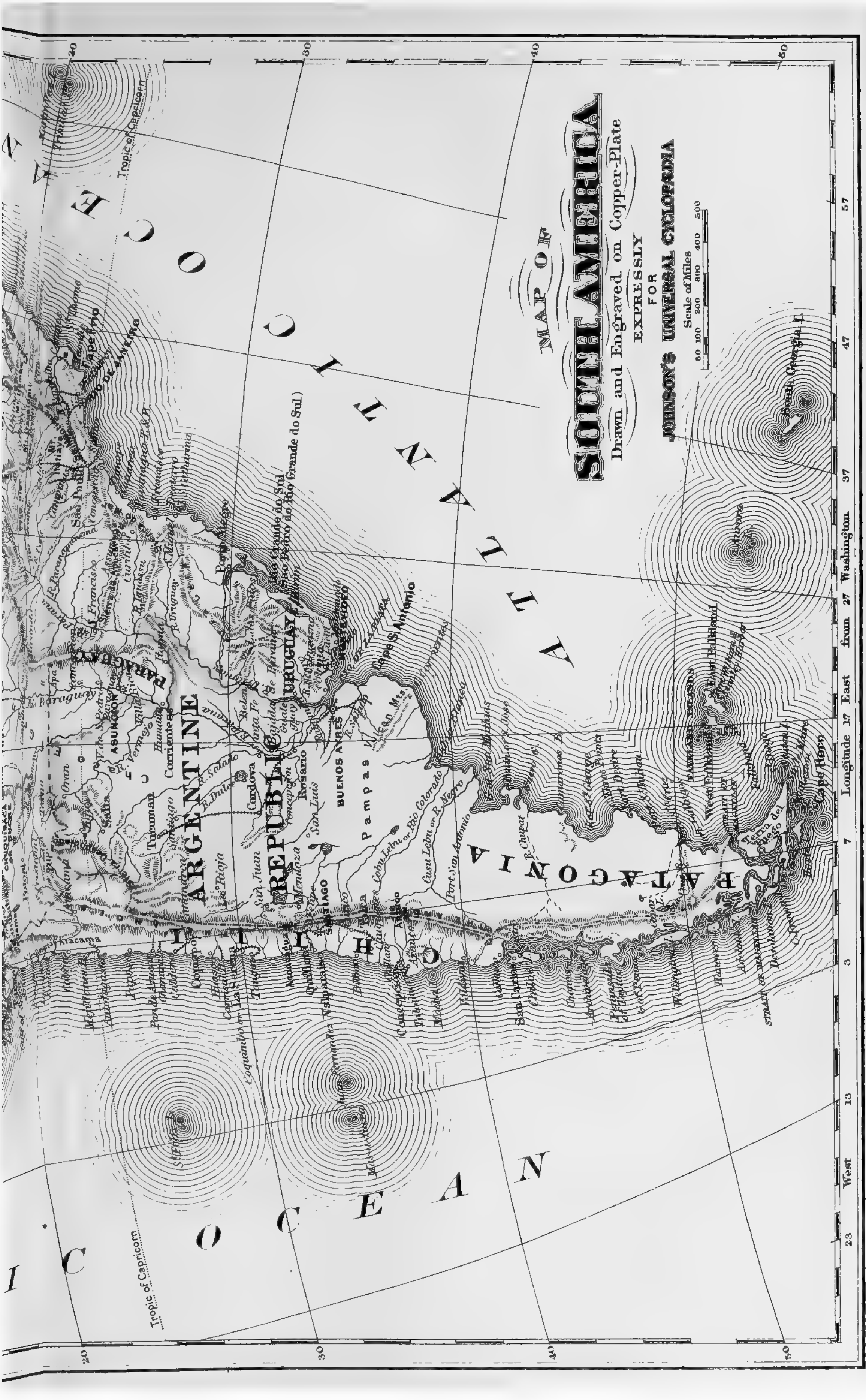
EQUATOR
CARIBBEAN SEA
ATLANTIC OCEAN
PACIF
CENTRAL AMERICA
U.S. OF COLOMBIA
VENEZUELA
BRITISH GUIANA
SURINAM OR DUTCH GUIANA
CAYENNE OR FRENCH GUIANA
ECUADOR
PERU
BOLIVIA
BRAZIL
Selvas of the Amazon
Rio Hacha
Santa Marta
Maracaibo
Cartagena
Valencia
Caracas
Barcelona
Trinidad
Tobago
Barquisimeto
Orinoco
Angostura
Mouth of the Orinoco
Georgetown
Paramaribo
Cayenne
Bogota
Medellin
Popayan
Pasto
Buenaventura
Mt. Duida
Roraima
Sierra Pacaraima
Sierra Acarai
Mucapa
Quito
Cayambe
Pichincha
Chimborazo
Cotopaxi
Guayaquil
Cuenca
C. San Francisco
C. Parina
Piura
Payta
Lambayeque
Cajamarca
Truxillo
Huanuco
Cerro de Pasco
Lima
Callao
Huancavelica
Ayacucho
Cuzco
Arequipa
Pisco
Ica
Arica
Tacna
Apolobamba
Nevado de Sorata
Titicaca
Mt. Illimani
La Paz
Cochabamba
Chuquisaca or Sucre
Santa Cruz
Trinidad
Concepcion
Villa Bella or Matto Grosso
Cuyaba
Diamantina
Diamond Dist.
R. Amazon
R. Negro
R. Branco
R. Madeira
R. Purus
R. Jurua
R. Javary
R. Ucayali
R. Maranon
R. Napo
R. Putumayo
Caqueta or Japura R.
R. Guaviari
R. Meta
R. Beni
R. Mamore
R. Guapore
R. Tapajos
R. Xingu
R. Tocantins
R. Araguay
Barra do Rio Negro or Manaos
Obidos
Santarem
Marajo I.
Para or Belem
Cameta
Alcantara
Maranhao
Parnahiba
Fortaleza
Cape St. Roque
Natal
Parahyba
Pernambuco
Maceio
R. San Francisco
Bahia or San Salvador
Porto Seguro
Belmonte
Cachoeira
Oeiras
Caxias
Therezina
R. Parnahiba
Porto Imperial
Natividade
Palma
Goyaz
Sierra do Estrondo
Cordillera Grande
Barra
Fernando de Noronha I.


MAP OF
SOUTH AMERICA
Drawn and Engraved on Copper-Plate
EXPRESSLY
FOR
JOHNSON'S UNIVERSAL CYCLOPAEDIA
Scale of Miles
50 100 200 300 400 500
ATLANTIC OCEAN
PACIFIC OCEAN
ARGENTINE REPUBLIC
PARAGUAY
URUGUAY
CHILI
PATAGONIA
Pampas
BUENOS AYRES
MONTEVIDEO
ASUNCION
SANTIAGO
RIO DE JANEIRO
Terra del Fuego
Cape Horn
South Georgia I.
FALKLAND ISLANDS
Tropic of Capricorn
Longitude West 23 13 3 7 17 East 27 from Washington 37 47 57
20 30 40 50

rivers combined. These rivers, as well as the Orinoco, have their estuaries on the Atlantic coast, and are navigable to the far interior. The Plata, with its great affluent the Paraguay, is 1500 miles long, the Orinoco 1800, the Amazon 4000. Other rivers are the San Francisco, Essequibo, Rio Negro, etc. The principal lake, Titicaca, on the borders of Peru and Bolivia, has 4000 square miles and a height of 12,200 feet. Many smaller lakes are scattered through the high plains and valleys. The coast of South America has few indentations, the gulfs of Maracaibo, San Antonio, and St. George being the principal on the Atlantic and the Gulf of Guayaquil on the Pacific coast.

Geology.—Unusual uniformity pervades the geological structure of South America. The pre-Silurian or oldest rocks are found on the coast, next to which come schists and quartz of the Silurian age. The transverse mountain-ridges exhibit sandstones and limestones of the carboniferous period. Secondary and tertiary beds of rocks are scattered through the great river-valleys and mountain-hollows. Bolivia has mountains of granite, which also occurs along the Chilian coast. Gneiss prevails along the shores of Peru, Ecuador, and Colombia, and in Brazil, where it is joined with granite. The Andes abound in porphyries, sandstones, and the schists. Agassiz found glacial formations in the Amazon valley and in the mountains of Brazil, and Orton found marine shells in Ecuador. The western coast is the region of earthquakes. In the northern part are found emerald-mines. Brazil and Venezuela furnish gold, and the diamond-mines of Brazil are famous. Silver is found in Peru, Chili, Ecuador, and Bolivia, which have furnished more than $2,400,000,000 of silver since the discovery of America. Iron and coal have not thus far been discovered in great quantities. Copper abounds in Chili.

Climate.—The chain of the Andes powerfully affects the climatic conditions of South America. The trade-winds blowing from the coast westward are arrested by the mountain-ranges, intercepting the moisture of the atmosphere, and producing copious rains on the eastern side of the Andes, while on the western side long seasons of drought prevail. Farther N., where the mountains are more depressed, there is free passage for the trade-winds, and the W. coast is well watered. So much of South America lies in the equatorial region that extreme sultriness prevails in the forests and the valleys, while the mountain-ranges have a rarefied atmosphere and a cool climate.

Soil and Productions.—A notable feature of South America is its vast forests, the area of which exceeds those of any other country. The growth of the native trees is amazing, and so luxuriant is vegetable life that they are covered all over with ferns, orchids, cactuses, and countless other plants, while the underwood is composed of thickets of palms, melastomaceæ, myrtaceæ, crotons, and tree-ferns. The most valuable forest trees are the mora, the cow tree (yielding a juice like milk), and the greenheart. Of cultivated plants, wheat, maize, sugar-cane, coffee, indigo, cacao, etc. are abundantly raised, while oranges, lemons, limes, cocoanuts, bananas, mangoes, pineapples, etc. grow almost without care. The cinchona or Peruvian bark, the balsam of Peru and tolu, ipecacuanha, and copaiba are among the native medicinal plants. The ivory-plant, the vanilla-plant, the caoutchouc or India-rubber tree, grow in profusion. Gigantic palms and almost impenetrable forests brilliant with flowers show the richness of the botany.

Zoology.—The animals most abundant are the monkeys, or tree-climbers, which swarm in the forest-regions, the jaguar, puma, dog, bear, llama, alpaca, tapir, etc. South America is the country of birds, of which more than 2300 species exist, while only 700 are described in North America. The tropical regions produce innumerable birds of bright plumage—cockatoos, toucans, parrots, humming-birds, etc.—while the Andes witness the lofty flights of eagles, condors, falcons, and vultures. The serpent tribe infest almost every region, and alligators and electric-eels swarm in the rivers. There are scorpions, mosquitoes, chigoes, ants, and insect pests innumerable. Horses and cattle are raised in prodigious numbers.

Population and Languages.—The native races of South America have been divided into the Brazilian, Patagonian, and the Appalachian, all distinguished by the large nose, broad skull, prominent cheek-bones, straight hair, and with brownish-yellow complexion. The Araucanians, the native tribes of Chili, are the best race, having many traits of civilization. The natives of Brazil are a mild race, living chiefly by rude agriculture. The equestrian tribes of Paraguay are a bolder and more active race. Cannibalism is still found in the interior of South America, and the slave-trade is still carried on. The Patagonians are tall and muscular, subsisting chiefly by hunting. Most of the South American countries have a mixed race of Spanish and native blood, and an extensive immigration from Europe (notably to the Argentine Republic and Brazil) forms a large and increasing element in the population. Spanish is the spoken and written language of nearly all South America except in Brazil, which has the Portuguese. Many native dialects exist.

Religion, Education, etc.—The prevailing religion of South America is the Roman Catholic. Other worships are freely established wherever voluntary societies are formed. Education is neglected, although there is much intelligence, especially in the active commercial towns.

History.—Columbus was the first to set foot on South American soil, in 1498. He was followed by a long series of invaders from Spain. The ancient race which inhabited the W. coast were far superior to their descendants, possessing a knowledge of art, architecture, etc., showing great advance in civilization. The coast of Brazil was discovered by Cabral in 1500; in 1508, Pinzon entered the Rio de la Plata; in 1531, Peru was conquered by Pizarro; Buenos Ayres was settled in 1535 by the Spaniards; in 1541, Chili was invaded and conquered, and Orellana sailed down the Amazon to the Atlantic; in 1635, Guiana was settled by the French. Early in the present century the South American provinces of Spain began to assert their independence. New Granada became a republic in 1811; Venezuela and Paraguay, in 1813; the Argentine Confederation and Chili, in 1818; Colombia, in 1819; Peru, in 1821; Bolivia, in 1824; and Uruguay, in 1825. Brazil was made an independent kingdom in 1825, being the only government on the American continent which is not a republic or a colonial appendage to some foreign state.

Literature.—See Humboldt, "Examen critique de l'histoire de la géographie du Nouveau Continent;" MacGregor, "The Progress of America from the Discovery of Columbus to the year 1846;" Squier, "The States of Central America;" Wappäus, in the new edition of Stein's and Hörschelmann's "Handbuch der Geographie und Statistik;" Kohl, "Geschichte der Entdeckung von Amerika;" "Naturalist's Directory of North America and the West Indies;" Dr. D. G. Brinton, "The Myths of the New World;" B. F. de Costa, "The pre-Columbian Discovery of America by the Northmen, illustrated by translations from the Icelandic Sagas."

Revised by Ainsworth R. Spofford.

American Antiquities. Under this appellation are commonly included the various remains of aboriginal fortifications, mounds, etc., as well as those of architecture and art, whether existing in North, Central, or South America. This name is obviously too general and of too extensive an application for a work in which the various articles are designed to be distributed as much as possible under separate heads, so as to adapt it to convenient and ready reference. The various architectural and other remains, therefore, of Mexico and Central and South America will be noticed respectively under Mexican Antiquities, Copan, Palenque, Peruvian Antiquities, Tiahuanico, etc. But as there is no other more appropriate head under which the peculiar though widely extended remains found in the valley of the Mississippi and its tributaries can be treated, it is proposed to describe them in the present article.

Most of these monuments are mounds and walls of earth. They are usually found overgrown by the primeval forests, and in the living and decaying trees which cover them we have a record that they have been *abandoned* at least a thousand years. As they are plainly the relics of a sedentary people, very different in their habits and modes of life from the Indians who occupied all the country at the time of the advent of the whites, they have been generally regarded as the work of a distinct and now extinct race, to whom the name of Mound-Builders has been given. Besides the mounds and other earth-works left by the Mound-Builders, one occasionally finds very wide walls laid up of rough stones without mortar, some of which will be referred to farther on. We have proof also that the Mound-Builders worked the copper-mines of Lake Superior, lead-mines near Lexington, Ky., and oil-wells in Canada and North-western Pennsylvania. (*Newberry.*)

The remains of the Mound-Builders are spread over a vast extent of country. They are found on the sources of the Alleghany, in the western part of the State of New York, and in nearly all the Western States, including Michigan and Iowa. They were observed by Lewis and Clarke on the Missouri, 1000 miles above its junction with the Mississippi. They line the shores of the Gulf of Mexico from Texas to Florida, whence they extend through Alabama and Georgia into South Carolina. They are especially numerous in Ohio, Indiana, Illinois, Wisconsin, Missouri, Arkansas, Kentucky, Tennessee, Louisiana, Mississippi, Alabama, Georgia, Florida, and Texas. Many of these remains were evidently designed as works of defence or as watch-towers in war. No inconsiderable number appear to have been formed as sepulchral monuments or places of burial for the dead; while others seem obviously to have been constructed as temples or places of worship and sacrifice. Among those evidently works of defence are the fortifications found in Ross co., O., near the village of Bourneville. These occupy the summit of a lofty hill, the sides of which are remarkably abrupt, so as to be at some points absolutely inaccessible. The defences consist of a wall of stone, now in ruins, carried around the hill a little below its brow, and extending across the neck which connects the hill with the range beyond. On the eastern side, where the declivity is least abrupt, the wall is stronger and higher than on the other sides, except across the neck (which is about 700 feet wide), where it is strongest of all. In this portion of the wall are three gateways about eight feet wide. In one place on the western side, where the abruptness of the hill makes it wholly inaccessible, the wall is discontinued for some distance. Everything, indeed, connected with these works clearly indicates that they were designed for purposes of defence. It may be added that the space enclosed within the wall is more than 140 acres, while the entire line of the fortifications measures about two and a quarter miles. The enclosure is abundantly supplied with water, which can readily be obtained at the depth of a few feet by digging, and is also found in two considerable ponds or small lakes, one of which covers about two acres. Another work of a similar character, in the southern part of Highland co., O., is known as Fort Hill. The fortifications are on the summit of a hill 500 feet high. They are composed of mingled earth and stone. Measured from the bottom of the ditch, from which the earth used in building the embankment has been excavated, the wall is in some places fifteen feet high, while the average breadth of the base is from thirty to forty feet. That these fortifications were constructed several centuries ago is rendered more than probable by the fact that a chestnut tree twenty-one feet in circumference was found growing some years since on the embankment, and an oak tree twenty-three feet in circumference, though now fallen and much decayed, had evidently grown upon the earth of the fortifications. The entire length of the wall at Fort Hill is more than a mile and a half: it encloses a space of about fifty acres. Among the remains, which give evidence of their having been constructed for religious purposes, are a large number consisting of an embankment or wall of earth in the form of a perfect circle, adjacent to which there is often a square or parallelogram made with an embankment similar to that of the circle. In Ross co., O., east of the Scioto River, near Chillicothe, are works of this description. The circle is 1050 feet in diameter, the side of the adjoining rectangle being about 900 feet. The wall of the latter is about twelve feet high, with a base of fifty feet, without any ditch on either side. The wall of the circle is somewhat lower. Nearly similar to the above, and of about the same extent, are the celebrated remains at Circleville, O., though they have (or rather had, for the lines have become almost obliterated by the repeated cultivation of the ground) this peculiarity, that the circle is formed by a double embankment, with a ditch between.

One of the most remarkable works of this kind is the Great Serpent, situated on the summit of a hill in Adams co., O. It extends 700 feet, terminating in a triple coil at the tail. The line of the body is gently and gracefully undulating, and the entire length, if extended in a straight line, would not be less than 1000 feet. Its jaws are widely distended, and it seems attempting to swallow an oval figure (perhaps designed to represent an egg) which is 160 feet long and 80 wide. The embankment which forms the body of the serpent is five or six feet high, with a base of from twenty to thirty feet. It would seem that it might have been designed as some mystical emblem. No small number of the remains consist of mounds, generally nearly conical in their form, at other times resembling a parallelogram. Of the former class is the great mound at Moundsville, in West Va., about twelve miles below Wheeling. It is about 70 feet high and 1000 feet in circumference at the base. In 1838 a shaft was sunk from the apex to the base; two sepulchral chambers were found constructed of logs, and covered with stones; the lower chamber contained two skeletons, the upper but one, in an advanced stage of decay. It is supposed that as a general rule each mound was raised over a single individual, although some may have been designed as general cemeteries.

Near Cahokia, in Illinois, is a very extensive earthwork in the form of a parallelogram, 700 feet long by 500 wide at the base, with a height of 90 feet. The top is level, having an area of near five acres.

Many implements and ornaments have been found in the mounds. They are usually composed of stone, though sometimes of copper, more rarely still of shell or bone. The copper is always in its native state—never alloyed, nor even cast—and shows specks of silver, such as are found only in the copper of Lake Superior. The stone implements—except the flint spear and arrow heads—are wrought with much care and skill. Pottery is found in most of the mounds; it is sometimes graceful in form and highly ornamented, oftener coarse and rude. Masses of galena, calc-spar, quartz crystals, sheets of mica, and marine shells found in the mounds, with copper and stone implements composed of materials brought from distant localities, indicate some internal but no foreign commerce. Fragments of coarse cloth have been discovered, but all fine fabrics are wanting, perhaps from the lapse of time. No bones taken from the mounds indicate that their builders had domestic animals. In many instances the human skeletons have almost entirely disappeared, attesting their great antiquity. No tablets or inscriptions yet discovered indicate that the Mound-Builders had a written language, and the inscriptions on rocks so common in the country they occupied, and usually referred to them, are of rude execution, mythical character, and of doubtful parentage; so that they throw little light on the history of this ancient race.

From all the facts before us, we can at present say little more than this: that the valley of the Mississippi and the Atlantic coast were once densely populated by a sedentary, agricultural, and partially civilized race, quite different from the modern nomadic Indians, though possibly the progenitors of some of the Indian tribes; and that after many centuries of occupation they disappeared from our country at least one thousand, perhaps many thousands, of years before the advent of the Europeans. The prehistoric remains found so abundantly in Arizona appear to be related to the civilization of Mexico; and the remnants of semi-civilized Indian tribes now found there are perhaps descendants of the ancient builders of the great houses and cities whose ruins are there found. (See SQUIER, "Memoir of the Ancient Monuments of the West," and "Aboriginal Monuments of the State of New York," 1849; BALDWIN, "Ancient America," 1872; DAVIS, "The Monuments of the Mississippi Valley;" FOSTER, "Pre-historic Races of the U. S." (1873). REVISED BY J. S. NEWBERRY.

American Eclectic, The. See APPENDIX.

American Indians. See article by D. G. BRINTON, M. D., under this head, in APPENDIX.

American Indians, Languages of. See INDIAN LANGUAGES, by J. HAMMOND TRUMBULL, LL.D.

American Institute. A few enterprising citizens in the year 1828 met in a small room in Tammany Hall and organized the American Institute, and in 1829 a charter was granted by the legislature of the State of New York under the title of the "American Institute of the City of New York." Its objects are to encourage and promote domestic industry in New York State, and the U. S., in agriculture, commerce, manufactures, and the arts, and any improvements made therein, by bestowing rewards and other benefits on those who shall make such improvements or excel in any of the said branches.

Although several public displays illustrating progress in the useful arts had been made previous to the foundation of the American Institute, yet it is fairly entitled to the credit of having first inaugurated the system of self-sustaining annual exhibitions.

Mr. Thaddeus B. Wakeman was very prominent as one of its founders—in fact, might be styled its father—and was its corresponding secretary for many years. He died in 1848. The institute, to mark its appreciation of his services, erected a monument to his memory in Greenwood Cemetery.

One of the principal means to accomplish its objects was the holding of exhibitions—or, as they were then called, annual fairs—in which inventors, manufacturers, and others could exhibit their various productions.

The first fair was held in 1828 in Masonic Hall, then standing on Broadway, nearly opposite the New York Hospital, at the head of Pearl street. This exhibition was very successful, and after holding six fairs there it was found necessary to secure more ample accommodations. After examining various locations, Niblo's Garden was selected, notwithstanding great doubts were expressed as to its accessibility, it being deemed by many too far out of town. The fair was, however, well patronized that year, and the exhibitions became very popular until the place was consumed by fire in 1846.

Castle Garden, on the Battery—then a fashionable resort for the citizens of New York—was next selected, and the fairs were held there every fall until 1853.

The exhibition of the industry of all nations was opened in the Crystal Palace in 1854, on Reservoir square, in Sixth avenue, between Fortieth and Forty-second streets. After its close the American Institute procured it for holding its exhibitions, which were held there in 1855, 1856, 1857, and 1858, when it was destroyed by fire on the afternoon of Oct. 5, 1858, with all its contents. This was a severe loss to the American Institute, and was thought by some to be its death-blow. Notwithstanding this disaster, the managers held an exhibition the next year in Palace Garden, in Fourteenth street, on the same lots on which now stands the armory of the Twenty-second regiment. The institute, at great expense, made many improvements in that building, and held fairs in it for several years.

In 1863 the exhibition was held in the Academy of Music, Fourteenth street and Irving Place.

In 1869 the institute secured the large structure on Third avenue between Sixty-third and Sixty-fourth streets. This building had been erected for a skating-rink; to this the institute have added three large buildings, the whole covering forty city building lots, extending from Third to Second avenues.

Many modest men who would have remained in obscurity have made fortunes in having their skill and ingenuity brought prominently before the public by the great facilities afforded them by the American Institute.

The exhibitions are held under the direction of a board of managers, elected annually by the members. The articles on exhibition are classified under seven departments, which are again divided into seven groups. The classifications are as follows:

1. Department of Fine Arts and Education.
2. Department of the Dwelling.
3. Department of Dress and Handicraft.
4. Department of Chemistry and Mineralogy.
5. Department of Engines and Machinery.
6. Department of Intercommunication.
7. Department of Agriculture and Horticulture.

In connection with the fairs, the American Institute has held eighteen exhibitions of livestock from 1838 to 1859; the exhibitions of 1857 and 1858 were confined to fat cattle.

The exhibitions were held for some years on the ground on which the Fifth Avenue Hotel now stands; it was then out of town. On this ground stood a famed hostelry known as Madison Cottage, kept by Corporal Thompson; this was the stopping place for the Broadway stages.

The cattle-shows were also held on Hamilton square and on Hamilton park, in Third avenue.

In addition to its valuable scientific library consisting of about 13,000 volumes, there are four sections—viz.:

1st. The Farmers' Club, under the direction of the committee on agriculture, which meets the second and fourth Tuesdays, at 1.30 o'clock P. M., at its rooms in Clinton Hall.

2d. The Polytechnic, under the direction of the committee on manufactures and machinery, which discusses scientific subjects, the examination of new inventions, etc.; it meets at the same place every Thursday, at 7.30 o'clock P. M.

3d. The Photographic Section, under the direction of the committee on chemistry and optics, which discusses all matters in relation to photography and the action of light. This section meets at the same place on the first Tuesday of each month, at 8 o'clock P. M.

4th. The Electrical Section, under the direction of the electric committee; its objects are advancement of electrical knowledge among its members.

All these meetings are open to the public.

The present number of members is about 2000. The institute is governed by a board of trustees consisting of thirteen members, of which the president, two vice-presidents, and two members are retired and elected annually.

It will be seen by this brief sketch that the American Institute is exactly adapted to meet certain intellectual wants of almost every class of citizens, and at the same time to give material aid to the inventor and manufacturer. It does not seek to educate the young, but rather to diffuse among those who have arrived at maturity a knowledge of the latest triumphs of science, the most important improvements in the arts, and the best machines and methods for increasing material productions. Its mission is not limited to its own members, for its highest aim is the public good.

The names of those who have labored long and faithfully for its success are too numerous to be here enumerated. Prominent among its early friends were Gen. James Tallmadge, for twenty years its president, and Robert L. Pell. Among those who have more recently increased its fame and influence by their pens and personal efforts we may mention the late Horace Greeley, president of the institute from 1866 to 1871, and the distinguished scientist and divine, the Rev. F. A. P. Barnard, LL.D., Nathan C. Ely, Orestes Cleveland, Cyrus H. Loutrel, and Thomas Rutter, who have most worthily filled the same responsible positions. JOHN W. CHAMBERS.

Amer'icanism, a term applied to certain peculiar expressions or forms of the English language prevailing in the U. S.; such as *fall,* for "autumn;" *clever,* for "kind" or "obliging;" to *fix,* instead of to "arrange" or "put in order," to "dress;" *go ahead,* etc., etc. It may, however, be remarked that some of the so-called "Americanisms" are nothing more than old English words, the original signification of which has become partly or wholly obsolete in England, while it is still retained in America; for example, *sick, sickness,* instead of the modern English "ill," "illness;" and *ride,* which originally signified to be conveyed either in a carriage or on horseback, but limited to the latter exclusively by the present English usage. Both of these words are often used in the common translation of the Bible in what we may call their American signification. Others are words which in England are provincial or local, but which are in extensive, if not universal, use in the U. S.; to *wilt,* in the sense of to "droop" or "wither," is an instance of this kind. It is an obvious error to call those words "Americanisms" which have been introduced as the name of something which does not exist or is comparatively little used in England, as *prairie, molasses,* etc.

The following are some of the most remarkable Americanisms extensively prevailing in the U. S.: *Baggage,* used instead of the English word "luggage" to denote the trunks or what contains the wearing apparel, etc. of one who is travelling.—*Boss* (a corruption of the Dutch *baas,* a "master"), one who has the employment or direction of a set of workmen.—*Creek,* which signifies in England a small arm or inlet of the sea, is used almost universally in the U. S. for a "small river."—*Hack,* signifying, according to English usage, a horse let out for hire, is employed in the U. S. for a "hackney coach," of which it is doubtless an abbreviation.—*Sleigh* is in universal use in the U. S. for what the English call a "sledge."—*Woods* is used in America instead of the English words "wood" and "forest."

Many expressions are reproachfully termed Americanisms which have the sanction of some of the best English writers; we may cite, among others, *talented,* which Coleridge condemned as an Americanism, but which is as legitimately formed as *gifted,* a word fully sanctioned by the usage of the best English authors; and *in this connection,* which, if not a very elegant expression, has at least the merit of brevity, and was used by Hazlitt long before the reproach of its being an Americanism was attempted to be fastened upon it. (See BARTLETT'S "Dictionary of Americanisms;" PICKERING'S "Vocabulary of Words and Phrases peculiar to the U. S.;" LOWELL'S Introduction to the "Biglow Papers," second series.) J. THOMAS.

American Museum of Natural History. See APPENDIX.

American River, in the N. central part of California, formed by the union of its North and South Forks in the western part of El Dorado county; it flows in a S. W. direction, and empties into the Sacramento River a short distance above Sacramento City. Gold is found along the banks of this river and its forks.

American Sunday-School Union, The. See APPENDIX.

American Tract Society. See TRACT SOCIETIES.

Amer'icus, on R. R., capital of Sumter co. Ga. (see map of Georgia, ref. 5-G, for location of county), 70 miles S. S. W. of Macon, has a female college and a male high school. Pop. in 1870, 3259; in 1880, 3635.

Americus, city, Lyon co., Kan. (see map of Kansas, ref. 6-I, for location of county), on R. R. and Neosho River, 9 miles N. W. of Emporia, has valuable water-power. Pop. in 1880, 431; in 1885, 518.

Americus Vespucius. See VESPUCCI.

Ameri'ola, a city of ancient Latium, one of those which were conquered by the elder Tarquin. It was among the "Prisci Latini," and was doubtless one of the thirty cities of the League. Its site is not definitely known.

Amersfoordt', or **Amersvoordt'** (JACOB), was born at Amsterdam, Holland, in 1786. He was a noted Oriental scholar. Died in 1824.

A'mersfort', or **A'mersfoort',** a town and port of the Netherlands, in the province of Utrecht, on the river Eem, 12 miles N. E. of Utrecht. It has a Jansenist seminary, a Latin school, and manufactures of cotton and woollen stuffs. Tobacco, grain, and dried herrings are exported from this town. It received municipal privileges in 1249, and was taken by the archduke Maximilian in 1483 and by the French in 1672 and 1695. Pop. in 1879, 13,704.

Ames, on R. R., Story co., Ia. (see map of Iowa, ref. 5-G, for location of county), is the seat of the State Agricultural College. Pop. in 1880, 1153; in 1885, 1317.

Ames (Adelbert), an American officer, born Oct. 31, 1835, at Rockland, Me., graduated at West Point 1861, lieutenant-colonel Twenty-fourth Infantry July 28, 1866, and brigadier-general U. S. volunteers May 20, 1863; served in the artillery in the Manassas campaign 1861, engaged at Bull Run (wounded and brevet major), in defences of Washington 1861–62, in command of battery in the Virginia Peninsula 1862, engaged at Yorktown, Gaines' Mill, and Malvern Hill (brevet lieutenant-colonel), as colonel Twentieth Maine Volunteers Aug. 29, 1862, in Maryland campaign 1862, engaged at Antietam, in Rappahannock campaign 1862–63, engaged at Fredericksburg, Chancellorsville, and Beverly Ford, in Pennsylvania campaign 1863, engaged at Gettysburg (brevet colonel), in operations in the department of the South 1863–64, in command of a division in the operations before Petersburg 1864, engaged at Port Walthall Junction, Cold Harbor, and Darbytown road, in expeditions to Fort Fisher 1864–65, engaged in the assault and capture of the place (brevet brigadier-general U. S. A. and brevet major-general U. S. volunteers), and in operations in North Carolina 1865–66. Breveted major-general Mar. 13, 1865, for gallant and meritorious services in the field. Since the war was made provisional governor of Mississippi June 15, 1868, in command of fourth military district, department of Mississippi, 1869. Resigned Feb. 23, 1870: U. S. Senator from Mississippi 1870–73; governor of State of Mississippi 1874–76.

George W. Cullum.

Ames (Edward R.), D.D., LL.D., bishop of the Methodist Episcopal Church, born at Athens, O., May 20, 1806. He was educated at Ohio University, was tutor at McKendree College (1823–29), began to preach in 1830, and was appointed a bishop in 1852. From 1861 he resided in Baltimore. D. at Baltimore, Md., Apr. 25, 1879.

Ames (Fisher), LL.D., an eminent orator and statesman, born in Dedham, Mass., April 9, 1758. He graduated at Harvard College in 1774, after which he studied law in the office of William Tudor of Boston, and was admitted to the bar in 1781. In several political essays which he wrote for the newspapers of Boston about 1785 he displayed practical wisdom and literary ability of a high order. He was a member of the convention of Massachusetts which in 1788 ratified the Federal Constitution, and he advocated its adoption in an eloquent speech. Having identified himself with the Federal party, he was elected a member of Congress in 1789 by the voters of the district which included Boston. He supported the administration of Washington, spoke frequently in Congress, and soon acquired a national reputation as an orator of the foremost rank. Among the most memorable of his parliamentary efforts was a powerful speech in support of Jay's treaty with England, April, 1796, which has been preserved. At the close of this speech an opponent of the treaty moved to postpone the vote on the question, giving as a reason that the members were too much excited to make a just and rational decision. After he had served four terms in Congress he retired to private life in 1797, on account of his delicate health. He married Frances Worthington of Springfield in 1792. In 1799 he pronounced a eulogy on Washington before the legislature of Massachusetts. He was elected president of Harvard College in 1804, but he declined that position. He died on the 4th of July, 1808, leaving several sons. His character was eminently pure and honorable. He was distinguished for his wit, his colloquial powers, and his brilliant imagination. His orations abound in happy metaphors and illustrations. His works, consisting of orations, essays, and letters, were published by his son, Seth Ames, in 2 vols., 1854.

Ames (Joseph), born in Roxbury, N. H., in 1816, became an artist, studied in Rome, painted excellent portraits and genre pictures, became a resident of Boston, Mass., and afterwards of Baltimore, and died in New York City, Oct. 30, 1872. Among his best works are portraits of Pius IX., Rufus Choate, and Ristori as "Medea," "Maud Muller," and "The Old Stone Pitcher."

Ames (Nathan P.), an American machinist, born in 1803, was remarkable for his sound judgment and practical ability. He owned extensive manufactories of firearms, bronze statuary, cannon, machinery, and edge-tools at Chicopee Falls and Cabotville, Mass. Died April 23, 1847.

Ames (Oakes) was born in Easton, Mass., Jan. 10, 1804. His father was a blacksmith, and the son was brought up to the same trade. The elder Ames had established his reputation as a maker of shovels; and his two sons, Oakes and Oliver, Jr., continued the manufacture of these and other implements, chiefly agricultural, upon a large scale, and acquired great wealth. He was a member of Congress from Massachusetts (1862–73), and his opinion upon financial matters had great weight. Mr. Ames was largely interested in the building of the Union Pacific R. R. and in the Credit Mobilier enterprise. Died at North Easton, Mass., May 8, 1873. Oliver, Jr., d. Mar. 9, 1877.

Ames (William), D.D., born in Norfolk co., England, in 1576, was a learned Puritan divine. He was professor of theology at Franeker for twelve years; wrote "Marrow of Theology" and "On the Conscience and its Authority." Died at Rotterdam Nov. 14, 1633.

Amesbury, on R. R., Essex co., Mass. (see map of Massachusetts, ref. 1–I, for location of county), is 40 miles by rail N. of Boston. There is a horse railroad extending to Newburyport, 5 miles distant, and also a branch railroad connecting with the Eastern R. R. Here are extensive manufactures of flannels, carriages, boots and shoes, cassimeres, broadcloths, etc. Amesbury is the residence of the poet Whittier. The township has been divided since census of 1870. Pop. of township in 1880, 3355; in 1885, 4403.

Am′ethyst [Gr. ἀμέθυστος, from α, priv., and μεθύσκω, to "make drunk"], a purple variety of rock-crystal or quartz, colored by manganese, so named from its reputed virtue of preventing intoxication. It is found in Brazil, Ceylon, India, and many other places, and is worn in the form of seals and ornamental articles. The Oriental amethyst is a variety of spinel, and is a more valuable gem than the common amethyst.

Amha′ra, the central division of Abyssinia, capital Gondar. (See Abyssinia.)

Amhar′ic Lan′guage, so called from the province of Amhara, has been, since the extinction of the Ethiopic Language (which see), the chief language of Abyssinia, and is spoken by the majority of the population in the countries between the rivers Tacazze and Abai, and in the former kingdom of Shoa, while in the countries in the N. E. of Abyssinia, N. of the Tacazze, the Tigre language predominates. Among the Semitic languages, the Amharic is nearest related, both grammatically and lexicographically, to the Ethiopic, but is by no means a new form of the Ethiopic, but rather a descendant of the Old Amharic, which is closely allied to the Ethiopic. Although the Amharic has retained many peculiarities of the Old Semitic, it still represents a later stage of development of the southern Semitic than does the Ethiopic. In all its phonetic relations the Amharic has degenerated very much, while many of its grammatical forms have been abolished, and have been only in part replaced by new forms. After the Amharic language had been used for many centuries by the people, and after the extinction of the Ethiopic, it became a written language, the Ethiopic alphabet being employed, while for the sounds peculiar to the Amharic new characters were introduced by a modification of the Ethiopic characters. Although the Amharic cannot be called a literary language in the true sense of the word, still many works have been written in it within the last three centuries, partly translations and explanations of biblical and other Ethiopic books and vocabularies, partly short historical works, dogmatical and ethical compendia, formulæ for confession, etc. for the people, and partly medical and magical treatises. In the Ethiopic-Amharic books of the history of the native kings some of the older Amharic poems are given. But of these works very little is known in Europe. Up to the present time, only missionary works have been printed. The Amharic has been treated grammatically and lexicographically by Ludolf (1698), more completely by Isenberg (Lexicon, 1841; Grammar, 1842).

Am′herst, a town and seaport of British Burmah, is on the E. shore of the Bay of Bengal, 30 miles S. S. W. of Maulmain. It was founded by the English in 1826, and named in honor of the governor-general of India, who projected it. Large teak-forests abound in its neighborhood, and the timber is exported in considerable quantities. The harbor, though large and deep, is difficult of access, and is exposed to the S. W. monsoon. Pop. about 30,000.

Amherst, on R. R., in Hampshire co., Mass. (see map of Massachusetts, ref. 3–E, for location of county), 85 miles N. of New London, and 82 miles W. of Boston. It is the seat of Amherst College and of the Mass. Agricultural College. (See Amherst College.) The town has excellent schools, including a high school. It has also paper and planing mills, manufactures of leather, children's wagons, palm-leaf hats, and planes. Amherst is also one of the healthiest and best agricultural towns in Mass. The village is situated upon an elevation which affords a beautiful view of the fertile and picturesque valley of the Conn. and of the surrounding mountains—the Holyoke range to the S. W., and on the N., Mettawampe, Sugar Loaf, and others. Pop. of township in 1870, 4035; in 1880, 4298; in 1885, 4199.

Amherst, on R. R., one of the three shire-towns of Hillsborough co., N. H. (see map of New Hampshire, ref. 10–E, for location of county), a beautiful village 48 miles from Boston, 11 from Nashua, and 30 from Concord.

The township contains Babboosuck Lake and a mineral spring. It is a fine summer resort. It was the birthplace of Horace Greeley. Pop. of township in 1870, 1353; in 1880, 1225.

Amherst (C. H.), on R. R., cap. of Amherst co., Va. (see map of Virginia, ref. 6–F, for location of county), 13 m. N. of Lynchburg. It contains a high school and a fine public hall. Pop. of district in 1870, 3632; in 1880, 4619.

Amherst, EARLS OF, and Viscounts Holmesdale (1826, in the peerage of the United Kingdom) and Barons Amherst (1788, in the peerage of Great Britain), a noble family of Great Britain.

Amherst (THE RIGHT REV. FRANCIS KERRIL), D.D., was born at London, England, Mar. 21, 1819. He was a Roman Catholic prelate, and was consecrated bishop of Northampton July 4, 1858, as successor to the first bishop, Right Rev. William Wareing. Died Aug. 21, 1882.

Amherst (JEFFERY), called **Lord Amherst,** a British general, born in Kent, Jan. 29, 1717. He entered the army in 1731, and became aide-de-camp to General Ligonier in 1741; served with him in the battles of Dettingen, Fontenoy, and Rocoux. In 1756 he became a colonel of infantry; went to America in 1758, and served against France in the intercolonial war; commanded the troops at the siege of Louisburg, a famous fortress built by the French upon the eastern coast of Cape Breton Island; the town was destroyed by the bombardment, and, with the garrison and the French fleet, surrendered July 26, 1758; became commander-in-chief of all the forces in America Sept. 30, 1758; completed the conquest of Canada from the French by the capture of Montreal Sept. 8, 1760; was made Knight of the Bath in 1761; governor of Virginia 1763; was dismissed from the army, but restored 1768; became governor of Guernsey 1770; lieutenant-general of ordnance 1772; Baron Amherst of Holmesdale 1776; commander-in-chief in England 1778–82; Baron Amherst of Montreal 1788; again commander-in-chief in England 1793–95; became field-marshal 1796. Died Aug. 3, 1797.

Amherst (WILLIAM PITT), FIRST EARL OF, a nephew of the preceding, was born in England Jan. 14, 1773. He was sent as ambassador extraordinary to China in 1816, and reached Pekin, but he failed to effect the object of his mission (which was to improve the commercial relations between that empire and Great Britain), as he refused to comply with the degrading ceremonies which Chinese etiquette prescribed, and was not admitted into the presence of the emperor. He was shipwrecked in Gaspar Strait on his return to England, but escaped by boat to Batavia, and continued his voyage, stopping at the island of St. Helena on his way, where he had a number of interviews with the emperor Napoleon. He was governor-general of India in 1823–26, and was created an earl in 1826. Died Mar. 13, 1857.—His son, WILLIAM PITT, born Sept. 3, 1805, succeeded him as second earl.—His eldest son, WILLIAM ARCHER, Viscount Holmesdale, born Mar. 25, 1836, was from 1859 to 1868 member of the House of Commons for West Kent, and was in 1868 re-elected as member for Middle Kent.

Am'herstburg, Essex co., Ontario, Canada, on R. R. and the Detroit River, 5 miles from its entrance into Lake Erie, and 225 miles W. S. W. of Toronto. It is one of the oldest towns in Ontario, and during the war of 1812 between England and the United States it was dismantled by Gen. Proctor, of the English army, Sept. 26, 1813, and destroyed by Gen. Harrison, of the American forces, Oct. 2, 1813. It was named in honor of Lord Amherst, and has a court-house and some manufactures. Pop. in 1881, 2672.

Amherst College, one of the leading colleges in the United States, is situated in Amherst, Hampshire co., Massachusetts. It was founded in 1821, and at its last triennial, in 1878, it had 2398 alumni, of whom 1800 are supposed to be living. Of the whole number of its graduates up to the last triennial, 897 were ministers, 97 missionaries in foreign lands, 181 doctors of medicine, 313 lawyers, and 257 professors and teachers; 208 served in the late war, and 28 sacrificed their lives in the service. The college edifices, 12 in number, have been erected at a cost of $400,000. The pecuniary value of the scientific and archæological collections cannot be estimated at less than $125,000, and the whole property of the institution, including permanent funds, professorships, scholarships, prizes, etc., is more than a million and a half of dollars. All this is the gift of private charity and munificence, with the exception of about $50,000 granted by the State. The donors have been the Christian men and women of Massachusetts. The largest benefactors are Hon. Samuel Williston and Dr. William J. Walker; the former gave $200,000, and the latter a quarter of a million. The Hitchcock Ichnological Cabinet, the Adams Collection in Conchology, and the Shepard Meteoric Collection, are known the world over as of unsurpassed value and excellence. The Pratt Gymnasium, with its accompanying system of exercise and instruction, constitutes a feature peculiar to this institution; all the students, unless excused for special reasons, are required to exercise half an hour daily, chiefly in the light gymnastics, under the direction of a professor who is an educated physician, and who has charge of their health and physical culture. The faculty of Amherst College at present consists of 28 persons, including the president, 16 professors, 1 lecturer, 7 instructors, and a librarian with two assistants. The number of students in 1883, the year of writing, all in four classes of the regular college course, was 352—94 seniors, 79 juniors, 97 sophomores, and 82 freshmen. The annual income is about $70,000. The presidents have been Rev. Z. Swift Moore, D.D. (1821–23); Rev. Heman Humphrey, D.D. (1823–45); Rev. Edward Hitchcock, D.D., LL.D. (1845–54); Rev. William A. Stearns, D.D., LL.D. (1854–76); and Rev. Julius H. Seelye, D.D., LL.D.

The Massachusetts Agricultural College, although the offspring of Amherst College, and situated in the same place for the purpose of securing the advantage of its scientific treasures, has no organic connection with it, having a separate faculty and a distinct board of trustees, elected by the legislature of the State. It was opened for students in the fall of 1867, and held its first commencement, with the graduation of its first class, in the summer of 1871. It has three college-halls, two boarding-houses, the Durfee Plant-house, a large military building, and a botanic museum, besides the buildings pertaining to the farm, which consists of over 300 acres. The students work on the farm a certain number of hours each week, under the direction of the superintendent and the professor of agriculture. They also receive regular military exercise and drill under the professor of military science and tactics. The real estate of the college cost about $200,000. Its permanent funds, derived from the sale of lands given by Congress, from grants by the State, and from private donations, amount to half a million. The faculty, as exhibited in the catalogue of 1883, consists of 12 persons, including the president, James C. Greenough, 6 professors, 1 instructor, 2 non-resident lecturers, a gardener, and a farm superintendent. There are now 103 students—13 post-graduates, 5 seniors, 19 juniors, 22 sophomores, and 44 freshmen. (See "History of Amherst College," by Prof. W. S. TYLER, D.D., 1872.)

W. S. TYLER.

Amherst Islands, a group in the Yellow Sea, near the S. W. coast of the peninsula of Corea.

A'mia Cal'va, the scientific name of a species of fish found in the fresh waters of North America. It is one of the few living ganoids, is interesting from its relationship to the ancient fossil fishes, and remarkable for the cellular structure of its air-bladder, which somewhat resembles the lung of a reptile. It is known as the "dog-fish" or "lawyer," and is worthless as food.

Amian'thus [Gr. ἀμίαντος, "undefiled," from α, priv., and μιαίνω, to "defile"], a delicate and fibrous form of serpentine, so called because cloth made of it can be purified by fire. It is sometimes called mountain flax. The cloths in which the ancients wrapped the bodies that were burned on the funeral pyre were sometimes made of amianthus.

Am'ic Ac'ids, acids in which a portion of the hydroxyl (OH) has been replaced by amidogen (NH_2). When dry ammonia gas is passed over a thin layer of sulphuric anhydride (SO_3), the gas is absorbed, and a white crystalline compound results which contains $N_2H_6SO_3 = (NH_4)_2SO_4 - H_2O$, or ammonic sulphate, less one molecule of water. On dissolving it in water it fails to give the reactions of sulphuric acid; it is the ammonium salt of a new acid, sulphamic acid. Its relation to sulphuric acid is thus shown:

$$\text{Sulphuric acid, } H_2SO_4 = \left.\begin{matrix} HO \\ HO \end{matrix}\right\} SO_2,$$

$$\text{Sulphamic acid, } H.NH_2.SO_3 = \left.\begin{matrix} HO \\ NH_2 \end{matrix}\right\} SO_2.$$

Sulphamic acid is monobasic, and forms numerous salts:

Ammonic sulphamate, $NH_4.NH_2.SO_3$,
Potassic " $K.NH_2.SO_3$,
Baric " $Ba(NH_2.SO_3)_2$.

Dry carbonic anhydride (CO_2) unites with dry ammonia (NH_3), forming ammonic carbamate, $NH_4.NH_2.CO_3 = N_2H_6CO_2$, or equivalent to ammonic carbonate, $(NH_4)_2CO_3$, less H_2O. This salt contains carbamic acid, the relation of which to carbonic acid is thus shown:

$$\text{Carbonic acid, } H_2CO_3 = \left.\begin{matrix} HO \\ HO \end{matrix}\right\} CO,$$

$$\text{Carbamic acid, } H.NH_2.CO_2 = \left.\begin{matrix} HO \\ NH_2 \end{matrix}\right\} CO.$$

Ammonic carbamate exists in common ammonic carbonate, and was formerly called anhydrous carbonate of ammonia. It dissolves readily in water, and by combining one molecule of water passes into ammonic carbonate, $NH_4.NH_2.CO_2 + H_2O = (NH_4)_2CO_3$.

When both molecules of hydroxyl in a bibasic acid are replaced by amidogen, a neutral amide results. Carbamide or urea, $(NH_2)_2CO$, is such an amide. Bibasic acids may thus form an amic acid or a neutral amide, according as one or both molecules of hydroxyl are replaced by amidogen. Tribasic acids may form two amic acids and a neutral amide. Monobasic acids containing only one hydroxyl yield no amic acids, only neutral amides.

C. F. CHANDLER.

Am'ice, or **Amic'tus,** an upper garment worn by the Romans over the tunic; also a linen vestment worn over the shoulders of Roman Catholic priests during the celebration of the mass.

Ami'ci (GIOVANNI BATTISTA), an Italian optician and savant, born at Modena Mar. 25, 1784. He was skilful in the fabrication of mirrors and lenses for telescopes and microscopes. He was for many years director of the observatory of Florence, where he gained distinction as an observer. He wrote on double stars and other topics of astronomy. The achromatic microscope which he constructed was considered a valuable improvement. Died April 10, 1863.

Am'ides, compounds derived from ammonia, NH_3, by the replacement of one or more atoms of H by a metal or by a compound radical, acid or basic. According to the character of the replacing body, they are either—

1. Amides proper, in which one or more hydrogen atoms are replaced by an acid radical; as,

Acetamide, $N.C_2H_3O.H_2$,
Diacetamide, $N.(C_2H_3O)_2.H$.

2. Amines, in which one or more hydrogen atoms are replaced by a basic radical; as,

Potassamine, $N.KH_2$,
Diamylamine, $N.(C_5H_{11})_2.H$.

3. Alkalamides, in which hydrogen is replaced by both acid and basic radicals; as,

Mercurobenzamide, $N.Hg.C_7H_5O.H$,
Ethylformamide, $N.C_2H_5.CHO.H$.

Monamides are derived from one molecule of ammonia, NHHH.
Diamides " " two " " $N_2H_2H_2H_2$.
Triamides " " three " " $N_3H_3H_3H_3$.
Amines and alkalamides present corresponding classes.

According as one-third, two-thirds, or all the hydrogen of the ammonia is replaced, the amide, diamide, or triamide is said to be primary, secondary, or tertiary. Amides are well illustrated by

$$\text{Acetamide, } N.C_2H_3O.H_2 = N\left\{\begin{array}{l} C_2H_3O \\ H \\ H. \end{array}\right.$$

It is a white crystalline solid, which melts at 172° F., and boils at 430° F. Heated with acids or alkalies, it unites the elements of water, forming acetic acid and ammonia, $N.C_2H_3O.H_2 + H_2O = NH_3 + H.C_2H_4O_2$. It is formed by the action of heat on ammonic acetate, and by other methods: $NH_4.C_2H_3O_2 = N.C_2H_3O.H_2 + H_2O$. It acts both as a base and as an acid. By uniting with hydrochloric and nitric acids it forms compounds analogous to ammonic salts, while by admitting silver in place of hydrogen, silver-acetamide is produced. (See AMINES.) C. F. CHANDLER.

Amidine. See STARCH.

Amid'ogen [contracted from *ammonia* and the Gr. γεννάω, to "produce"], a compound of one atom of nitrogen and two atoms of hydrogen. Its symbol is NH_2. It has not been obtained in a separate state, but may be traced in combination with other substances, with which it forms important organic compounds called *amides*. Potassiamide, NH_2K, is a compound of the metal potassium with amidogen. Ammonia is a compound of NH_2 with H. (See AMIC ACIDS, AMIDES, and AMINES, by C. F. CHANDLER.)

Amiens (anc. *Samarobri'va* and *Ambia'ni*), an ancient and important town of Northern France, capital of the department of Somme, is on the river Somme, and on the Paris and Boulogne R. R., 81 miles by rail N. of Paris. It was once very strongly fortified, and still has a citadel. It is the seat of a bishop, and contains a magnificent Gothic cathedral 415 feet long, 182 feet wide, having a spire 420 feet high, which was founded in 1220 and finished in 1288. Among its other fine edifices are the hôtel de ville, Château d'Eau, and the library, containing 60,000 volumes. Here are extensive manufactures of cotton velvet, serges, plush, and other cotton and woollen stuffs. The river, which is here divided into many canals, affords water-power for mills and manufactories. Amiens was the native place of Peter the Hermit and of Delambre. An important treaty, called "the Peace of Amiens," was signed here by the French and British in Mar., 1802. On Nov. 27, 1870, the German general Manteuffel obtained here a great victory over the French army of the Loire, and soon after the Germans took possession of the town. Pop. in 1881, 74,170.

Am'ines, amides in which the radical replacing hydrogen is basic, an alcohol radical. They are monamines, diamines, triamines, etc., according as they are formed from one, two, three, or more molecules of ammonia. The nitrogen may be replaced by phosphorus, arsenic, antimony, etc., giving rise to phosphines, arsines, stibines, etc.

The natural organic bases, alkaloids, found in plants, probably belong to this class of bodies. The amines have of late acquired great theoretical and practical importance. They are basic compounds, resembling ammonia to a greater or less degree in odor, alkaline reaction, and readiness to form salts with acids. A few examples will best illustrate the class: Ethylamine, $NC_2H_7 = NH_2(C_2H_5)$, a mobile liquid which boils at 66° F. It has a pungent odor, very like that of ammonia, turns reddened litmus blue, forms a cloud with hydrochloric acid, produces salts with acids very similar to the corresponding ammonic salts, is readily soluble in water. Diethylamine, $NH(C_2H_5)_2$, and triethylamine, $N(C_2H_5)_3$, are similar compounds. When triethylamine is mixed with ethyl iodide, C_2H_5I, a crystalline tetrethyl-ammonium-iodide, $(C_2H_5)_4I$, is formed, analogous to ammonium iodide, NH_4I. On treating this compound with precipitated silver oxide suspended in water, a tetrethyl-ammonium hydrate is formed, which resembles in many respects potassic and sodic hydrates. Its solution is strongly alkaline, very bitter, destroys the skin, saponifies the fats, decomposes many metallic salts, precipitating hydrates. With acids it forms neutral salts. Its chloride unites with platinic chloride, forming orange-yellow octahedra. The analogy with ammonia is shown by the following symbols:

Ethylamine, $NH_2(C_2H_5)$, ammonia, NH_3.
Diethylamine, $NH(C_2H_5)_2$.
Triethylamine, $N(C_2H_5)_3$.
Tetrethyl-ammonium, $N(C_2H_5)_4$, ammonium, NH_4.
" iodide, $N(C_2H_5)_4I$, ammonium iodide, NH_4I.
" hydrate, $N(C_2H_5)_4(OH)$, ammonic hydrate, $NH_4(OH)$.

Phenylamine or aniline, $C_6H_7N = N(C_6H_5)H_2$, is a very important member of this class. (See ANILINE.)

Diamines represent two molecules of ammonia in which two, four, or six atoms of H are replaced by one, two, or three molecules of a diatomic radical:

Ethylen-diamine, $N_2(C_2H_4)'' H_4$.
Diethylen-diamine, $N_2(C_2H_4)''_2 H_2$.
Triethylen-diamine, $N_2(C_2H_4)''_3$.

(See ETHYLENE BASES.) Triamines, triglyceryl-triamine, $N_3(C_3H_5)'''_3$, tetramines, and pentamines are supposed to exist. (See ROSANILINE.) C. F. CHANDLER.

Amite, a river rising in the S. W. part of Mississippi, enters Louisiana, flows southward to Ascension parish, where it turns towards the E., and falls into Lake Maurepas. Length, about 100 miles.

Amite, city, capital of Tangipahoa parish, La. (see map of Louisiana, ref. 9–F, for location of parish), on R. R. and the Amite River, 68 miles N. N. W. of New Orleans. Pop. in 1870, 910; in 1880, 1120.

Am'leth, or **Ham'leth,** an ancient prince of Jutland, who is considered a fabulous personage by some writers. He is said to have lived about 150 B. C. His story is related by Saxo Grammaticus, whose narrative was formerly considered the foundation of Shakspeare's "Hamlet." But Saxo Grammaticus was not translated into English when Shakspeare wrote his play, and the differences between the historical narrative and the tragedy give irrefragable evidence that the writer of the latter has known the former only at second hand—probably through the novel of Belleforest, which just at that time was translated from French into English.

Am'ling (KARL GUSTAV), born at Nuremberg, Bavaria, about 1650, was a famous designer and engraver; worked at Munich, Bavaria; was patronized by Maximilian II., and very successful in portraits. He was considered the best German engraver of his time. Died in 1701.

Am'ling (WOLFGANG), born at Minnerstadt, Franconia, in 1542; educated at the universities of Tübingen, Wittenberg, and Jena; became rector of the school of Zerbst in 1566, minister at Koswig in 1573, and soon after minister at St. Nicolai in Zerbst. He strongly opposed the *Formula Concordiæ*, and wrote the *Confessio Anhaldina*. Died May 18, 1606.

Am'lwch, a seaport and parliamentary borough of North Wales, is on the N. coast of the island of Anglesey, 15 miles N. W. of Beaumaris. It owes its growth and prosperity to the Parys and Mona copper-mines. Pop. of civil parish in 1881, 4847.

Am'man, or **Am'mon** (the ancient *Rabbah*, the capital of the Ammonites), a ruined city of Syria, in the pashalic of Damascus, is picturesquely situated on the Zurka, an affluent of the Jordan, 55 miles E. N. E. of Jerusalem. Here was an important city in ancient times, originally named Rabbah, which was besieged and taken by the army of King David. (See 2 Samuel xi. and xii.) After it had been once ruined, it was rebuilt by Ptolemy Philadelphus, and called Philadelphia. It has extensive ancient remains. As late as 300 A. D. it was a remarkable city, having a magnificent theatre and temples. It was one of the cities of the Decapolis.

Am'man (Johann Conrad), M. D., a Swiss physician, born at Schaffhausen in 1669, practised at Haarlem, in Holland. He acquired distinction by his successful efforts to teach the deaf and dumb to speak, and wrote on that subject an essay called "Surdus Loquens" (the "Deaf Speaking," 1692). Died in 1730.

Amman (Jost or Justus), an eminent Swiss engraver and designer, born at Zurich in 1539. He removed about 1560 to Nuremberg, where he worked for many years, and illustrated numerous books with his designs. He engraved on copper and on wood. Among his works are "Portraits of the Kings of France from Pharamond to Henry III." (1576), and wood-cuts of "Reinecke Fuchs." Died in 1591.

Ammana'ti, Ammana'te, or **Ammana'to** (Bartolommeo), an eminent Italian sculptor and architect, born at Florence in 1511, was a pupil of Sansovino. He was patronized by Pope Julius III., who employed him to adorn the Capitol (in Rome) with sculptures. He completed the Pitti palace of Florence. Among his best works are a bridge called Ponte della Trinità at Florence, and three statues which adorn the tomb of Sannazar at Naples. Died about 1590.

Am'meline, a white crystalline, feebly basic substance, resulting from the action of acids or alkalies on melam, is considered to be an amic acid of cyanuric acid. Its composition is $C_3N_5H_5O$.

Am'men (Daniel), U. S. N., born May 15, 1820, in Ohio, entered the navy as a midshipman July 7, 1836, became a passed midshipman in 1842, a lieutenant in 1849, a commander in 1863, a captain in 1866, a commodore in 1872. During the latter part of 1861, and all of 1862, he commanded the gunboat Seneca in the South Atlantic blockading squadron; he bore a conspicuous part in the battle of Port Royal, Nov. 7, 1861, where he gained the admiration of his officers and men for his skill, coolness, and intrepidity. He engaged afterwards in all the operations of Dupont's command on the coasts of Georgia and Florida. In an official report to Flag-officer Dupont of Dec. 6, 1861, Commander C. R. P. Rodgers writes: "I have to thank Lieutenant-commanding Stevens for the most earnest, cordial, and efficient co-operation, and also Lieutenants-commanding Ammen and Bankhead, whose vessels were always in the right place, and always well handled." And again in a despatch of Jan. 3, 1863, Rogers says: "Lieutenant-commanding Ammen will make a separate report of the Seneca and Ellen at Seabrook before I met him. It is unnecessary for me to say to you that his work was *thoroughly* done." He was engaged as commanding officer of the monitor Patapsco with Fort McAllister, Mar. 3, 1863, and complimented by his superior officer, Captain Percival Drayton, for his services during the action; in the ironclad attack on Fort Sumter, April 7, 1863, and commended by Flag-officer Dupont in his despatch of April 15, 1863, for "the highest professional capacity and courage;" in both attacks on Fort Fisher Dec., 1864, and Jan., 1865, and for the "cool performance" of his duty on these occasions recommended for promotion by Rear-admiral David D. Porter; in 1866 and 1867 a member of the board assembled to examine volunteer officers for admission into the regular navy; in 1869 appointed chief of the bureau of yards and docks, and on Oct. 1, 1871, chief of bureau of navigation. He became rear-admiral; retired June 4, 1878.

Foxhall A. Parker.

Ammen (Jacob), an American officer and teacher, born Jan. 7, 1808, in Botetourt co., Va., graduated at West Point 1831, and became, July 16, 1862, brigadier-general U. S. volunteers. While a lieutenant of artillery he served at the Military Academy as an assistant instructor, 1831–32 and 1834–37; at Charleston harbor 1832–33, during South Carolina's threatened nullification, and at Fort Trumbull, Conn., 1833–34. After his resignation from the army, Nov. 30, 1837, he was professor of mathematics in Bacon College, Ky., 1837–39, of mathematics in Jefferson College, Miss., 1839–40 and 1843–48, of mathematics in the University of Indiana, 1840–43, and of mathematics and astronomy in Georgetown College, Ky., 1848–55; and civil engineer at Ripley, O., 1855–61. During the civil war he was captain and lieutenant-colonel of the Twelfth Ohio Volunteers, colonel of the Twenty-fourth, and brigadier-general U. S. volunteers, serving in the West Virginia campaign 1861; engaged at Cheat Mountain and Greenbriar, in the Tennessee and Mississippi campaign, engaged at battle of Shiloh and siege of Corinth, in various movements of the army of the Ohio, 1862–63, and in command of several districts in Illinois, Kentucky, and Tennessee, till he resigned, Jan. 14, 1865. George W. Cullum.

Am'mergau' Mys'tery [Ger. *Ammergauer Passionsspiel*], the name given to the representation of our Saviour's Passion which since 1634 has taken place every ten years at the village of Ober-Ammergau, in Bavaria. The custom originated in a vow made by the inhabitants, on their deliverance from the plague, to celebrate the Passion Tragedy every tenth year. The last representation took place in 1880. (See Holland, "Das Ammergauer Passionsspiel im Jahre 1870," 1870.)

Ammia'nus Marcelli'nus, an eminent Roman historian, born at Antioch, was of Greek extraction. He served in the army in his youth (about 350 A. D.), and in the expedition which the emperor Julian conducted against Persia. Having abandoned the military profession, he settled at Rome, and there composed in Latin his "History of the Roman Empire," in 31 books, of which 13 are lost. The entire work comprised the period from 96 A. D. to 378 A. D. His history is highly prized for its impartiality and other merits. (Best ed. by Wagner and Erfurdt, 1808, 3 vols.; English translation by Phil. Holland, London, 1609. Died about 395 A. D.

Ammira'to (Scipione), an Italian historian, born at Lecce, in the kingdom of Naples, Sept. 27, 1531. He became a resident of Florence in 1569, and was patronized by the grand duke Cosimo. In 1596 he obtained a prebend in the cathedral of Florence. He wrote, besides other works, a "Discourse on Cornelius Tacitus" (1594), and a "History of Florence" ("Istorie Fiorentine," 2 vols., 1600–41), which is regarded by some critics as the most accurate work on that subject. He has been styled the modern Livy. Died Jan. 30, 1601.

Ammod'ytes [from the Gr. *ἀμμοδύτης*, a "sand-burrower"], the name of a Linnæan genus of apodal fishes, characterized by a compressed head narrower than the body, and both elongated. The sand-eel is an example of this genus.

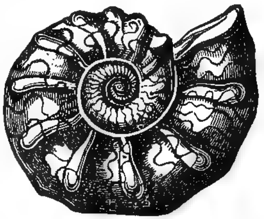
Am'mon, or **Ham'mon** [Gr. Ἄμμων], an ancient pagan deity worshipped in Egypt, Greece, and other countries, was called *Amun* by the Egyptians, and *Jupiter Ammon* by the Romans. He was sometimes represented in the form of a ram. There was a great temple of Ammon in the oasis of Siwah or Ammonium in the Libyan Desert, and another at Thebes, which city was called No-Ammon by the ancient Hebrews. Alexander the Great visited the temple of Ammon in the oasis (B. C. 331), and assumed the title of the son of Ammon. Remains of this temple still exist.

Ammon, von (Christoph Friedrich), an eminent German Protestant theologian and pulpit orator, born at Baireuth Jan. 16, 1766. He became professor of theology at Göttingen in 1794, obtained a chair at Erlangen in 1804, and removed in 1813 to Dresden, where he was appointed court-preacher to the king of Saxony. He was a man of great and varied erudition, and belonged to the Rationalist school in theology. His most important work is "Fortbildung des Christenthums zur Weltreligion" (4 vols., 1833–40). Died May 21, 1850.

Ammo'nia [for etymology see below], or **Volatile Alkali,** an important chemical compound in the form of a transparent, colorless, and pungent gas, is formed by the union of one atom of nitrogen and three atoms of hydrogen. Its symbol is NH_3. Priestley, who first obtained it in a separate state, called it *alkaline air*. The name *ammonia* is derived from *sal-ammoniac*, which was formerly procured near the temple of Ammon, in Libya, by burning camel's dung. It is now obtained as a by-product by the distillation of bituminous coal in making gas, and from refuse animal matter in preparing bone-black, etc. It combines with acids to form salts. As it supplies to plants the nitrogen they require, it is one of the most important ingredients in manures. (See Guano.) A solution of this gas in water is used in medicine, and is called spirits of hartshorn or *liquor ammoniæ*. One volume of water will dissolve or absorb 500 volumes of ammonia. Liquid ammonia has been employed as a motive-power by Tellier, and for the production of artificial cold by Carré. (See Ice.) This gas can also be liquefied by pressure and cold, and then becomes a colorless liquid, with the properties of ammonia much intensified. The smelling salt, or volatile salt of hartshorn, used as a restorative in faintness, is a carbonate of ammonia. Ammonic sulphate, $(NH_4)_2SO_4$, is manufactured in large quantities, by boiling "gas-liquor" with lime, and conducting the ammoniacal gas which is liberated into sulphuric acid. On evaporating the solution, the sulphate is obtained as a white salt. It is extensively used in the manufacture of alum in place of potassic sulphate, as a constituent of artificial fertilizers, and for the preparation of other ammoniacal salts. Ammonic nitrate is used for the preparation of nitrogen monoxide (N_2O), laughing-gas. Ammonic chloride, NH_4Cl, has long been known as *sal-ammoniac*. The "ammonia type" is one upon which a few inorganic and many organic compounds are formed. (See AMIDES, AMINES, etc., by PROF. C. F. CHANDLER, PH. D., LL.D.)

Ammo'niac [Lat. *ammoni'acum*], a gum-resin used in medicine, is imported from Africa and India. It is obtained from the *Dore'ma ammoni'acum*, an umbelliferous plant containing a milky juice, which by drying is converted into this gum. It is used as an expectorant, and sometimes applied externally as a plaster.

Ammoni'tes [from *Am'mon*, and the Gr. λίθος, a "stone;" so named from their resemblance to the horns of Jupiter Ammon; English *Am'monite*], an extinct genus of mollusks belonging to the order Cephalopoda, and one of the most striking features in the fauna of the mesozoic ages. The ammonites were discoid, chambered, spiral shells, sometimes four feet in diameter, and often beautifully ornamented exteriorly. The internal structure was similar to that of the *Nautilus*, except that the siphon was external, and the septa (partitions between the chambers) were arched outward, and were convoluted at their margins, so that their intersecting with the walls of the shell produced beautiful foliated figures. The ammonites began in the trias, were immensely multiplied in the Jurassic and cretaceous ages, and became entirely extinct at the close of the latter. More than 500 species have been described, and they are found in the mesozoic strata of all parts of the world. Beautiful ammonites occur in the cretaceous rocks of the country bordering the upper Missouri, in the Indian Territory, and in Texas. The old genus *Ammoni'tes* has been lately much subdivided by Prof. Alph. Hyatt, Prof. von Hauer, and others. (See "Proc. Bost. Soc. Nat. Hist.," 1883, and article AMMONITIDÆ.)



Ammonite.

Am'monites, an ancient Semitic tribe or nation, descendants of Ben-Ammi, a son of Lot. They inhabited the east side of the Jordan, between the rivers Arnon and Jabbok, and adjoining the northern part of Moab. Their chief city was Rabbah. (See AMMAN.) They frequently waged war against the Israelites, and were conquered by Jephthah, and afterwards by King David. (See 2 Samuel xi. and xii.) About 164 B. C. they were defeated by Judas Maccabæus. They are called "the children of Ammon" in the Old Testament.

Ammonit'idæ, a family of cephalopodous mollusks, of which the genus *Ammoni'tes* is the type. The genera of this group are all extinct, beginning with *Goniati'tes* in the Devonian and carboniferous, followed by *Cerati'tes* and *Ammonites* in the trias; *Ammonites* in great development in the Jurassic and cretaceous; *Baculi'tes*, *Scaphi'tes*, *Ancylo'ceras*, *Crio'ceras*, *Helico'ceras*, *Hetero'ceras*, *Ptycho'ceras*, *Hami'tes*, *Turrili'tes*, etc., being exclusively cretaceous, and the family ending with them.

The shells of the Ammonitidæ are all chambered, and were generally, though not always, external; the animal inhabiting the last and largest, called the body-chamber. The series of smaller chambers are supposed to have served as a float, by which the specific gravity of the animal was harmonized with that of the surrounding medium, and this shell maintained in a position best suited to its movements.

The septa are arched outward at the centre, and ruffled at the margins; are nearly simple in the earliest stages of growth, most convoluted at full maturity, more simple again in old age. The ornamentation of the external surface, which consists of ridges, knobs, and spines, and is often very elaborate, follows the same law.

In most of the Ammonitidæ the shell is a discoid spiral, but the cretaceous genera exhibit great diversity of form; as *Ammonites*, with a symmetrical spiral coiled in the same plane; *Scaphites*, *Ancyloceras*, *Crioceras*, and *Toxo'ceras*, showing a gradual unrolling of the coil, until in *Baculites* the shell is quite straight. In *Helicoceras* it forms an open elevated spiral; in *Turrilites*, an elongated conical closed spire, like that of a gasteropod, but sinister, turned to the left.

The life-history of the Ammonitidæ is very peculiar and interesting. After a long term of existence, during which they show a modest simplicity of structure and little diversity of form, in the mesozoic ages the family is expanded and developed in the most wonderful way, their numbers being enormously increased, their size becoming gigantic, their forms being almost infinitely varied, their structure more complicated, their ornamentation more elaborate, diversified, and beautiful. The cretaceous period was the golden age of the Ammonitidæ, when they attained such numbers, size, variety, and beauty as to far eclipse all other tribes of shelled mollusks, living or extinct. Their greatness ended here, however. Like the flowering of a plant or the splendor and extravagance of an over-civilized nation, their extraordinary development seems to have been exhaustive of the vital energies, as in the age next succeeding their grand climacteric, so far as now known, they had no representative.

The peculiar features in the career of the Ammonitidæ are best seen in contrast with that of their nearest relatives, the Nautilidæ. The latter began their existence in the earliest palæozoic seas as mollusks, with straight (*Orthoceras*) or coiled (*Nautilus*) shells, of which the structure was very simple. Of this family the Orthocerata are extinct, but the genus *Nautilus* has held its undeviating way through all past ages, and is now represented by living species which can hardly be distinguished from those that lived millions of years ago. The full explanation of the difference in the history and fate of these two closely allied families is perhaps beyond our reach, but it seems probable that we have here another illustration of the truth which underlies the diversity of fate in human individuals and nations, as well as of species, genera, and orders in the life-history of the globe—viz., simplicity of structure and habit promotes longevity by its adaptation to general and prevailing circumstances in time and space, while a highly specialized organization will flourish only in special and rare conditions. J. S. NEWBERRY.

Ammo'nium (NH_4), a hypothetical metal which is supposed to exist in the salts of ammonia, and to be composed of one volume of nitrogen and four of hydrogen. It is the analogue of potassium and sodium, but has never been obtained in a separate state; a supposed amalgam of ammonium, however, may be formed by the action of the galvanic battery on a globule of mercury surrounded by a solution of ammonia, and by the action of sodium amalgam on a solution of ammonium chloride.

Ammo'nium Ba'ses, compounds analogous to $NH_4.H.O$, ammonic hydrate, in which the H atoms are replaced to a greater or less extent by basic radicals, such as ethyl, C_2H_5, amyl, C_5H_{11}, etc. (See AMINES, by C. F. CHANDLER.)

Ammo'nium, or **Am'mon,** the ancient name of an oasis in the Libyan Desert, about 300 miles W. S. W. of Cairo. It is now called El Siwah. Here was a celebrated oracle and temple of Jupiter Ammon, in a grove of palms; also royal palaces and the "Fountain of the Sun," the water of which was cold at noon and warm at midnight. The ruins of the temple may still be seen.

Ammo'nius, surnamed SACCAS (because in his youth he was a porter and carried sacks), a Greek philosopher, born in Alexandria, was the founder of the school called Neo-Platonic about 193 A. D. Though born of Christian parents, he went over to paganism. Among his pupils were Longinus, Origen, and Plotinus. He left no writings, and died about 243 A. D.

Ammonoo'suc, Lower, a river of New Hampshire, rises in Coos county, near Mount Washington, and flowing south-westward through Grafton county, enters the Connecticut River. It is about 100 miles long.

Ammonoosuc, Upper, a river of Coos co., N. H., which empties into the Connecticut at Northumberland. It is about 75 miles long.

Ammoph'ila (*i. e.* "delighting in sand"), [from the Gr. ἄμμος, "sand," and φιλέω, to "love"], (the *Calamagrostis* of Gray), a genus of grasses nearly allied to *Arundo*, and distinguished by a spikelike panicle, and by the glumes being nearly equal, keeled, and longer than the palæ of the single floret. The *Ammophila arundinacea*, called sand-reed, mat-grass, or marum, grows on the sandy shores of Europe, and is of great utility in fixing the shifting sand. It is also used to make mats.

Ammuni'tion [from the Lat. *ad*, "for," and *munitio*, "defence"], a military term applied to cannon-balls, shells, bullets, fuses, cartridges, grenades, gunpowder, and all the projectiles and explosive substances used in war. The ammunition of field artillery consists of shot, loaded shells, case-shot, shrapnel, cartridges, priming-tubes, matches, and rockets. An infantry soldier generally carries sixty rounds in his cartridge-box.

Am'nesty [from the Gr. ἀμνηστία, "non-remembrance"], an act of oblivion of past misconduct granted by the government to those who have been guilty of some offence. It is usually granted to whole communities or classes of individuals who have taken part, or are supposed to have participated, in some movement against lawful authority; it may be granted either before or after conviction, and its effect is entirely to efface the crime and cause it to be forgotten by the law. An instance is an act of amnesty in England in the 20th Geo. II. c. 52, called "an act for the king's most gracious general and free pardon." This subject has recently excited much interest in the U. S., owing to a provision in the fourteenth amendment to the Constitution creating certain disqualifications as to holding office by persons who have participated in rebellion, and at the same time allowing their removal by a special vote of the Congress. Such a removal is in the nature of an act of amnesty.

Am'nion, or **Am'nios** [etymology doubtful], the soft, delicate, and most internal membrane containing the waters which surround the fœtus *in utero;* also called *agni'na tu'nica.* It secretes a fluid called *li'quor am'nii.* (See Embryology, by Prof. J. C. Dalton, M. D.)

Am'nios, in botany, a thin, semi-transparent, gelatinous substance in which the embryo of a seed is suspended when it first appears, and by which the embryo is probably nourished in its first stages.

Amœ'ba Dif'fluens, an organism of the order Rhizopoda, is one of the lowest animal structures with which zoologists are acquainted. It is a mere gelatinous mass of a rounded form, capable of emitting processes and lobes from all parts of its body, and retracting them at will. This animal abounds in the bottom of fresh-water ponds, and is well known to amateur microscopists under the name of *Proteus.* With the exception of a clear pulsating space, it appears to be a structureless mass of sarcode.

Amol', a city of Persia, in the province of Mazanderan, on the river Heraz, about 12 miles from its entrance into the Caspian Sea, and 85 miles N. E. of Teheran. A bridge of twelve arches crosses the river here. Pop. estimated at from 35,000 to 40,000.

Amo'mum [from the Gr. ἄμωμος, "blameless," "without fault"], a genus of plants of the order Zingiberaceæ or Scitamineæ, and of the Linnæan class Monandria. They are natives of the tropical parts of Asia and Africa, and produce aromatic seeds called cardamom and grains of Paradise.

Amoo', or **Amu,** also called **Amoo Darya** (anc. *Oxus;* Arab. *Gihon*), a river of Western Asia, rises on the Belur Tagh, nearly 15,000 feet above the level of the sea, receives many affluents from the mountains of Turkestan and the Hindukush, flows through Turkestan, and falls into the Aral Sea. The length of its course is 1610 miles. According to the treaty of peace concluded in July, 1873, between Russia and Khiva, this river will hereafter constitute the boundary-line between Khiva and Bokhara.

Amoor', Amur, or **Saghalien,** a large river of Eastern Asia, formed near lat. 53° N. and lon. 122° E. by the union of the Shilka and the Argoon, the latter of which forms for about 400 miles the boundary between Siberia and the Chinese empire. The Amoor flows alternately eastward and south-eastward, forming the boundary between China and Siberia, until it arrives at a point about lat. 48° N. It afterwards pursues a general N. E. direction through the Littoral province of Siberia, and enters the Sea of Okhotsk or Gulf of Saghalien. Its length, exclusive of the branches, is estimated at 1800 miles. It is stated that steamboats have ascended from its mouth to the junction of the Shilka and Argoon. The navigation is obstructed by ice until May. In the lower part of its course it traverses a fertile country, covered with extensive forests of oak, ash, elm, maple, pine, etc. The largest tributary of the Amoor is the Soongari, which enters it on the right.

Amoor, Country of the [Ger. *Amurland*], the name given to a part of Mantchooria which in 1858 was ceded by China to Russia. It includes the island of Saghalien and the whole tract on the left side of the Amoor lying between 43° and 54° N. lat., and containing an area of 276,000 square miles. It is divided into the province of the Amoor and the Littoral province. The area of the province of the Amoor is 173,552 square miles, and the population 44,400. The winters are very severe, and navigation is generally closed from the end of October to the beginning of May. The soil is fertile, and in the more sheltered parts many plants of Southern Asia grow luxuriantly. The forests are magnificent, abounding in oaks and nut-bearing trees. Fur-producing animals are very numerous, and the rivers yield great quantities of fish. Gold-fields have been recently discovered, and coal is abundant in the island of Saghalien.

Amoret'ti (Carlo), an Italian naturalist and writer, born at Oneglia, near Genoa, Mar. 13, 1741. He produced a good biography of Leonardo da Vinci (1784), and a work on the natural history and geography of Lakes Como, Maggiore, and Lugano, called a "Journey from Milan to the Three Lakes" (1794). In 1797 he became librarian of the Ambrosian Library of Milan. Died Mar. 24, 1816.

Amor'gos, or **Amor'go** [Gr. Ἀμοργός], a fertile island in the Archipelago, 18 miles S. E. of Naxos, belongs to the kingdom of Greece. It is 13 miles long and 6 miles wide, and contains a small town called Amorgos. The surface is mountainous. The poet Simonides was born here. It has a good harbor; lat. of E. end, 36° 54' N., lon. 26° 6' E. Pop. about 3700.

Am'orites ("mountaineers"), a powerful nation of Canaan that occupied the country on both sides of the Jordan in the time of Moses, and resisted the Israelites in their march towards the Promised Land. Moses defeated their two kings, Sihon and Og, who reigned at Heshbon and Bashan respectively. Og is said to have been the last "remnant of giants" (Deuteronomy iii. 11). The Amorites were afterwards subdued by Joshua, but he was not able to exterminate them. They appear to have been long hostile to the Israelites, but in Solomon's time were reduced to a tributary condition.

A'mos, one of the minor Hebrew prophets, was a contemporary of Isaiah, and lived about 785 B. C. He was originally a herdsman and a gatherer of sycamore fruit in Tekoa, a town 12 miles S. S. E. of Jerusalem. He denounces the prevalent idolatry in vigorous and eloquent terms, using many images taken from rural and pastoral life. His prophecies seem to have all been given in one year, and his plain speaking caused the charge of conspiracy against the government because he alienated the people.

Amo'tion [from the Lat. *a* (*ab*), "away," and *moveo, motum,* to "move"], in law, the removal of an officer of a corporation from his office. It differs from disfranchisement, which refers to the removal of a member. Amotion may accordingly take place without disfranchisement.

A'moy, a seaport-town of China, on an island of the same name, in the province of Fo-Kien, and on the Channel of Formosa; lat. 24° 28' N., lon. 118° 4' E. It is situated at the mouth of a river which passes by the large city of Chang-Choo-Foo, of which Amoy is the port. Amoy is one of the chief commercial towns of China, and its merchants are noted for their enterprise. It was taken by the British in 1841, and has been open to the trade of all nations since 1843. Among the articles of import are cotton, cotton goods, iron, sugar, camphor, and pepper. The chief articles of export are tea, sugar, porcelain, silks, and paper. Amoy is one of the chief centres of the Protestant missions in China. Pop. 95,600.

Ampel'ic Açid, a white solid produced by the action of nitric acid on schist oils.

Am'pelin, a substance resembling creasote, obtained from schist oil.

Ampelop'sis [from the Gr. ἄμπελος, a "vine," and ὄψις, "resemblance"], a genus of creeping, vine-like, woody plants, to which the Virginia creeper or American woodbine (*Ampelopsis quinquefolia*) belongs. This is one of the most beautiful of our hardy creeping ornamental plants. It is highly esteemed in England, and is better adapted to the climate of America than the ivy, and is also more rapid in its growth, and has handsomer foliage. The leaves are deciduous, but they die in a blaze of crimson glory when touched by the frost, so that the plant is lovely even in death. It is of the order Vitaceæ.

Ampère (André Marie), an eminent French natural philosopher and mathematician, born at Lyons Jan. 20, 1775. He produced in 1802 an interesting essay "On the Mathematical Theory of Games of Chance." He became inspector-general of the University (1808), professor of analysis in the Polytechnic School (1809), chevalier of the Legion of Honor (1809), and a member of the Institute (1814). Having made important discoveries in electro-magnetism, he published in 1822 a "Collection of Observations on Electro-Dynamics," a work which displays remarkable sagacity. "The vast field of physical science," says Arago, "perhaps never presented so brilliant a discovery, conceived, verified, and completed with such rapidity." He further explained his discoveries in this department of science, to which he gave the name of electro-dynamics, in his "Theory of Electro-Dynamic Phenomena deduced from Experiments" (1826). Among his other works are treatises on optics and an "Essay on the Philosophy of the Sciences," etc. (1834). He was a man of genial disposition, and noted for simplicity of character. (See his "Journal et Correspondance," an interesting record of his domestic and private life.) Died in Marseilles June 10, 1836.

Ampère (Jean Jacques Antoine), an accomplished scholar and *littérateur,* a son of the preceding, born at

Lyons Aug. 12, 1800. He enjoyed in his youth the society of Madame Récamier, and devoted much attention to English and German literature. In 1833 he succeeded Andrieux as professor of French literature at the College of France. He became a member of the Academy of Inscriptions in 1842, and a member of the French Academy in 1847. He travelled extensively in Egypt, the Levant, and the U. S. Among his works are "Literature and Travels" ("Littérature et Voyages," 1833), "Literary History of France before the Twelfth Century" (3 vols., 1839), an "Essay on the Formation of the French Language" (3 vols., 1841), "Greece, Rome, and Dante" (1850), and "Roman History at Rome" ("Histoire Romaine à Rome," 4 vols., 1856–64). Died Mar. 27, 1864.

Amphacanthidæ. See TEUTHIDIDÆ.

Amphib'ia [Gr. *ἀμφίβια*, from *ἄμφω*, "both," and *βιόω*, to "live"], a term applied to animals that live both on the land and in the water. In the Linnæan system it included all reptiles and cartilaginous fishes, although some reptiles would be drowned if they remained very long under water. This classification has been modified by the removal of the cartilaginous fishes from the class of *Amphibia*. Cuvier applied the term to such mammals as the seal and walrus, which inhabit both the land and water.

Naturalists now divide the Reptilia of the olden zoologists into two classes—viz., Reptilia, which includes the lizards, snakes, and turtles; and Amphibia, which comprises the serpent-like cecilians, salamanders, and batrachians (frogs and toads). Most amphibians pass through a metamorphosis like that of the frog, which emerges from the egg as a tadpole, when it is fishlike in form and breathes by gills, being truly aquatic; subsequently the tail and gills disappear, legs and lungs are developed, and the mature animal, though perhaps inhabiting the water, is an air-breather. In some amphibians the first or embryonic condition continues unchanged through life, as *Menobranchus*, *Menopoma*, etc., the water-puppies and young alligators of the Western rivers. The largest of these aquatic carnivorous salamanders is *Sieboldia*, which inhabits the lakes of Japan, and attains a length of three feet. Though now regarded as dull and disgusting creatures, this latter group of amphibians once stood at the head of all then existing members of the zoological series. The amphibians first appeared in the carboniferous age, and the lagoons in the coal-marshes swarmed with aquatic salamanders, some of which were six feet in length, very active, and predaceous, and the monarchs of the animal world of that age. More than twenty species of amphibians have been obtained by Dr. Newberry from the cannel coal of one mine in Ohio. The amphibians had their golden age in the trias, when *Labyrinthodon*, with a body as large as that of an ox, and teeth four inches long, ruled the animal kingdom. In the succeeding age (Jurassic) the sceptre passed from the amphibians to the true reptiles. J. S. NEWBERRY.

Amphib'ole [from the Gr. *ἀμφίβολος*, "equivocal"], a name given by Haüy to hornblende, on account of its resemblance to augite. (See HORNBLENDE.)

Amphic'tyon [Gr. Ἀμφικτύων], an ancient and perhaps fabulous hero and king of Attica, supposed to have been a son of Deucalion.

Amphictyon'ic Coun'cil, a celebrated congress or politico-religious court of the confederated tribes of ancient Greece, which met twice every year at Thermopylæ. It was composed of the deputies of twelve tribes—viz. Thessalians, Bœotians, Dorians (or Spartans), Ionians (or Athenians), Locrians, Dolopians, Magnetes, Malians, Achæans, Phocians, Ænianians, and Perrhæbians, who each sent one or two members. The predominance of northern and Pelasgic tribes proves the great antiquity of this institution, which in course of time declined, and in the age of Demosthenes had lost its authority. The members of this council bound themselves by an oath that "they would not destroy any Amphictyonic city nor cut off its streams in war or peace." One great object of the council was the protection of the temple at Delphi. (See TITTMANN, "Ueber den Bund der Amphiktyonen," 1852.)

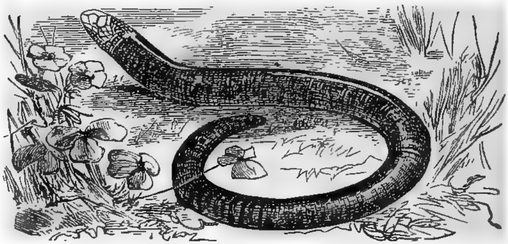
Amphil'ochus, a brother of Alcmæon, took part in the march of the Epigoni to Thebes, and in that of the Greeks to Troy. After his death he was raised among the gods.

Amphi'on [Gr. Ἀμφίων], in classic mythology, a Theban prince and musician, a son of Jupiter and the husband of Niobe. According to the poetic legend, he availed himself of his skill in music to build the walls of Thebes, and the stones, attracted by the sound of his lyre, moved and arranged themselves in the proper position.

Amphiox'us [from the Gr. *ἄμφω*, "both," and *ὀξύς*, "sharp"], the name of a genus of fishes (Leptocardii), so called because they are sharp at both ends. They are recognized as vertebrate animals only by their gelatinous dorsal cord, which supports a medullary spinal cord. They are without brain or true heart, and have various other exceptional characters. The genus is often called *Branchiostoma*. The popular name is lancelet. One species is found in the marine waters of the Southern U. S.

Amphip'olis [from the Gr. *ἀμφί*, "around," and *πόλις*, "city"], an ancient and important city of Thrace or Macedonia, was founded by an Athenian colony about 437 B. C. It was situated at the mouth of the river Strymon, which here enters the *Strymon'icus Sĭn'us*, the modern Gulf of Contessa. The waters of the river are said to have once surrounded the town (whence the name). In the Middle Ages it was called Popolia. Its site is now occupied by a small Turkish town called Yenikeui.

Amphisbæni'dæ [Gr. *ἀμφίσβαινα*, from *ἀμφίς*, "on both sides," quasi at both ends, and *βαίνω*, "to go"], a family of Lacertian reptiles with the pterygoid and quadrate bones united, no columella and no interorbital septum, and an elongated serpentiform body with a blunt tail. The head and tail are sufficiently similar in appearance to have gained their scientific names. About two dozen species inhabit the warm portions of both hemispheres. They burrow in the earth, and have rudimentary eyes.



Amphisbæna fuliginosa.

Amphis'sa, a town of ancient Greece, in Locris, was situated 7 miles from Delphi, on the site of the modern town of *Salona*. The town was destroyed B. C. 338 by Philip of Macedon, but was rebuilt. Here was a temple of Athena, containing an image of the goddess.

Amphithe'atre [Gr. *ἀμφιθέατρον*, from *ἀμφί*, "around," and *θέατρον*, a "theatre"], a spacious and uncovered edifice of an elliptical or circular form, in which the ancient Romans witnessed the exhibition of public games and the combats of gladiators and wild beasts. It was constructed so that all the spectators could behold the performance, which was exhibited in an open level space called the arena, surrounded on all sides by tiers of seats, which rose higher as they receded from the arena. The most famous of these edifices was the Flavian Amphitheatre, or Colosseum of Rome, which was built by the emperors Vespasian and Titus, finished about 80 A. D., and is still standing. It is about 620 feet long, 513 feet wide, and 157 feet high. The longest diameter of the arena was 287 feet. It is said to have had seats for 80,000 spectators, and standing-room for 20,000 more. The exterior was adorned by three rows of columns—Doric, Ionic, and Corinthian. The Colosseum is regarded by many as the most august and imposing ruin in the world.

Amphithe'rium [from *ἀμφί*, "on both sides," and *θηρίον*, "beast;" named probably in allusion to its double or doubtful character], a genus of fossil insectivorous mammalia found in the oolitic strata in Oxfordshire, England. It presents many points of analogy with the living marsupial genus *Myrmecobius*.

Amphitri'te [Ἀμφιτρίτη], in the Greek mythology, a Nereid, a goddess of the sea, the wife of Neptune and the mother of Triton. She is represented sitting in a car of shells drawn by tritons, or on a dolphin.

Amphit'ryon [Gr. Ἀμφιτρύων], in classic mythology, a son of Alcæus. Having accidentally killed his uncle Electryon, he was banished from Mycenæ. He married Alcmena, who was the mother of Hercules.

Am'phora [from the Gr. *ἀμφί*, "on both sides," and *φέρω*, to "bear," from its being borne by its two handles], the Latin name of a vase with two handles which was used by the ancient Greeks and Romans to hold wine and oil. It was also a liquid measure, containing about eight and a half gallons among the Greeks, and six among the Romans.

Amplifica'tion [Lat. *amplifica'tio*, from *am'plus*, "large," and *fa'cio*, to "make"], in rhetoric, is the enlargement and expansion of a subject or discourse by the use of epithets and illustrations and the enumeration of circumstantial accessories, with a view to produce a deeper impression. Cicero was much inclined to amplify his orations. Exaggeration is a vicious kind of amplification.

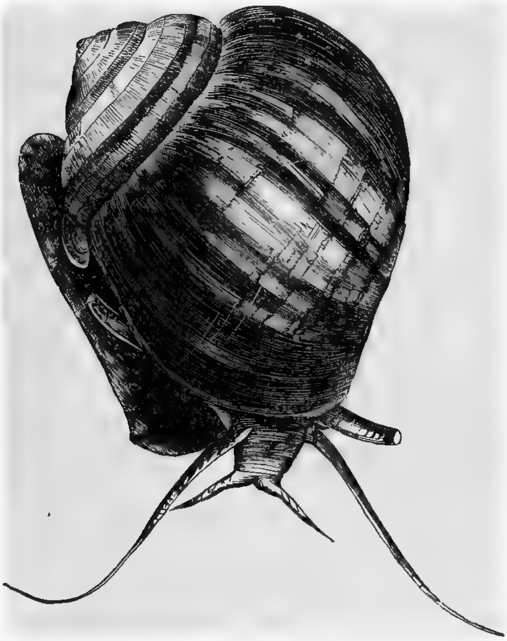
Am'plitude [Lat. *amplitu'do*, from *am'plus*, "large," "great"], in astronomy, is the angular distance of a heavenly body, when it rises or sets, from the east or west points of the horizon. The amplitude of a fixed star remains the same all the year, but that of the sun changes daily, and on a given day varies according to the latitude of the observer.

AMPLITUDE, in mechanics and physics, is used in reference to oscillating and vibrating bodies, to indicate the distance between the extreme positions assumed by the body. Thus the amplitude of oscillation of a pendulum is the angle between the extreme positions of the line joining the centres of suspension and oscillation.

Ampu'dia, de (PEDRO), a Mexican officer who obtained the rank of general in 1840. He fought against the Texans in 1842, and commanded the Mexican troops which defended Monterey in 1846 against Gen. Taylor, to whom he surrendered in September of that year.

Ampul'la, a Roman vessel of glass or earthenware, used for holding oil, wine, etc., was nearly globular in form. Many of these are preserved in the collections of antiquaries. In the Catholic Church an ampulla is a vessel which contains wine for the sacrament. *Ampulla Remensis* (in Fr. *la Sainte Ampoule*) was a famous vessel of holy oil which, according to tradition, was brought from heaven by a dove, and was used to anoint Clovis when he was crowned at Rheims in 496 A. D.

Ampulla'ria [from the Lat. *ampulla*, a "flask"], an interesting genus of gasteropod mollusks, called apple-shells, idol-shells, pond-snails, etc. Fifty or more species are known, mostly tropical, and all inhabiting fresh water and mud, though some are occasionally found in salt and brackish waters. They are remarkable for their tenacious hold on life, many being able to live away from the water for years. One species is occasionally found alive in hollow logs of mahogany and logwood from Honduras. The *Ampullaria dubia* is brought from the Nile.


Ampullaria dubia.

Amputa'tion [from the Lat. *amputo, amputatum*, to "prune," to "lop off"], in surgery, is the removal, by operation, of any part of the body or limbs on account of disease or injury, such as would endanger life if the part were allowed to remain. The term of late denotes more especially such removal of a limb, but is still sometimes used for the excision of a tumor or gland.

Amputations are properly resorted to not only after severe and very dangerous injuries, but in such diseases as gangrene, cancer, etc., which are without rational prospect of cure by other means. In general, cases where the chances of cure will probably be much increased by this operation afford legitimate subjects for its exercise. This rule would include some cases of intractable ulcers of the leg, of aneurism, and of diseased bones and joints. Incurable and unsightly deformities, where they put the patient to great inconvenience, may in some circumstances be removed by the knife. An amputation in which a bone is cut off is said to be "in the continuity." An amputation at a joint, when no bones are divided, is in "the contiguity;" the latter operation is not often performed, though it has had recent advocates. Amputations are chiefly either "flap" or "circular" operations. The "flap" operation, in some of its many modifications, is probably the most frequently employed. One, two, or even three flaps have been employed, the size, shape, and thickness of these flaps of skin and flesh varying with circumstances. In general, they ought to be large enough to cover amply the end of the stump, and not so large as to be redundant after the wound shall have healed. The flap amputation, practised by certain mediæval surgeons, and revived by Lowdham of England nearly 200 years ago, was made general by Liston, and has since his time been variously improved and modified.

"Circular amputation" is performed by first dividing the skin and superficial fascia by a sweep of the knife around the limb, dissecting up the skin for two or three inches, and at that part dividing the muscles down to the bone. The flesh is removed from the bone to allow the saw to be applied.

The danger attending amputation is generally in proportion to the nearness of the operation to the trunk, as well as to the size of the limb. Thus, amputation at the hip-joint is the most doubtful of all in its results; but even this, in some cases, especially in military surgery, may improve the chances of life under severe injury. Amputations at the joints are by most surgeons considered as more serious than in the continuity of the limbs. Of the foot alone several different modes of amputation are in use, as Lisfranc's, Chopart's, Syme's, and Pirogoff's amputations.

Amrit', the richest place in ruins on the whole Phœnician coast (Syria), near the city of Tortosa. It is the ancient Marathus, and was discovered in the seventeenth century by Pococke, but was not explored until the present century, by Ernest Renan. The most important ruin found here is "El Maabed" (*i. e.* "the temple").

Am'rita [from the Sanscrit *a*, signifying "without," and *mrita*, "dead," also "death"], sometimes incorrectly written **Amreeta,** in Hindoo mythology, is the name applied to the water of immortality, which is said to have been obtained by the churning of the ocean. The term amrita or amrit is sometimes given to the food as well as the drink of the gods, and likewise to any delicious drink.

Amrit'sir, or **Amritsur,** written also **Umritsir,** the sacred city of the Sikhs, in the Punjâb, in Northern India, 40 miles E. of Lahore; lat. 31° 40′ N., lon. 74° 56′ E. It is said to contain 399 Hindoo places of worship. Here is a magnificent temple of the Sikhs, on an island, in a large tank or reservoir, called "the Pool of Immortality," which is visited by many pilgrims. Runjeet Singh built here the large fortress of Govindghur, which is one of the most remarkable objects in the place. Amritsir has manufactures of shawls, silk stuffs, and cotton goods; also an extensive transit trade with India and Central Asia. Pop. in 1876, 142,381.

Am'rou Ben el As, a famous Arabian warrior, born about 600 A. D., at first opposed Mohammed, but became a zealous proselyte, aided in the conquest of Syria, conquered Egypt, of which he became emir, taking Alexandria in 640 A. D., and Tripoli three years later. He became an opponent of Ali. He was a man of energy and prudence. Died in 663.

Ams'dorf, von (NIKOLAUS), a Reformer, born in Saxony Dec. 3, 1483. He became a zealous Lutheran, and accompanied Luther to the Diet of Worms in 1521. He was afterwards an opponent of Melanchthon, and was much addicted to controversy about doctrines. In 1542 he was appointed bishop of Naumburg. He wrote numerous polemical works. Died May 14, 1565.

Ams'ler (SAMUEL), a skilful engraver, born in Switzerland in 1791. He became professor of engraving in the Academy of Fine Arts in Munich. He engraved many of the works of Raphael and Thorwaldsen, and reproduced the former with peculiar fidelity. Among his best works are the "Triumph of Alexander the Great," after Thorwaldsen, a "Holy Family," and a "Burial of Christ," both after Raphael; also a "Christ," after Dannecker. Died in 1849.

Am'sterdam', formerly **Amstelredamme,** or **Amsteldamme** ("the dike or dam of the Amstel"), [Lat. *Amsteloda'mum*], an important commercial city and capital of the kingdom of Holland, is situated at the junction of the Amstel with the Y, and near the Zuyder-Zee, through which it has access to the ocean; lat. 52° 22′ N., lon. 4° 53′ E. It is the largest city of Holland and its constitutional capital, but the royal court is at The Hague. Amsterdam stands on flat, marshy ground, into which piles, fifty feet long, are driven to form a foundation for the houses, which are mostly built of brick. The city is divided into ninety islands by a number of canals, which are crossed by 280 bridges. A part of the old ramparts have been pulled down, and twenty-eight windmills for grinding grain have been erected on the bastions. The principal streets are the Heerengracht, Keizergracht, and Prinzensgracht, each of which is about two miles long and describes a semicircle. Canals occupy the middle of these streets, which are scarcely surpassed in elegance by those of any capital in Europe. Among the grand public buildings of this metropolis is the palace or town-hall, a stone edifice 282 feet long and 235 feet wide, resting on 13,659 piles, driven into the ground to the depth of 70 feet. This palace contains a remarkable hall 120 feet long, 60 feet wide, and 100 feet high, lined with white Italian marble. The city has a beautiful justiciary hall, a modern building of Grecian architecture. The most beautiful church of Amsterdam is the Nieuwe Kerk (founded in 1408), which is 350 feet long and 210 wide. This Nieuwe Kerk and the Oude Kerk, which has a remarkable organ, belong to the Reformed Church. Much of the water-supply of Amsterdam now comes from the sand-dunes of the coast. Amsterdam is liberally supplied with hospitals and other charitable institutions. Among the important educational and literary institutions are the Athenæum Illustre, which has a botanic garden, a school of anatomy, and chairs of art, law, medicine, and theology; the city Latin school; the Royal Academy of Fine Arts, founded in 1820; the Arti et Amicitiæ society of painters; the naval school; the Royal Dutch Institution for science, literature, and art; the antiquarian society; and the society of literature and fine arts, called Felix Meritis. The Museum of Pictures, the Museum van der Hoop, and the Feodor Museum (since 1866) contain rich collections of the works of the Dutch masters. The Six collection of pictures belonging to the Six family is one of the finest private collections in Europe.

The chief manufactures are tobacco, soap, canvas, glass, jewelry, cordage, machinery, steam-engines, etc. Its commerce is more important than its manufactures. That great trade which in the sixteenth century placed Amsterdam at the head of the commercial cities of Europe gradually declined, partly from the rise of other ports, but principally from the difficulties of navigation caused by the silting up of the Zuyder-Zee, and, above all, the Pampus Bar. Large vessels were obliged to discharge their cargoes outside, and were then floated over the bar by means of *camels*, which, when the water was pumped out of them, raised the vessel with them. To remedy this, the North Holland Canal was cut to the Helder, a distance of 51 miles. It is 124 feet broad at the surface and 31 feet at the bottom, and is available for vessels drawing 18 feet of water. But even this great highway is now inadequate, and moreover is obstructed in winter by ice. To maintain the rank of Amsterdam as one of the great commercial entrepôts of Europe, one of the most remarkable engineering works of modern times was commenced in 1863, and is now completed—the *direct* connection of the port of Amsterdam with the North Sea, 15 miles distant, by a canal terminating in an artificial harbor on that sea. This has made Amsterdam practically a seaport. Diamond-cutting is almost exclusively carried on here. (See Canal; also "Prof. Papers Corps of Engineers," No. 22.)

Amsterdam is the terminus of railways which connect it with Utrecht, the Helder, Haarlem, Rotterdam, and the cities of Prussia. The chief articles of export are butter, cheese, sugar, coffee, oil, spices, colors, etc.

Amsterdam was founded about 1250, before which it was a mere fishing-village, with a castle, the residence of the lords of Amstel. It was fortified in 1482, and became a part of the United Provinces in 1578, after which its commerce and population rapidly increased. Between 1630 and 1750 it was the foremost commercial city of Europe. This city was the native place of Spinoza, Admiral de Ruyter, and other eminent men. Pop. in 1867, 267,627; in 1883, 361,326, of whom about 59,000 were Catholics, 35,000 Lutherans, 4000 Mennonites, 1000 Remonstrants, and 30,000 Jews. Revised, J. G. Barnard.

Amsterdam Treaty, between France, Russia, and Prussia, was concluded Aug. 4, 1717. The mediation of France was accepted between the czar and the king of Prussia on one side, and Sweden on the other. Russia also abandoned the invasion of Mecklenburg, and France agreed not to renew a treaty of subsidies with Sweden.

Amsterdam, city on R. R. and Mohawk River, Montgomery co., N. Y. (see map of New York, ref. 4–I, for location of county), 33 miles N. W. of Albany. It has about 20 manufactories and a horse railroad. Pop. in 1870, 5426; in 1880, 9466.

Amuck′, or **Amook,** a word used among the Malays. Men who are rendered insane and desperate by the habitual use of opium or hasheesh run along the streets armed with a dirk, and kill or wound all persons in their reach. This is called "running amuck." It is generally deliberately planned, and is the Malay mode of suicide. Where a Japanese would commit hari-kari, the Malay runs *amuck* —*i. e.* by attacking all he meets he seeks and finds death at the hands of others.

Am′ulet [Lat. *amule′tum*], an object worn on the person as a charm, and supposed to have power to protect the wearer against evil spirits, sickness, and other real or imaginary evils. Amulets were worn by the ancient Egyptians, Greeks, and Jews. The Greeks and Romans wore a variety of gems and small figures of heroes, deities, and animals. Amulets were also used by the early Christians, but that form of superstition was condemned by the Council of Laodicea about A. D. 360. They are common among the Turks at the present day. An astrological amulet called talisman was highly prized by the Arabs.

Am′urath, or **Mu′rad I.,** sultan of the Turks, born in 1326, succeeded Orkhan, his father, in 1359, took Adrianople in 1361, and waged with success long and bloody wars, chiefly with the Christians, in what is now European Turkey. He was assassinated June 15, 1389.

Amurath II. succeeded his father, Mohammed I., in 1421, attacked Constantinople in 1423, contended with varying success for many years against the Hungarians under Hunyady, and against Scanderbeg. He gained a great victory at Kosovo in 1448. Died Feb. 9, 1451.

Amurath III., one of the most cruel of the sultans, born in 1545, came to the sultanate in 1574. His reign was marked by long wars with Austria and Persia, and with the janizaries at home. Died Jan. 17, 1595.

Amurath (Murad) IV., sultan of Turkey, born about 1610, succeeded his uncle Mustafa in 1623. He had a passionate temper, which was rendered more violent and dangerous by habitual drunkenness. He amused himself by shooting from his palace windows at passengers in the streets. The most important event of his reign was the capture of Bagdad by his army in 1638. Died in 1640.

Amussat (Jean Zuléma), a French surgeon and writer, born in Deux-Sèvres in 1796. He invented and improved several surgical instruments, and published some able professional treatises, among which are "Researches into the Nervous System" (1825), and a "Memoir on the Torsion of Arteries" (1829), which obtained a prize of the Institute. Died in 1856.

Amy′clæ [Gr. Ἀμύκλαι], an ancient town of Laconia, on the Eurotas, 20 stadia S. E. of Sparta, in a district noted for the abundance of its trees and its fertility, was famous in the heroic or legendary age as the abode of Tyndarus and Leda and Castor and Pollux, who were called *Amyclæi Fratres* (Amyclæan Brothers). This town was conquered by the Spartans about 775 B. C.

Amyg′dalin, or **Amyg′daline,** a white crystalline principle which is contained in the bitter almond, and under the influence of emulsine and water yields hydrocyanic acid and the volatile oil of bitter almonds. The symbol of amygdalin is $C_{20}H_{27}NO_{11}$. (See Almonds, Oil of.)

Amyg′daloid [from the Gr. ἀμύγδαλον, an "almond," and εἶδος, a "form"], having the form of an almond; applied in geology to certain volcanic rocks in which once existed oval cavities or cells now filled with nodules of some crystalline mineral deposited from an infiltrated solution. These nodules are composed of agate, chalcedony, calcareous spar, etc., and are commonly found in a basis of basalt, greenstone, or other trap rock. Empty cells often occur in the same rocks that contain these nodules, the cavities in each case having been originally formed and filled with gas or steam.

Amyg′dalus [from the Gr. ἀμύγδαλος, the "almond tree"], a genus of plants of the order Rosaceæ, consists of trees whose fruit is a drupe. It comprises the almond (*Amyg′dalus commu′nis*) and the peach (*Amyg′dalus Per′sica*).

Am′yl (C_5H_{11}), a compound radical belonging to the alcohol series, exists in amylic alcohol, $C_5H_{11}.O.H$, or fusel oil. It forms a series of compound ethers (see Ethers), some of which are used as substitutes for the essences of natural fruits. The nitrite of amyl is an ethereal liquid of agreeable odor, which has been recently brought to the attention of medical practitioners on account of its peculiar action on the circulation. A few drops inhaled causes a sudden acceleration of the pulse and flushing of the face.

Amyl′amines, organic bases formed on the ammonia type by the substitution of amyl, C_5H_{11}, for H. Amylamine is $N(C_5H_{11})H_2$, diamylamine is $N(C_5H_{11})_2H$, tri-amylamine is $N(C_5H_{11})_3$, tetramylammonium is $N(C_5H_{11})_4$. (See Amines, by Prof. C. F. Chandler, Ph. D., LL.D.)

Am'ylene (C_5H_{10}), a diatomic radical homologous with ethylene. It is produced by the dehydration of amylic alcohol, and is a transparent liquid of a faint but offensive odor. It possesses anæsthetic properties, and has been used as a substitute for chloroform, but was abandoned after having produced fatal results. (See Ethylene.)

Amyot (Jacques). See Appendix.

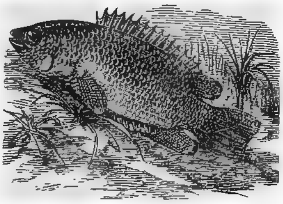
Amyot (Joseph), a French Jesuit missionary, born at Toulon in 1718. He sailed to China in 1750, was invited to Pekin by the emperor, and passed the rest of his life there. He learned the Chinese language, from which he translated several works into French, and compiled a "Mantchoo-Tartar-French Dictionary" (Paris, 3 vols., 1789–90). Few European authors have done so much to illustrate the history and customs of China. He wrote a large portion of the "Memoirs concerning the History, Sciences, Arts, and Customs of the Chinese" (16 vols., 1776–1814). Died in Pekin in 1794.

Amyrida'ceæ, a natural order of exogenous plants (trees or shrubs), natives of tropical regions, and abounding with balsamic and resinous juice. The type of the order is the genus *Am'yris,* which produces elemi. They have compound leaves, three to five petals, and stamens twice or four times as many as the petals. Among the products of this order are myrrh, frankincense, bdellium, elemi, olibanum, and balsam of Gilead. It comprises, besides *Amyris,* the genera *Balsamodendron, Boswellia, Icica,* and *Bursera.* Southern Florida has two trees of the order —the cachibou gum tree, *Bursera gummifera* (a large tree), and *Amyris Floridana* (torchwood), a small tree.

A'na [ἀνά], a Greek word signifying "upward," "through," "again." In medical prescriptions, *Ana,* or *aa,* denotes an equal quantity of each ingredient.

Ana, a suffix which often occurs as the termination of words which are the titles of books containing collections of the anecdotes, conversations, and sayings of eminent men. Among the most remarkable of these are "Scaligerana" (1666), "Menagiana," "Huetiana," "Walpoliana" (relating to Horace Walpole), and "Johnsoniana." They abound most in French literature. The "Scaligerana" was the first publication of this kind that ever appeared.

Anabant'idæ [from *An'abas,* one of the genera], a family of acanthopterygian fishes, with the superior branchihyals of the gill-arches laminated and developed into a superbranchial organ which retains water sufficient to moisten the gills for a considerable time, and with more or less spines in the dorsal and anal fins. Species are found in South-eastern Asia and Africa. One, the *An'abas scan'dens,* found in India, etc., is especially remarkable for a limited power of climbing. Unlike the eel, which passes over only moist ground, the anabas takes its journey over hard, dry, and dusty roads, and frequently up steep ascents heated with the burning beams of the noonday sun, and does not seem to feel any serious inconvenience from these. It is even asserted by some writers that this fish is able to climb a tree.



Anabas scandens: Climbing Perch.

Anabap'tists [from the Gr. prep. ἀνά, "again," and βαπτίζω, to "baptize"], a name applied during the sixteenth century to various bodies of Swiss and German Christians, who, while differing widely in personal character, in social and political opinions, and religious faith, agreed in discarding infant baptism, and in re-baptizing (according to the popular notion) those who personally accepted of Christianity. While in this respect the German Anabaptists held a position similar to that of the Baptists of to-day, they did not, as a general thing, insist that immersion only is valid baptism. Indeed, they generally practised pouring or affusion.

Many of the early Anabaptists were men of irreproachable character and true Christian devotion. (See Hubmeyer, Menno.) Some of them believed that it was wrong, in any circumstances, to bear arms. Others, however (whose vices and follies have been imputed to all who agreed with them in rejecting infant baptism), aspiring with a fanatical zeal to purify the Church and reform society, taught that, among men living under the gospel and having the Spirit of God to direct them, human government was not only unnecessary, but an unlawful encroachment on their spiritual liberty; that the distinctions of birth, rank, and wealth should be abolished; and that all Christians, throwing their possessions into one common stock, should live together as members of one family. Many of their leaders claimed to be enlightened and directed by supernatural visions and revelations. One of these, Thomas Münzer, claimed, it is said, a divine commission to establish a holy community, and to overthrow the then existing governments by the sword. He assembled a considerable force, which was totally defeated in May, 1525, near Mühlhausen, and Münzer, with the other leaders, was put to death. Many of his followers, however, survived, and spread their doctrines through Germany, Holland, and Switzerland. A numerous body of them, under John Matthias of Haarlem and John Boccold (or Bockholdt) of Leyden, established themselves in 1533 at Münster, deposed the magistrates, and having confiscated the property of many of the more wealthy citizens, they deposited it in a public treasury for the common use. The inhabitants were drilled to military duty, and vigorous preparations were made for the defence of Münster, which they styled Mount Zion. Count Waldeck, bishop and prince of Münster, having surrounded the city with an army, Matthias sallied from the gates, and was at first successful in several engagements. But having once gone forth with a small company, they were all killed. Boccold succeeded him, with the title of King John. He wore a crown, clothed himself in purple, and took to himself numerous wives, only one of whom, however, was honored as queen. Encouraged by the example of their monarch, many of Boccold's followers, it is said, gave themselves up to sensuality and license. At length, in 1535, Münster was taken, and Boccold and other leaders of the Anabaptists were put to death with torture. (See Cornelius, "Geschichte des Münsterischen Aufruhrs," Leipsic, 1855, and the "Dutch Martyrology;" Bouterwek's "Literatur und Geschichte der Wiedertäufer;" Winter's "Geschichte der Baierischen Wiedertäufer;" Calvary's "Mittheilungen aus dem Antiquariate," vol. i., p. 111, *seq.*)

The word Anabaptist is sometimes applied, at the present day, to those who baptize by immersion, and on profession of their faith, persons who have been sprinkled in infancy; but the name is repudiated by modern Baptists, since they regard the immersion of a believer as the only valid baptism, and maintain that they do not rebaptize. As no historical connection can be established between the Baptists and the fanatics of Münster, the name "Anabaptist" ought not to be applied to them. J. H. Gilmore.

Anaba'ra, a river of Siberia, in the government of Tobolsk, rises about lat. 66° 30′ N., and lon. 107° E., flows northward about 300 miles, and enters the Arctic Ocean in lat. 72° 40′ N.; lon. 112° 30′ E.

Anab'asis [from the Gr. ἀνά, "up," and βαίνω, to "go"], a Greek word signifying an "ascension," a march from a lower into a higher region. In medicine, it is sometimes applied to the increase of a disease or paroxysm. Also the title of two Greek historical works: 1. Xenophon's account of the expedition of Cyrus the Younger against his brother Artaxerxes Mnemon, king of Persia, 401 B. C., and of the retreat of the ten thousand Greeks who had served in the army of Cyrus. 2. Arrian's "Anabasis," in which are recorded the expeditions of Alexander the Great into Persia and India.

An'ableps [from the Gr. ἀναβλέπω, to "look up"], a genus of haplomus fishes, characterized by a remarkable projection of the eyes from the sides of the head, and by a singular structure of the cornea and iris, in consequence of which it has two pupils on each side, and seems to have four eyes. Several species are found along the sandy coasts of tropical America.

Anacan'thini [from the Gr. ἀν, priv., and ἄκανθα, a "spine"], an order of fishes distinguished by an ossified endoskeleton, the surface covered in some cases with cycloid, in others with ctenoid, scales; fins supported by flexible or jointed rays; ventrals beneath the pectorals, or wanting; swimming-bladder without air-duct. This order includes the cod and many other edible fishes.

Anacardia'ceæ [from *Anacar'dium,* one of the genera], a natural order of exogenous trees and shrubs, mostly natives of tropical regions, and often abounding in a resinous fluid of extreme acridity. The leaves are alternate and without dots, the petals perigynous, and the fruit is usually a drupe. The order is founded on *Anacardium occidentale* (cashew-nut), and contains many species, among which are poison ivy, mastic, sumac, pistachio-nuts, and the mango.

Anach'aris Canaden'sis, an herbaceous plant of the order Hydrocharidaceæ, is a native of North America, growing in ponds and slow streams, in which it is entirely submerged. It has a much-branched and slender stem, and is remarkable for the rapidity of its growth. It is naturalized in Great Britain, where it suddenly appeared in such abundance as to obstruct the navigation of the

Trent, Derwent, and other rivers. It was first observed in Great Britain about 1842. It causes no such trouble in the U. S.

Anachar′sis [Gr. 'Ανάχαρσις], a celebrated Scythian philosopher who lived about 600 B. C., and was a friend of Solon. He was the only "barbarian" admitted to the privilege of a citizen of Athens, and according to some authorities was reckoned among the Seven Wise Men of Greece. It is said that on his return to Scythia he was put to death, because he practised some Greek religious rites. Some of his pithy sayings have been preserved by Diogenes Laertius and others. A French author, Jean Jacques Barthélemy, published a popular work entitled "Travels of Anacharsis the Younger in Greece" (1788), which represents with considerable fidelity the life and customs of the ancient Greeks. It was translated into English.

Anach′ronism [Gr. ἀναχρόνισμος, from ἀνά, used for "against," and χρόνος, "time"], an error in chronology, an inversion or disturbance of the order of time. The use of cannon in Shakspeare's "King John" is an anachronism, as cannon were not employed in England until a hundred years or more after his reign. Painters who represent ancient patriarchs in modern costumes are censured for anachronism.

Anacla′che, a snowy peak of the Bolivian Andes, is supposed to be 22,000 feet or more above the level of the sea; lat. 18° 12′ S., lon. 69° 20′ W. It is covered with perpetual snow.

Anacle′tus, bishop of Rome, was a native of Athens. He was the successor (or, according to others, the predecessor) of Saint Clement. Died about 100 A. D.

Anacletus, an antipope, was elected by a party of cardinals in 1130 as a rival pope to Innocent II., who was recognized by the majority of the European powers. Anacletus was supported by the Romans. Died in 1138.

Anacon′da [*Eunec′tes muri′nus, Bo′a muri′na* of some naturalists], a large serpent allied to the *Boa constrictor,* is a native of tropical America, especially of Brazil and Guiana. It sometimes grows to the length of forty feet, and is the largest serpent of America. It passes much of the time in the water, preferring the shallow parts of a lake or stream. Among the generic characters that distinguish it from the boa are the small size and position of its nostrils, which open at the upper part of the end of the muzzle, and are directed upward. It is not venomous.

Anac′reon ['Ανακρέων], a famous Greek lyric poet, born at Teos, in Ionia, about 560 B. C. He emigrated from Teos when that town was taken by the Persians, about 540, and passed many years at Samos, where he was patronized by King Polycrates. After the death of this patron, 522 B. C., he became a resident of Athens, to which he was invited by Hipparchus. Love and wine were the favorite themes of his muse. Died in 476 B. C. According to tradition, his death was caused by a grape-stone which stuck fast in his throat. Some fragments of his poems are extant.

Anadir′, or **Anadyr,** a river of Siberia, near the extreme N. E. part of Asia, rises north of Kamtchatka, flows nearly eastward, and enters the Sea of Anadir. Length, about 450 miles. The Sea or Gulf of Anadir is in Siberia, near the N. E. extremity of Asia, and is a large inlet of the Pacific Ocean. It is separated from the Arctic Ocean by a peninsula about 150 miles wide.

Anadyom′ene [Gr. 'Αναδυομένη], (the goddess "rising up out" of the sea), a surname given to Venus; also the name of a masterpiece of Apelles, representing Venus rising from the sea and wringing her flowing hair with her fingers. This picture was purchased by the people of Cos, who sold it to the emperor Augustus for one hundred talents, or more than $100,000 of our money.

Anæ′mia [from the Gr. αν, priv., and αἷμα, "blood"], also called **Spanæ′mia** [from σπανός, "scarce," "rare," and αἷμα, "blood"], a morbid condition of the body in which the blood is of an abnormal composition, there being usually a deficiency in the normal number of red corpuscles, a poverty of albumen, and an excess of salts, the absolute amount of the blood being usually below that observed in health. This condition is not properly a disease, so much as a result of some disease or lesion, such as dyspepsia, hæmorrhage, excessive secretion from any gland or surface, insufficient nutrition, defective aëration of the blood, consumption, cancer, malarial or other slow poisoning, leucocythæmia, excessive labor, or long-continued mental troubles. The symptoms are, first, great debility, paleness of face, lips, and tongue, wasting of the tissues, various cardiac, arterial, and venous murmurs, a small and often rapid pulse, clearness and low specific gravity of the urine. Late in the disease the feet swell and sweating is observed. The treatment is, first, if possible, to remove the cause. Next, the proper conditions for recovery must be established, such as proper food, due exercise, and good air. Tonics, if they are well borne by the patient, are generally useful. Strychnia, quinia, and, above all, iron, are often extremely useful. The iron is generally thought to act as food, there being an actual deficiency of iron in the blood.

Anæsthe′sia [from the Gr. αν, priv., and αἰσθάνομαι, to "perceive," to "feel"], in medical language, when used to designate a symptom, denotes a diminution or a complete loss of the sense of feeling, either general or much more frequently local. In this sense it is opposed to the term hyperæsthesia, which denotes an exaltation or excess of sensibility. Both these conditions are symptoms of disease of the nervous system. When feeling proper is abolished while pain exists, it is called "anæsthesia dolorosa;" when both pain and the sense of touch are absent, it is "analgesia." But of late the term commonly denotes a total or partial, local or general, suspension of all the senses as the result of the application or inhalation of some chemical agent. Local anæsthesia is produced by the rapid evaporation of some highly volatile substance, like ether or rhigolene, and consequent chilling of the part to be affected. The local application of certain drugs, such as aconitine, will also produce a degree of anæsthesia. General anæsthesia is, however, by far the most common result of this kind to which the physician directs his efforts. The Chinese have used preparations of hemp for this purpose for many centuries. The "Arabian Nights" contain numerous allusions to a similar use of this drug. Mandragora, opium, and many other soporifics were used by the ancients as anæsthetics, though such use is dangerous from the profound effects produced. Surgical operations in later times have been successfully performed while the patient was in the mesmeric sleep or condition of "hypnotism." Such a condition is, however, usually regarded as a diseased one, and its production is outside the province of the physician. The anæsthetics generally in use are common or ethylic ether, chloroform, and nitrous oxide gas, each of which is administered by inhalation. There is some reason to believe that the anæsthetic property of ether was not unknown in the sixteenth century, soon after the discovery of this agent by the alchemists. Several physicians in the eighteenth century recommended the use of ether by inhalation for the relief of pain. Sir Humphry Davy in 1800 observed the anæsthetic effect of nitrous oxide, and proposed its use in surgery, but it was not till 1844 that Horace Wells, a dentist of Hartford, Conn., successfully employed this gas for the prevention of pain in removing teeth. The subject, however, fell for the time into undeserved neglect, though at present this gas is extensively employed in dentistry and in some other surgical operations.

Between 1816 and 1846 several American physicians proposed the use of ether as an anæsthetic. In October of the latter year, Dr. W. T. G. Morton of Boston (who had successfully used ether in dentistry) administered it to a patient in the Massachusetts General Hospital during a surgical operation by the late Dr. Warren. In Nov., 1847, Sir J. Y. Simpson of Edinburgh first announced chloroform as an anæsthetic, it having been used for the relief of difficult breathing by Ives of New Haven, Conn., in 1832, and its anæsthetic effect upon the lower animals having been shown by Flourens ten months before Simpson's experiments. The use of both ether and chloroform has spread rapidly since the above discoveries. Various other agents (amylene, amyl hydride, carbon bichloride, Dutch liquid, methylene bichloride, etc.) have been proposed, but for the most part they have turned out to be more dangerous than the older and better known anæsthetics.

With regard to the relative superiority of the various agents used, opinions differ. It is claimed by some that ether is much safer than chloroform, while other practitioners of eminence assert that chloroform is pleasanter, cheaper, and more speedy in its effect, and equally safe if the requisite skill is employed in administration. The principal objections to nitrous oxide are, that it is not easily portable, and that its effects are very transitory. Experiments tend to show that ether produces anæsthesia by causing anæmia of the brain, while chloroform appears to act by producing hyperæmia. Further observations are constantly being made on these points, and these experiments may be fairly expected to throw great light on the subject. CHAS. W. GREENE.

Anæsthet′ics, the name applied to certain preparations having the property of producing ANÆSTHESIA (which see).

Ana′gni (anc. *Anag′nia*), an episcopal town of Italy, situated 37 miles E. S. E. of Rome. It was the birthplace of several popes, among whom were Innocent III., Boniface VIII., and Gregory IX. Anagnia was nearly as old as Rome, was the chief city of the Hernici, and was an important place during the whole period of the ancient

Roman history. Vergil mentions it as the wealthy Anagnia. Here are some of the finest cyclopean walls in existence. Pop. 6000.

An'agram [from the Gr. ἀνά, "backward," and γράμμα, a "letter" or "writing"], a word or sentence formed by the transposition of the letters of some word, phrase, or sentence. The most perfect or proper anagram, called palindrome, is formed by reading backward—*i. e.* reversing the order of the letters—as "evil," *live*. The making of anagrams was a fashionable exercise of ingenuity in the sixteenth and seventeenth centuries, as well as in the Dark or Middle Ages. A very curious specimen of anagram is the transmutation of Pilate's question, *Quid est Veritas* ("What is Truth?") into *Est Vir qui adest* ("It is the Man who is present"). Dr. Burney made the felicitous discovery that the Latin sentence *Honor est a Nilo* ("Honor is (or comes) from the Nile") is concealed in the name of Horatio Nelson. The opponents of the Dutch theologian Jacobus Arminius transformed his name into *Vani Orbis Amicus* ("A Friend of the Vain World").* Among recent examples of the anagram are—Florence Nightingale, "Flit on, cheering Angel;" Sir Robert Peel, "Terrible Poser;" French Revolution, "Violence, run forth."

An'aheim, on R. R., the second town in size and importance in Los Angeles co., Cal. (see map of California, ref. 6–C, for location of county), situated in the centre of the largest valley in California, is 12 miles from the sea, and is the head-quarters of the wine interest of Southern California. It produces over 1,000,000 gallons of wine annually. Pop. in 1870, 881; in 1880, 833.

Anahuac', a Mexican word used vaguely or in various senses, sometimes applied to the great central table-land or plateau of Mexico, which comprises more than half of the Mexican republic, and lies between lat. 15° and 30° N. and lon. 95° and 110° W. It is elevated from 6000 to 9000 feet above the level of the sea, contains several lakes, and is bounded on the E. and W. by chains of high mountains. From this plateau rise several high volcanoes, one of which, Popocatepetl, has an altitude of 17,784 feet.

Anahuac Mountains, a branch of the Rocky Mountains, is a chain in the northern part of Mexico, W. of the Rio del Norte, with which it is nearly parallel, and connected with the Anahuac table-lands.

An'akim, the ancient race of giants who lived in the S. of Palestine at the time of the exodus of the Israelites. They are called "the children of Anak" in Numbers xiii. 28. "Joshua destroyed them utterly with their cities," but a remnant of them was left in Gaza, in Gath, and in Ashdod (Joshua xi. 21).

Anal'cime, or **Anal'cite** [from the Gr. αν, priv., and ἄλκιμος, "strong"], a hydrated silicate of soda and alumina, generally occurring in twenty-four-sided crystals, which are sometimes transparent. By friction it becomes *feebly* electrified, whence its name. It is found in the traprocks of Ireland, Scotland, Nova Scotia, and Lake Superior.

Analem'ma [Lat. *analem'ma;* Gr. ἀνάλημμα, a "support" or "object supported," from ἀνά, "up," and λαμβάνω, to "take"], in geometry, the projection of a sphere upon the plane of a meridian, the eye being supposed to be placed at an infinitely distant point of the radius perpendicular to that plane. In this projection (which is also called *orthographic*) all small circles whose planes are parallel to that of projection are represented by concentric circles of the same magnitude as the originals, all circles in planes perpendicular to that of projection are seen as chords or diameters of the meridian circle, and all other circles of the sphere are projected into ellipses.

A'nal Glands, in comparative anatomy, are organs for secreting substances which, though not always so, are generally repulsive in their character, and are commonly employed for purposes of defence. They present every grade of the glandular structure, nearly always opening into the termination of the intestine near the anus. The sweet fluid ejected by the aphides, and of which the ants are so fond, is the product of secerning tubules opening on the posterior part of the body; and the singular defensive acrid vapors discharged explosively by the insects called "bombardiers" are likewise the products of anal glands. In the mollusks the most remarkable example of these glands is presented by certain cephalopods, such as the cuttle-fish, in which there is sometimes a single and sometimes a bilobed or trilobed cyst, that secretes an inky fluid which these animals eject to blacken the water around them, for the purpose of concealment in time of danger. In reptiles the anal bags are either single, double, or triple, and in many species, as in frogs and tortoises, are developed to a great size, and serve for aquatic respiration. In birds the anal follicles consist of a single cavity, which is termed the *bursa Fabricii*. In quadrupeds the anal follicles generally consist of two sacciform cavities, each having an opening near the verge of the anus. In the skunk (*Mephi'tis va'rians*) the secretion of these glands furnishes to the animal its principal means of defence. In the civet (*Viverra civetta*) and the beaver (*Castor fiber*) the secretions from the anal glands have long been an article of commerce; the former is sometimes employed, when combined with other substances, as a perfume; the latter, under the name of castor, is used in medicine.

An'alogue [from the Gr. ἀνά, "according to," and λόγος, "ratio" or "proportion"], in comparative anatomy, a member or organ of an animal that performs the same function as a part or organ in a different animal. Thus, the wing of a bird is the analogue of the wing of an insect, though different in structure.

Anal'ogy [Lat. *analo'gia;* Gr. ἀναλογία, from ἀνά, "according to," and λόγος, "ratio" or "proportion"], literally, the state or circumstance of having proportion one to the other; used to denote a relation or agreement between different things in certain respects. The conclusions to which we are led respecting one thing, by reasoning from our experience concerning another similar thing, form what is termed analogical knowledge. The word analogy is generally employed to designate an imperfect degree of similarity. Thus, a physician, arguing from the effects which he had seen produced by a certain drug on one man to its probable effects on another man, would be said to reason from *experience;* but reasoning from the effects produced on an inferior animal to the probable effects on man, he would be, more properly, reasoning from analogy. Thus also, Bishop Butler, in his celebrated treatise on the "Analogy of Religion, Natural and Revealed," has argued that the same sort of difficulties which are found in the constitution of nature must be looked for in the spiritual world, and that the existence of this analogy is a good reason for believing that revealed religion proceeds from God, the Creator of the material universe.

In rhetoric, the word analogy designates, not the direct resemblance between two objects, but a resemblance between the relations in which they stand to other objects. For example, to term youth "the dawn of life" is said to be an analogical metaphor, because there is no direct resemblance between youth and morning, but the one may be said to bear the same relation to life that the other does to day. In grammar, analogy means a conformity in the principles of organization of different words or collections of words. In geometry, analogy signifies nearly the same thing as proportion, or the equality or similitude of ratios.

In zoology, the term analogy is usually restricted to the relation which animals bear to one another in the similarity of a smaller proportion of their organism; thus, the *Ascalaphus Italicus,* in the length and knobbed extremities of its antennæ, the coloring of its wings, and its general aspect, exhibits a striking resemblance to the butterfly, but in all the essential parts of its organization it conforms to the neuropterous type of structure; its relation to the Lepidoptera is therefore said to be one of analogy, while it is, in fact, connected with the ant-lions by affinity.

Reasoning from analogy consists in inferring that certain facts are true with reference to objects which have afforded us no examples of those facts, on the basis of the similarity of those objects to other objects better known. It warrants only probable conclusions, but the probability may often become very strong, and in the affairs of life it is often necessary to act upon conclusions thus attained. Even when its conclusions are very uncertain, they may often serve to guide inquiry and lead to discovery.

REVISED BY J. H. GILMORE.

Anal'ysis [Gr. ἀνάλυσις, from ἀνά, "throughout," and λύω, to "untie"], in geometry, a method of conducting geometrical inquiries, invented by the philosophers of the school of Plato, or, according to Theon of Alexandria, by Plato himself, and one of the most ingenious and beautiful contrivances in the mathematics.

"Analysis," says Pappus, "may be distinguished into two kinds: in the first, which may be called contemplative analysis, we propose to discover the truth or falsehood of an affirmed proposition; the other belongs to the solution of problems, or the investigation of unknown truths. In the first we assume the subject of the proposition advanced to be true, and proceed through the consequences of the hypothesis till we arrive at something known. If this result is true, the proposition is true also, and the direct demonstration is obtained by stating in an inverse order the different parts of the analysis. If the ultimate consequence at which we arrive is false, the proposition was also false. In the case of a problem, we first suppose it to be resolved, and deduce the consequences resulting from that solution till we arrive at something known. If the last consequence involves only something which can be executed, or is comprised among what geometers called *data*, the proposed problem can be solved; and the demonstration—or rather, in this case, the construction—is obtained, as in the former case, by taking the different parts of the analysis in an inverse order. If the last result is impossible, the thing demanded is also impossible."

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* It is usual for anagrammatists to treat *i* as the same with *j*, and *u* as identical with *v*.

The names of the ancient writers on the geometrical analysis are—Euclid, in his "Data and Porismata;" Apollonius, in his treatise "De Sectione Rationis" and in his "Conic Sections;" Aristæus, "De Locis Solidis;" and Eratosthenes, "De Mediis Proportionalibus;" but of these only the "Data" of Euclid and some fragments of Apollonius have come down to our times. A complete system of the ancient geometrical analysis may be found in the works of Dr. Simson of Glasgow. The reader may also consult with advantage Leslie's "Geometrical Analysis."

Analysis is directly opposed to synthesis, which advances step by step through known propositions, from the data to the quæsita in the case of a problem, or from the hypothesis to the predicate in the case of a theorem. Analysis is the chief though not the sole instrument of *discovery*, whilst synthesis adapts itself naturally to *instruction*. Euclid's direct demonstrations, for example, are all synthetical; his indirect ones, however, retain the analytical character. The methods of conducting analysis and synthesis are the same in kind, the only difference being that, in the hands of the investigator at least, the several steps of the former are experiments suggested by experience, for which no rule can be assigned, whereas in the latter these steps are suggested by previous knowledge, gained, in fact, very frequently from a preliminary analysis.

The ancient geometers conducted their analysis by means of ordinary language only; their successors, however, frequently availed themselves of the powerful resources of algebra. As a consequence of this habit the word analysis, until a very recent reaction set in, lost entirely its original meaning as a *method* of reasoning opposed to synthesis, and by a strange perversion of terms became synonymous with algebra and the calculus; that is to say, with the *instruments* employed in investigation. The fact that algebra may be, and often is, employed synthetically as well as analytically appears to have been overlooked.

REVISED BY J. THOMAS.

Analysis, Chemical. See CHEMICAL ANALYSIS, by PROF. S. W. JOHNSON, A. M., and VOLUMETRIC ANALYSIS.

Analytical Geometry. See GEOMETRY.

Anam′, or **Annam′, Empire of,** called also **Cochin China,** a country of South-eastern Asia, is bounded on the N. by China, on the S. and E. by the Chinese Sea, and on the W. by Laos, Siam, and the Gulf of Siam. Its area is 170,033 square miles and it lies between lat. 8° 40′ and 23° 22′ N. The length from N. to S. is about 800 miles, and the width is very unequal in different parts. It is traversed by a long range of high mountains, the direction of which is nearly N. and S. The principal river is the Mekong (or Cambodja), which is navigable, and flows southward into the Chinese Sea. The empire of Anam was formed at the beginning of the present century out of the former kingdoms of Tonquin and Cochin China (Ko-Tchin-Tching), to which were added the province of Champa and a part of the ancient kingdom of Cambodja. The population is estimated (including that of Cambodia and the provinces now held by the French) at 21,000,000.

TONQUIN is the most northern part of Anam, and borders on the Gulf of Tonquin. It is intersected by the river Sang-koi, which enter the Gulf of Tonquin. The soil is fertile, and produces rice, cotton, and spices, with a variety of varnish trees and palms. Gold, silver, copper, and iron abound in Tonquin, which is the only part of Anam that is rich in metals.

COCHIN CHINA is a long and narrow district, bounded E. by the Chinese Sea, and W. by a range of barren mountains. Much of the soil is sterile. The chief products are eagle-wood (*Aloex′ylon*), sugar, and cinnamon.—*Lower Cochin China*, now the French colony of Saigon or Cochin China, includes six provinces, 35,928 square miles, and a population of 1,204,287. Land fertile, but low, and sickly to strangers. Exports, sugar, spices, rice, etc.

CAMBODIA, or KAMBOJA. See CAMBODIA.

CHAMPA, or TSIAMPA, is the most southern part of Anam, bordering on the sea. The soil is sterile, consisting of sand-hills and granite formations, but yields one valuable product, the fragrant eagle-wood.

The government of Anam is despotic. Mandarins appointed by the emperor govern the provinces, and are the commanders of the army. Buddhism is the religion of the majority of the people; among the higher classes Confucius has many adherents. Roman Catholic missions were planted in the seventeenth century, soon became prosperous, and have maintained themselves in spite of the most cruel persecutions. In 1862 the emperor engaged in a treaty of peace concluded with France to tolerate Christianity and protect the Christians in their lives and property throughout the empire. In 1872 the Catholic Church of Anam (inclusive of the French Cochin China) was divided into eight vicariates apostolic, of which four were in Tonquin, three in Cochin China, and one in Cambodja. The Christian population was in 1854 estimated at 500,000; and though from 1854 to 1862 it greatly decreased, it is now believed to exceed that number, as in 1865 the apostolic vicariate of Tonquin alone had 127,852, and that of Eastern Tonquin 43,315 Catholics. The commerce of Anam is to a large extent in the hands of Chinese merchants; the chief branch of industry is silk manufacture. The capital is Hue, at the mouth of the river of the same name.

The Anamese language is, like the Chinese, monosyllabic; the literature consists almost exclusively of imitations of Chinese works. About 214 B. C., Tonquin and Cochin China were conquered by a Chinese prince and settled by Chinese colonists. From that time to 1428 they were in turn sometimes subject to China, sometimes independent. In 1428 they threw off the Chinese yoke and formed an independent empire, under the dynasty Leh. But the authority of this house became soon merely nominal, Tonquin being ruled (since 1545) by the dynasty of the Trinh, Cochin China (since 1600) by that of Nguyen. A new dynasty, Tay-song, arose in 1765, and exterminated the dynasties of Leh, Trinh, and Nguyen. Only one scion of the latter, Nguyen-anh, escaped, was educated in France, and having returned to Anam, and conquered and exterminated the dynasty Tay-song, was under the name Gya-long proclaimed as the first emperor of Anam. His natural son and successor, Minh-menh (1820–41), and the son and grandson of the latter, Thien-tri (1841–47), and Tu-duc (since 1847), were all cruel persecutors of the Catholic Church, and thus became involved in hostilities with France and Spain. A four-years' war (1858–62) ended in a treaty of peace, by which the emperor of Anam ceded three provinces of Cochin China, Saigon, Bienhoa, and Mytho, to France. In 1867 three other provinces of Cochin China, Vinh-long, Chan-doc, and Ha-tien, were annexed to the French dominions. By treaty (June 6, 1884), France secured a protectorate over Anam. (See VEUILLOT, "La Cochin Chine et la Tonquin," 1859; CORTAMBERT and DE ROSNY, "Tableau de la Cochin Chine," 1863; BASTIAN, "Die Völker des östl. Asiens," vol. iv., 1868; and the *brochures* of St. Garnier, 1864–69.)

A. J. SCHEM.

Anam′boe, or **Anamaboe,** a seaport and British fort on the Gold Coast of Africa, 11 miles E. N. E. of Cape Coast Castle, is the residence of a governor. It exports palm-oil, gold-dust, ivory, etc. Pop. about 3000.

Anamirapucu′, a river of Brazil, in the province of Pará, enters the estuary of the Amazon after a course of about 200 miles.

Anamor′phosis [Gr. ἀναμόρφωσις, from ἀνά, "again," and μορφόω, to "form"], in natural history, denotes the ideal change of form or development which may be traced through the species or higher members of a natural group of animals or plants. Some naturalists adopt the theory that living species have been developed from extinct species by the process of anamorphosis. The term is sometimes applied in botany to an unusual development of an organ, as the calyx of a rose assuming the form of a fruit.

ANAMORPHOSIS, in perspective, denotes a drawing which when viewed in the usual way appears distorted or presents an image of something different, but when viewed from a particular point or reflected by a curved mirror, it appears in its proper form and just proportions.

Anamo′sa, city and R. R. junction, capital of Jones co., Ia. (see map of Iowa, ref. 4–K, for location of county), situated on the Wapsipinicon and Buffalo rivers, 50 miles S. W. of Dubuque. It has excellent quarries of building-stone and a State penitentiary. Pop. in 1880, 2083; in 1885, 1874.

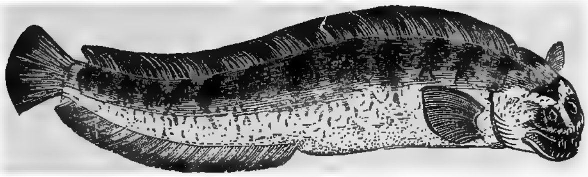
Ananassa Sativa. See PINEAPPLE.

Ananyev, a town of Russia, in the government of Kherson, 90 miles N. W. of Odessa. Pop. in 1882, 15,983.

Anapa′, a seaport and fortified town of Russian Circassia, on the N. shore of the Black Sea, near the mouth of the Kuban. The harbor is not safe in stormy weather. The town has been by turns the property of Turks and Russians, and now belongs to the latter. Pop. 1882, 5037.

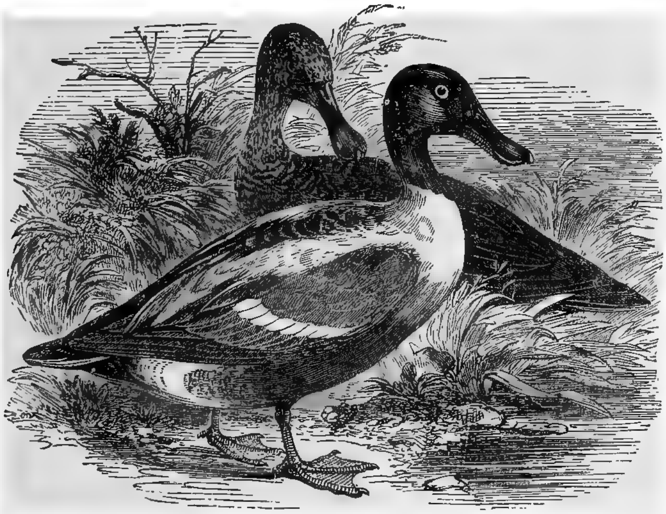
Anaph′ora [Lat. *anaph′ora*; Gr. ἀναφορά, from ἀνά, "again" or "back," and φέρω, to "carry"], in rhetoric, a repetition of a word or phrase at the beginning of two or more consecutive sentences or clauses, as, "It is sown in corruption; it is raised in incorruption. It is sown in dishonor; it is raised in glory. It is sown in weakness; it is raised in power."

Anar'rhichas [from the Gr. ἀνά, "up," and ἀῤῥιχᾶσθαι, to "clamber"], the name of a genus of spiny-finned osseous fishes, characterized by having their mandibular, palatine, and vomerine bones armed with large osseous tubercules bearing on their summits enamelled teeth. It includes the wolf-fish, which is common to both sides of the Atlantic.



Anarrhichas lupus, Sea Wolf.

A'nas [from the Lat. *a'nas*, a "duck"], a Linnæan genus of web-footed birds belonging to the order Palmipedes, has been divided by recent ornithologists into many genera—namely, *Anas* (the duck), *Anser* (the geese), *Cygnus* (the swans), *Aythya* (red-head), *Somateria* (eiders), etc. The anas in this restricted sense has a flattened bill, the base of which has a greater breadth than depth, and the bill is as wide (or wider) at the extremity as at the base.



Anas clypeata, or Shoveler Duck.

Anasarca. See DROPSY.

Anasta'sius I., emperor of Constantinople, was born at Durazzo about 430 A. D. He succeeded the emperor Zeno in 491. The orthodox, who considered him a heretic, revolted and defeated his army in 514. Died in 518 A. D.

Anastasius II. became emperor of the East in 713 A. D. Theodosius was chosen emperor by his army, which took Constantinople and deposed Anastasius in 716. Died in 720 A. D.

Anastasius I., SAINT, a native of Rome, became pope about 398 A. D. He condemned the doctrines of Origen. Died in 402 A. D.—ANASTASIUS II., SAINT (Pope), a native of Rome, succeeded Gelasius I. in 496 A. D. Died in 498.—ANASTASIUS III. was chosen pope in place of Sergius III. in 911. Died in 913.—ANASTASIUS IV. succeeded Eugenius III. as pope in 1153. He died at an advanced age Dec. 2, 1154.

Anastasius, surnamed THE LIBRARIAN, a Roman priest who was librarian of the Vatican, and lived about 860 A. D. He compiled an "Ecclesiastical History" in Latin, and wrote other works. Died about 890.

Anastasius, SAINT, surnamed ASTRIC, the apostle of the Hungarians, was born in 954. He converted the duke Stephen, and many other Hungarians. Died in 1044.

Anastasius Grün. See AUERSPERG.

Anastat'ica [from the Gr. ἀνάστασις, "resurrection"], the name of a genus of cruciferous plants, one species of which, called the rose of Jericho (*Anastatica Hierochuntina*), grows in Palestine and has singular hygroscopic properties. Under the influence of drought it rolls up into a ball, becomes detached from the ground, and is carried away by the wind. When it comes into contact with moisture it expands into its natural form. It retains for many years this property of expanding when moistened.

Anastat'ic Printing, a process by which printing and engravings may be transferred to metal, from which impressions exactly like the original can be taken. The printed sheet is moistened with dilute phosphoric or nitric acid, and pressed with great force upon a zinc plate, which is afterwards washed with an acid solution of gum, and then inked with a roller.

Anas'trophe [from the Gr. ἀνά, "up," "back," "over," and στρέφω, to "turn"], a term in rhetoric applied to a species of inversion or departure from the usual order of succession in words, as when Scott, in the "Lady of the Lake," says, "Clattered a hundred steeds along," for "A hundred steeds clattered along;" so Virgil in the "Æneid," lib. i., l. 32, has "*Maria omnia circum*" for "*circum omnia maria*" ("around all the seas").

An'atase [from the Gr. ἀνάτασις, "extension," so called from the length of its crystals], a name of titanic acid or oxide of titanium, which occurs in octahedral crystals, having a splendent and adamantine lustre. Some specimens found in Brazil resemble diamonds so much as to be mistaken for them. Called also *octahedrite*.

Anath'ema [ἀνάθεμα, from ἀνά, "up," and τίθημι, to "set" or "place"], a Greek word, the primary meaning of which was something "placed" or "hung up" in the temples of the gods, and hence "consecrated" or "devoted." Among the Jews and Christians it is a curse or denunciation uttered by ecclesiastical authority, and a form of excommunication of heretics and other offenders.

An'athoth, or **A'nata,** an ancient Jewish city of refuge, about 4 miles N. E. of Jerusalem, is supposed to have been the native place of the prophet Jeremiah.

Anat'idæ, the name of a family of web-footed birds, of which the genus *Anas* is the type. It includes the duck, goose, swan, and others. Cuvier gave them the name of Lamellirostres.

Anato'lia, Anado'li, or **Nato'lia** [from the Gr. 'Ανατολή, the "rising" or "orient"], the modern name of Asia Minor, which is a large peninsula, bounded on the N. by the Black Sea and the Sea of Mármora, on the S. by the Mediterranean, and on the W. by the Grecian Archipelago. The Euphrates forms part of its ill-defined eastern boundary. It lies between lat. 36° and 42° N., and between lon. 26° and 41° E. The length from E. to W. is about 700 miles, and the area is estimated at 204,434 square miles. The western coast is indented with numerous gulfs, and presents many high and precipitous cliffs. The interior is an elevated plateau, enclosed by two mountain-ranges—namely, Mount Taurus, which extends through the southern part from the Euphrates to the archipelago; and Anti-Taurus, which traverses the northern part. The general direction of these ranges is nearly E. and W. Some peaks of Mount Taurus attain a height of 10,000 feet or more. Between these two long ranges are several others which rise to a great height. The highest summit in Anatolia is the volcanic Arjish-Dagh, or Mount Argæus, which is situated 13 miles S. of Kaisareeyeh, and is 13,000 feet above the level of the sea. Mount Olympus, about 8 miles S. of Brusa, has an altitude of 8800 feet.

The largest river of Anatolia is the Kizil-Irmak (anc. *Halys*), which rises in the E. part and enters the Black Sea. The western part of the peninsula is drained by the Meander and the Hermus (Sarabat), which flow westward into the Ægean Sea. In the central part are a number of salt lakes and barren steppes of large extent. The Katakekaumene, or "burnt country," a volcanic waste, is the best known of these regions.

The rocks which underlie the upper regions of Anatolia are mostly granite, serpentine, and schist. Along the southern and western coasts calcareous rocks predominate, and marble is abundant. Numerous extinct volcanoes and rocks of volcanic origin occur in different parts of the country. The climate presents a great diversity in consequence of the inequality of the surface. The western shores have been celebrated in all ages for their mild and genial climate, and the coast of the Black Sea is favored in that respect. The central plateau is very hot in summer and cold in winter, partly because it is not well watered and is generally destitute of forest trees. The northern region and the other sea-coasts are covered with extensive forests of oak, ash, beech, plane, and other trees good for timber. The coasts of the Ægean and Black seas have a very luxuriant vegetation and a fertile soil. Among the chief products are sugar, wine, opium, tobacco, olives, figs, wheat, barley, and silk. The flora of Southern and Western Anatolia is extremely beautiful. The mountains are infested by panthers, bears, and wolves.

Anatolia, which forms a part of the dominions of the sultan of Turkey, comprises the pashalics of Anatolia, Itchelee, Karamania, Adana, Marash, Sivas (or Room), Trebizond. The population, estimated at 10,970,000, not including Armenia, consists of Ottoman Turks, Turkomans, Greeks, nomadic Koords, and Armenians, The cultivation of the soil is generally neglected here, and the principal branches of industry are the production of opium, wine, and oil, and weaving shawls and carpets. The chief cities are Smyrna, Brusa (or Bursa), Sinope, Angora, Konieh, Kutaieh, and Trebizond. In ancient times this peninsula was occupied by many powerful kingdoms and famous cities. (See Asia Minor, Ionia, Lydia, Pontus, etc. Hamilton, "Researches in Asia Minor," 1842; Tchihatcheff, "Asie Mineure," 1853–60; and Barth, "Reise von Trapezunt bis Skutari," 1860.)

A. J. Schem.

Anatolia is also a pashalic of Asiatic Turkey, forming the western portion of the peninsula called Asia Minor. It is the largest and richest province in the Turkish empire, and the most populous in Western Asia, comprising nearly half of the Anatolia described above.

Anat′omy [from the Gr. *ἀνά*, "up," "through," and *τέμνω*, to "cut"], the science of the structure of organized bodies; so called because its results are attained and its investigations are pursued by "cutting up" or dissecting organisms. The widest and most general knowledge of organized structures is to be attained only by the examination and comparison of the structure of all species of animals and vegetables. Such a comparison has given name to the science of Comparative Anatomy (which see)—a science embracing in its field all the other branches of anatomical knowledge. That branch of comparative anatomy which seeks to trace the unities of plan which are exhibited in diverse organisms, and which discovers, as far as may be, the principles which govern the growth and development of organized bodies, and which finds functional analogies and structural homologies is denominated "philosophical" or "transcendental" anatomy. The study of the structure of animals is called zootomy, or animal anatomy; vegetable anatomy is known as phytotomy, or more frequently as structural botany. That branch of anatomy which describes the organs or viscera, etc. of any one species, and the relations of these organs to each other, is called descriptive or special anatomy, or organography. Histology treats of the "tissues" or *immediate* structural elements. Microscopic anatomy is minute histology, or the science of the more *remote* structural elements of which the body is built up. The examination of the *ultimate* structural elements is the province of organic chemistry, but between that science and histology there is yet an uncrossed, perhaps an impassable, barrier. (See Histology, by Col. J. J. Woodward, M. D.)

Vegetable anatomy is, and must be, chiefly histological, since the various parts of plants are structurally much less differentiated from their typical histological elements than those of most animals. Indeed, the organography of plants is very simple, the philosophical anatomist being able to show that all the proper organs of the vegetable are modifications of the leaf.

Human anatomy, the science of the structure of the human body, is not only a subject of interest and vital importance to the physician and the surgeon, but should be understood in its general outlines by parents and teachers, and by every one who recognizes the importance of the knowledge of that self of which the body is so important a part. To the painter and sculptor the study of the superficial muscles and bones is considered indispensable. Such knowledge is primarily sought in the dissecting-room; but the slowly accumulated results of the practical anatomist's work have been minutely recorded; and for ordinary instruction the published text-books are sufficient; while for the surgeon, and even for the artist, practical work with the scalpel is all important, as substituting certainty and familiar personal knowledge for the less valuable knowledge that is acquired by reading and tradition. Practical anatomical work is pursued and legalized in most civilized nations; and the (much exaggerated) abuses to which it has led in former times are now for the most part prevented by law.

Human anatomy is "general," "special," "topographical," or "surgical." "General anatomy" applies the result of philosophical anatomy to the human body, assigns various organs to appropriate groups, and divides the whole subject into suitable branches or heads; "special anatomy" describes the constituent parts; "topographical" or "regional anatomy" studies the relations of parts in important portions of the body; "surgical anatomy" is the application of regional anatomy to parts peculiarly liable to surgical operations, and its study is entered into as a preparation for such operations. "Pathological anatomy," or the study of organs as modified by disease, is also an important branch of the science.

As the leaf and its appendages in the organography of the vegetable kingdom, and as the segment with its appendages in articulate animals, are regarded as the single structural elements upon which the whole organism is built, so in man and in all vertebrates the vertebra with its apophyses or branches is the typical element of which the osseous framework is composed, and all the symmetrical or bilateral parts are in a manner dependencies of the osseous system.

This great truth was first fully grasped by Oken. Another remarkable generalization was made by the great Bichat—that all non-symmetrical parts, such as the digestive and circulatory systems, are of a character resembling the vegetative growth, and not directly subject to the will. Such parts have in general non-striated muscles, and are largely supplied with nerves of the so-called sympathetic system; while, on the other hand, bilateral and symmetrical parts, as the limbs and the most important muscles, are largely under the direction of the will, and are supplied by cerebro-spinal nerves. Two hundred and twenty-nine pairs of voluntary muscles are recognized by anatomists.

The muscles, in accordance with this theory, are divided into—1, striated muscles, or "muscles of animal life," which are symmetrical or found alike on both sides; and, 2, non-striated muscles, those of "organic life," which are found chiefly in non-symmetrical parts, or if in symmetrical parts they always exist as parts of some special organ, while striated muscles are never so found.

We have seen incidentally that there are likewise two systems of nerves—the cerebro-spinal and the sympathetic or ganglionic systems, which are somewhat analogous to the two classes of muscles. Some theorists, perhaps rather fancifully, make a similar twofold division in almost all the animal tissues.

Anatomists divide their science into osteology, which treats of the skeleton; myology, the science of the muscles; angiology, which describes the blood-vessels or the circulatory system; splanchnology, relating to the viscera or organs concerned in the digestion of food; and into other branches which relate to the respiratory, nervous, and reproductive systems and the organs of special sense. These minor sciences, however, treat of the physiology (functions) as well as the anatomy (structure) of the various parts. (For descriptions of the various organs and tissues, see Eye, Ear, Heart, Bone, Muscle, etc.)

History.—It is said that the priests of ancient Egypt were familiar with the facts of human anatomy. The ancient Greeks practised the dissection of animals, and gained considerable knowledge of their structure. Alcmæon, Democritus, Hippocrates, Diocles, and Aristotle were zootomists, but no ancient Greek seems to have suspected the existence of a nervous system or of the circulation of the blood. Erasistratus (300 B. C.) is said to have been the first to dissect the human body. Herophilus and Parthenius followed him. Later, Galen, Soranus, and Moschion practised dissection of the human body. The science of anatomy, except so far as taught by Galen, perished with the old Roman empire. Its restorers were Mundinus (born 1315), Guy de Chauliac, Vigo (1516), Sylvius (1539), Ingrassias, Horman, Fallopius (1523–62), Eustachius (1500–75), but especially the Flemish Vesalius (1514–64). Leonardo da Vinci (1452–1519) had practically studied anatomy in its relations to art. Servetus (1509–53) is believed to have first announced the circulation of the blood; Cæsalpinus, Paolo Sarpi, and others soon after made the same announcement, but its truth was first shown by Harvey (1578–1657), a pupil of Fabricius. The later names of Asellius, Bartholine, Wharton, Willis, Ruysch, Pachionius, Malpighi, Valsalva, Cotunni, Monro, and Meckel are among the most brilliant; but the number of eminent anatomists is very great. In recent times microscopical and pathological anatomy have been the fields of numerous and important discoveries. Drs. John Bard and Peter Middleton of New York are said to have made the first dissection in America in 1750.

Chas. W. Greene.

Anaxag′oras ['Αναξαγόρας], an eminent Greek philosopher of the Ionic School, was born at Clazomenæ, near Smyrna, about 500 B. C. He passed nearly thirty years at

Athens, to which he removed about 480, and enjoyed the friendship of Pericles. He wrote a "Treatise on Nature," of which small fragments are extant. In 450 B. C. he was accused of impiety, and, though defended by Pericles, was condemned to death or banishment, and retired to Lampsacus, where he died in 428 B.C. He appears to have maintained the eternity of matter. Combining great sagacity and close reasoning with diligent observation, he rendered important services to physical science. He ascribed the origin of the world and the order of nature to the operation of an eternal self-existent and infinitely powerful principle which he termed Nous (Mind). He taught that generation and destruction are only the union and separation of elements which can neither be created nor annihilated, demonstrated that air is a substance, explained the theory of eclipses, and refuted the doctrine that things may be produced by chance. (See Ritter, "History of Philosophy," 1838.)

Anaxar′chus [Ἀνάξαρχος], a Greek philosopher, born at Abdera, in Thrace, accompanied Alexander the Great in his expedition against Persia in 334 B. C. He gained the favor of that prince, whom he survived a short time.

Anaximan′der [Ἀναξίμανδρος], an eminent Greek philosopher, born at Miletus about 610 B. C., was a disciple of Thales. He is said to have discovered the obliquity of the ecliptic, and to have invented the sun-dial. According to tradition, he taught that the earth is a cylinder, that the sun is a globe of fire as large as, or larger than, the earth, and that infinity is the beginning and end of all things. He appears to have been the first Greek who wrote any work in prose on geometry or philosophy. Died about 546 B. C.

Anaxim′enes [Ἀναξιμένης], a Greek philosopher of whom little is known, was born at Miletus, in Asia Minor, date uncertain. He taught that the original principle or primary form of things was air, or a subtle ether which is in perpetual motion.

Anaximenes (of Lampsacus), a Greek historian and preceptor of Alexander the Great, about 340 B. C. He wrote a history of the reign of Philip of Macedon, and another of the exploits of Alexander, neither of which is extant.

An′cachs, a department of Peru, is bounded on the N. by the department of Libertad, on the E. by the littoral province of Loreto and the department of Junin, on the S. by the department of Lima, and on the W. by the Pacific. Area, estimated at 43,100 square miles. The department extends from the Andes to the Pacific, and contains all climates and their products. The chief occupations of the inhabitants are agriculture and the raising of cattle. The rich silver-mines in the mountains, as well as the rivers containing gold, are but very little worked at present. Chief town, Huaraz. Pop. 284,091.

Ancelot (Jacques Arsène François Polycarpe), a French dramatic poet, born at Havre Feb. 9, 1794, produced in 1819 a tragedy entitled "Louis IX.," which was warmly applauded, and procured for him a pension of 2000 francs. Among his other works are an epic poem called "Marie de Brabant" (1825), "Fiesque," a tragedy (1824), and "Olga," a drama (1828). He was admitted into the French Academy in 1841. Died Sept. 7, 1854.

His wife, Marguerite Virginie Chardon, born at Dijon Mar. 15, 1792, was a novelist and an artist. She wrote several dramas and tales. D. Mar. 21, 1875.

An′cestor [remotely from the Lat. *an′te*, "before," and *ce′do*, to "go"], one who has preceded another in the direct line of descent. In law it signifies one from whom an estate has been derived by inheritance; a deceased person from whom, on account of his decease, an estate has passed to another, called an heir, by operation of law. Ancestor and heir are correlative terms. A brother may be the ancestor of a brother, or a child of a father, wherever those persons can take land from such relatives by inheritance.

Anchi′ses [Gr. Ἀγχίσης], a Trojan prince related to Priam, was, according to tradition, a favored lover of Venus, and the father of Æneas, with whom he escaped from Troy. He is said to have died in Sicily.

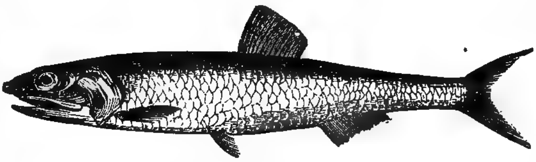
Anchitheri′idæ, a family of perissodactyle Ungulates with the upper molars provided with subequal crescentoid ridges, the lower molars also with crescentoid ridges and with internal tubercles or cusps, the premolars like the molars, and the upper with two internal lobes, without cementum in the teeth, and with the lateral digits and hoofs reduced and the middle hypertrophied. All the representatives are extinct, and lived in the lower and middle miocene periods. In age as in structure they were intermediate between the Equids (horses, etc.) and the Palæotheriids. Anchitherium is the best known genus.

Anch′or [Lat. *an′chora*; Gr. ἄγκυρα], an iron implement used to fasten a vessel to the ground in comparatively shallow water. It consists of a round straight bar called the *shank*, at the upper end of which is a transverse piece called the *stock*, and of two curved arms at the lower end of the shank, each of which arms terminates in a triangular plate called a *fluke* or *palm*. The lower end of the shank is the *crown*. The stock is at right angles to the plane of the flukes. The cable is fastened to a ring in the upper end of the shank. When the anchor is cast from the ship into the sea, the crown first strikes the ground. The anchor then falls over, so that one end of the stock rests upon the ground, and the movement of the ship causes one of the flukes to enter the ground, and to penetrate deeper in proportion as the strain or traction on the cable increases. Mr. Porter invented an improved form of anchor, the arms of which are pivoted to the stock, instead of being rigidly fixed. Men-of-war and large ships carry two large anchors of equal size at the bows, thence called bower anchors, and two of smaller size, called the sheet anchor and spare anchor. For particular and special services they have also the "stream" and the "kedge" anchor. Smaller vessels have fewer anchors and of inferior size. When one anchor is down, the ship is said to be at single anchor. When the anchor is dragged out of the ground by the movement of the vessel, it is said to come home, and when the cable becomes twisted around the anchor or stock, the anchor is said to be foul. *To weigh anchor* signifies to heave or raise the anchor out of the ground into the ship.

Anch′orage, ground fit to hold a ship's anchor, so that she may ride safely. Hard sand or stiff clay forms the best anchorage. A landlocked harbor is also a requisite of good anchorage. The water should not be too deep, as in that case the cable, extending nearly vertically, will be apt to pull the anchor out of the ground. The term is also applied to the toll or harbor-dues which the owner or captain of a ship pays for permission to cast anchor.

Anch′orite, or **Anch′oret** [from the Gr. ἀνχωρητής, from ἀνά, "up," "back," and χωρέω, to "retire"], a hermit or person who has retired from the world and devoted himself to ascetic religion in solitude. The term was first applied to Christians of the third century who retired to caves and solitary places in the deserts of Palestine, Egypt, and Syria, to which, in some cases, they were driven by persecution. They often subjected themselves to painful privations and various forms of penance. The first of these anchorites was Paul of Thebes, who died in 340, aged 104 years. The so-called "father of monachism" was Antony of Coma, in Upper Egypt, who was born in 251 and died in 356, aged 105 years. One anchorite, Simeon Stylites, is said to have lived many years on the top of a pillar in Syria, about 420–450 A. D. The chief difference between an anchorite and a monk is that the former lived alone, and the latter associated with other monks. The first monastery was founded by Pachomius, on the island of Tabenna in the Nile, about the year 340; the first nunnery, some eight years later.

Ancho′vy (the *Engrau′lis encrasich′olus* of the naturalists), a small fish, from five to seven inches long, which abounds in the Mediterranean Sea and the Atlantic shores of Europe. It belongs to the Clupeidæ, or herring family, and is distinguished by a sharp-pointed head, the upper jaw longer than the lower, and the deeply-cleft mouth extending behind the eyes. It is salted and packed in small barrels for exportation, and used for sauces, pastes, etc. The *Engraulis vittatus*, an anchovy of the Atlantic shores of the U. S., might easily be taken in immense quantities. Anchovies also abound on our Pacific coast.



Anchovy.

Anchovy Pear (*Gri′as cauliflo′ra*), a tree which grows in the West Indies in moist ground or shallow water, and is allied to the Myrtaceæ. It bears a fruit (a drupe) which is pickled and used for food.

Anchylosis. See Ankylosis.

Ancient Order of United Workmen. This is a secret order, having three degrees, composed of men of all useful professions and occupations, and is purely fraternal and benevolent in its teachings and practice. It has no connection or affiliation with any of the *labor* organizations of the day, and was started in Meadville, Pa., Oct. 27, 1868. It has grand lodges in Cal., Ia., Ind., Ill., Ky., Minn., Mo., Mich., N. Y., O., Pa., Tenn., and Wis., and subordinate lodges in other States. The principal feature of the order is its beneficiary fund, by means of which, in case of death, a stipulated sum is paid to each member's family or such person or persons as he has designated.

Ancients, Council of, in French history, one of the two assemblies composing the legislative body in 1795–99. It consisted of 250 members, each of whom had to be at least forty years old. It was dissolved by the revolution of the 18th Brumaire.

Anci'le (plu. **Ancil'ia**), the shield of Mars, which, according to tradition, fell from heaven in the reign of Numa, when an oracle declared that Rome could never be taken while this shield remained in that city. Numa committed it to the custody of the Salii or priests of Mars, and had eleven other shields made precisely like it, in order to prevent the genuine shield from being stolen.

Ancillon (Johann Peter Friedrich), an able German historian and statesman of French extraction, was born at Berlin April 30, 1766. He was the pastor of a Protestant church in that city in the former part of his mature life. In 1801 he published "Mélanges of Literature and Philosophy." His principal historical work is a "View of the Revolutions of the Political System of Europe since the Fifteenth Century" (in French, 4 vols., 1803–05), which was very successful. He was soon appointed royal historiographer and councillor of state. In 1831 he became minister of foreign affairs. His policy was prudent and moderate. Died April 19, 1837.

Anc'karswärd (Karl Henrik), a Swedish statesman, born at Sweaborg in 1782. He was elected a member of the Diet in 1817, and soon became the leader of the opposition party, but retired to private life in 1829. Died in 1865.

Anco'na, a province of Central Italy, is bounded on the N. by Pesaro and Urbino, on the E. by the Adriatic Sea, on the S. by Macerata, and on the W. by Perugia. Area, 740 square miles. The country is chiefly mountainous, and is traversed by the Esino and Musone. The chief articles of export are grain, oil, wine, and hazel-nuts. The chief branch of industry is the silk manufacture. Chief town, Ancona. Pop. in 1879, 273,351.

Ancona, an important city and seaport of Central Italy, on the Adriatic, 132 miles by rail N. E. of Rome, capital of the province of Ancona. It is built on the slope of a hill, and presents a picturesque appearance from the sea. It is supposed to have been founded about 400 B. C. Among the remarkable public buildings are a cathedral, the government palace, the town-house, and a triumphal Corinthian arch, which was built by Trajan of white marble. It has a college, ten churches, and several convents. The harbor is one of the best on the Adriatic. In 1732 it was declared a free port. Ancona is connected by railways with Rome, Bologna, and Brindisi. It has considerable trade, carried on by steamships which ply between this point and the Levant. The chief articles of export are wool, grain, silk, oil, alum, sulphur, fruit, and soap. Ancona was taken in 1832 by the French, who occupied it until 1838. Lat. 43° 38′ N., lon. 13° 30′ E. Pop. of commune in 1881, 47,729.

Anco'na (Sydenham E.), born at Warwick, Lancaster co., Pa., Nov. 20, 1824, was a member of Congress from Pennsylvania (1860–66).

Ancona, d' (Ciriaco), born at Ancona, Italy, about 1390, was a writer and antiquary. He travelled much in the Levant, copied inscriptions, and collected manuscripts. Among his works is an "Itinerarium." Died about 1450.

Ancre, d' [It. *D'Ancora*], (Concino Concini), Le Maréchal, an Italian courtier, born at Florence. He formed a part of the retinue of Maria de Medici (queen of Henry IV. of France) when she went to Paris in 1600, and he married Eleonora Galigai, who had much influence with that queen. His talents for intrigue and the favor of the queen (who in 1610 became regent) raised him suddenly to power. In 1613 he was appointed a marshal of France and prime minister. Having excited general odium by his rapacity, he was assassinated at Vitry April 24, 1617, by De Luynes and other conspirators.

An'cus Mar'tius, fourth king of Rome, a grandson of Numa, succeeded Tullus Hostilius about 640 B. C. He promoted the religious institutions of Numa, and is considered the founder of the plebeian order. He waged war against the Latins, whom he subdued, founded Ostia, and built the Pons Sublicius (Bridge of Piles). Died about 616 B. C.

An'cylus, a genus of small, patelliform, fresh-water gasteropod mollusks, of which several species inhabit the streams and lakes of North America.

Ancy'ra [Gr. Ἄγκυρα], an ancient city of Galatia, in Asia Minor, said to have been built by Midas, was about 30 miles W. of the river Halys. Under the Roman empire it was an important city and the capital of Galatia. It had a famous temple of Augustus in which was the *Monumentum Ancyrateum.* Its site is occupied by the modern city of Angora (which see). Two councils of the Church were held here—one in 314, and the other in 358 A. D.

An'da, a genus of plants of the order Euphorbiaceæ. The only known species is the *Anda Brasiliensis,* a Brazilian tree, the fruit of which contains two seeds, called *Purgados Paulistas.* These afford a valuable fixed oil, which is used in medicine as a cathartic, and as a drying-oil by painters. The bark is astringent.

Andalu'sia [formerly called *Vandalusia,* from the Vandals; Sp. *Andaluci'a*], the southern portion of Spain, is bounded on the N. by Estremadura and La Mancha, on the E. by Murcia and the Mediterranean, on the S. by the Mediterranean, and on the W. by Portugal and the Atlantic Ocean. Area, 33,665 square miles. It is supposed to correspond to the *Tarshish* (the western) of the Bible and the *Bætica* of the Romans. The Sierra Morena extends along the northern border, and the southern part is traversed by the Sierra Nevada, the highest summits of which rise about 11,000 feet above the sea. The largest river is the Guadalquivir, which flows south-westward and enters the Atlantic. The soil of the valleys and plains is fertile. Silver, copper, iron, lead, and mercury are found here. The chief products are grain, cotton, wine, wool, sugar, olives, oranges, and figs. The climate is delightful. The Andalusian breed of horses has long been celebrated. Andalusia is divided into eight provinces—viz., Almería, Granada, Jaen, Cadiz, Córdova, Málaga, Huelva, and Sevilla. It corresponds to the kingdoms of Seville, Jaen, Cordova, and Granada, into which the Moors divided the southern part of Spain. Pop. in 1877, 3,282,448.

Andalusia, capital of Covington co., Ala. (see map of Ala., ref. 7–D, for location of county). Pop. in 1880, 596.

Andalu'site, an anhydrous silicate of alumina, which is found in Andalusia and other places, and occurs in four-sided prisms. It may be distinguished from felspar by its greater hardness and infusibility. A peculiar variety called chiastolite or macle is very abundant at South Lancaster, Mass. It occurs in stout crystals, having the axis angles of a different color from the rest, exhibiting a tessellated appearance on the cross section. (See Dana's "System of Mineralogy," 5th ed.)

Andaman' Islands, a group of small, densely-wooded islands in the Bay of Bengal, between lat. 10° and 13° N., and about 93° E. lon. Area, 2550 square miles. They are 180 miles S. W. of Cape Negrais. The inhabitants are in the lowest stage of barbarism, and are said to resemble none of the races of the adjacent parts of Asia. It has been used as a penal colony for Hindoos by Great Britain. The earl of Mayo, the governor-general of India, was murdered here by a convict on Feb. 8, 1872. The native population does not exceed 1000, and is dying out. They wear no clothing except a coating of mud. The chief settlement is Port Blair. The two groups, Andaman and Nicobar, have been united under a commissioner at Port Blair. Both groups are connected with Calcutta by steamer.

Andan'te [the present participle of the It. verb *anda're,* to "walk," to "go"], an Italian musical term directing the time, or rather the style, in which a piece is to be performed. It denotes a movement that is moderate, rather slow and sedate, but distinct and flowing.

Andaquies Wax, a peculiar beeswax from South America.

Andelys, Les, lȧ zŏɴd'lē', a town of France, in the department of Eure, near the Seine, 20 miles N. E. of Evreux. Pop. in 1881, 5474.

Andennes, a town of Belgium, in the province of Namur, on or near the Meuse, and on the railroad from Namur to Liege, 12 miles by rail E. of the former. Porcelain is made here. Pop. 6278.

An'derlecht, a market-town of Belgium, in the province of Brabant, 10 miles S. W. of Brussels. It has breweries and large dyeing establishments. Pop. 11,663.

Anderlo'ni (Pietro), a skilful Italian engraver, born near Brescia Oct. 12, 1784. He lived at Milan, and engraved some works of Raphael, Titian, and Poussin. Died Oct. 13, 1849.

An'dersen (Hans Christian), an eminent Danish poet and novelist, born at Odense, in the island of Fünen, April 2, 1805, was a son of a poor shoemaker, who died when Hans was nine years old. In 1819 he went to Copenhagen to seek employment in the theatre, but was rejected because he was too lean. Before this period he had written several tragedies and poems, among which was the "Dying Child." He made various unsuccessful efforts to obtain employment, and passed several years in adversity, until he found generous friends, who in 1828 placed him in the university, where he was educated at the public expense. In 1830 he published a volume of his collected poems. Having received a gift of money from the king, he visited Germany, France, and Italy in 1833, and produced in 1834 a romance called "The Improvisatore," in which the scenery and manners of Italy are described with admirable fidelity. He related some episodes of his early life in a book entitled "Only a Fiddler" (1837). Among his other works are "The Poet's Bazaar" (1842); "Ahasuerus," a drama; "The Two Baronesses," a tale in English; and several volumes of tales, which display original genius and a rich imagination. His works have been translated into many languages. (See Hans Andersen, "True Story of my Life," new edition, 1871.) Died Aug. 4, 1875.

An′derson, city and R. R. junction, capital of Madison co., Ind. (see map of Indiana, ref. 6–F, for location of county), on the West Fork of White River, is a manufacturing city, having a hydraulic canal with 44 feet fall. Pop. in 1870, 3126; in 1880, 4126.

Anderson (C.-H.), on R. R., capital of Anderson co., S. C. (see map of South Carolina, ref. 4–C, for location of county), 127 miles W. N. W. of Columbia, is the seat of Carolina High School for boys and girls. Pop. in 1870, 1432; in 1880, 1850.

Anderson, capital of Grimes co., Tex. (see map of Texas, ref. 4–J, for location of county), about 110 miles E. by N. of Austin, has excellent schools, and is the seat of Patrick Academy. Pop. in 1870, 495; in 1880, 412.

Anderson (Alexander), M. D., born in New York City in 1774, graduated as M. D. at Columbia College, and became the earliest wood-engraver in the U. S. He made the cuts for Webster's "Spelling Book," illustrations for an edition of Shakspeare, and published an illustrated "General History of Quadrupeds" (1804). Died at Jersey City Jan. 16, 1870.

Anderson (Christopher), pastor of a Baptist church in Edinburgh from 1808 till 1850, published sacred works, of which the most important is "The Annals of the English Bible" (2 vols. 8vo, 3 editions—1845, 1848, and 1855; the last two enlarged and improved), characterized by Allibone as "by far the best book on the subject." (See his "Life and Letters," 1854, 8vo.) Died in 1851.

Anderson (George B.) was born at Wilmington, N. C., in 1831; graduated at West Point 1852; became first-lieutenant of the Second Dragoons in 1855; adjutant 1857; resigned April 25, 1861; was made a brigadier-general in the Confederate army; commanded the defences of the coast of North Carolina in Nov., 1861; led a brigade at the battle of Antietam, and received a wound which caused his death at Raleigh, N. C., Oct. 16, 1862.

Anderson (Henry James), M. D., LL.D., born in New York Feb. 6, 1799, graduated at Columbia College, N. Y., 1818, at the College of Physicians and Surgeons 1824; professor of mathematics and astronomy at Columbia College 1825, trustee 1851, and emeritus professor 1866; published "Geology of Lynch's Expedition" and "Geological Reconnaissance of the Holy Land" (1848). D. at Lahore, India, Oct. 19, 1875.

Anderson (Rev. H. T.), born in 1811, was an eminent scholar of the denomination known as the "Disciples" and "Campbellites," and was the author of an interlinear translation of the New Testament. Died in Washington, D. C., Aug. 19, 1872.

Anderson (Hugh J.), born in Maine in 1801, became a lawyer, was a member of Congress from Maine (1837–41), governor of Maine (1844–47), a presidential elector in 1849, U. S. commissioner of customs (1853–58), and in 1866 became sixth auditor of the U. S. treasury. D. May 31, 1881.

Anderson (James) was born in Scotland Nov. 17, 1678; ordained by Irvine Presbytery Nov. 17, 1708, for settlement in Virginia. He arrived there Apr., 1709, but settled at Newcastle, Del., where he remained till he took charge, Oct., 1717, of the First Presbyterian church, then forming in New York City. A division occurred in 1720, and he was installed Aug., 1727, in Donegal, Pa., where he died July 16, 1740.—His brother, John, of Perth Amboy, N. J., born in 1663, became a member of the council of the province in 1712, and at his death, Mar., 1736, was president of the council.

Anderson (James), M. D., was physician-general of the army of the East India Company at Madras in the latter part of the eighteenth century. He was famous for the zeal and ability he manifested in his persistent efforts to introduce the cochineal, silkworm, mulberry tree, etc. into Hindostan, and he published letters on these subjects to Sir Joseph Banks and others. Died Aug. 5, 1809.

Anderson (James), LL.D., an able Scottish writer on political and rural economy, was born near Edinburgh in 1739. He was a practical as well as a scientific farmer, and invented an improved form of plough. In 1777 he published "Essays relating to Agricultural and Rural Affairs" (3 vols.). He removed to London in 1797, and there issued a monthly periodical called "Recreations in Agriculture, Natural History," etc. (1799–1802), in which he anticipated the famous theory of rent afterward adopted by Malthus and Ricardo. Died Oct. 15, 1808.

Anderson (John), F. R. S., a Scotch naturalist, born in Dumbartonshire in 1726, was educated in the University of Glasgow. He became in 1760 professor of natural philosophy in that institution. In 1786 he published a valuable work entitled "Institutes of Physics." He gave gratuitous scientific lectures to the working-classes for many years. By his last will he founded a useful institution (in Glasgow) called Andersonian University (which see). Died Jan. 13, 1796.

Anderson (John) was born at Cumberland, Me., in 1792; graduated at Bowdoin College in 1813; was admitted to the bar in 1816; member of Maine senate in 1824; member of Congress 1825–33; mayor of Portland, Me., in 1833 and 1842; U. S. district attorney for Maine 1833–37; collector of customs at Portland, Me., 1837–41 and 1843–48. Died Aug. 21, 1853.

Anderson (John Jacob), born in New York City in 1821, was long at the head of a public school of that city, and has published numerous works, chiefly educational.

Anderson (Joseph) was born in New Jersey Nov. 5, 1757, was an officer in the Revolutionary war, became a lawyer, was appointed a territorial judge by Washington (1791), was U. S. Senator from Tennessee (1797–1815), and first comptroller of the U. S. treasury (1815–36). Died April 17, 1837.

Anderson (Lars). See Andreæ (Laurentius).

Anderson (Martin Brewer), LL.D., of Scotch-Irish descent on his father's side, was born in Brunswick, Me., Feb. 12, 1815, graduated at Waterville College (now Colby University), Waterville, Me., in 1840, was tutor in the college two years, and then professor of rhetoric nearly seven years. In 1850 he removed to New York City, and became editor-in-chief, and in part proprietor, of the "New York Recorder." In 1853 he was chosen president of the Rochester (N. Y.) Baptist University, which position he still (1886) holds. He has published numerous review articles, addresses, and educational papers.

Anderson (Mary), an American actress, born at Sacramento, Cal., July 28, 1859, was educated at the Ursuline convent in Louisville, Ky., and determined, when only thirteen years of age, to devote herself to the art of acting. Having met with Charlotte Cushman, the celebrated tragedian, in Cincinnati in 1874, she went to New York to take lessons in elocution and other dramatic requirements, and about a year after her return to her native place she made her *début* there as Juliet, Nov. 27, 1875, with great success. After visiting all the principal cities of the U. S., she in 1883 went to England, where she also played with success. (See her "Stage Life," by William Winter, 1886.)

Anderson (Philip) was a native of India, son of an officer in the service of the East India Company. Philip was educated at St. Paul's School, London, and at Corpus Christi College, Cambridge, England, where he graduated, and from which he went to Durham and passed an examination for a license in theology; became curate of Gateshead in 1839, and afterward successively of St. George's, Bloomsbury, and St. Peter's, Ashton-under-Lyne; went to India in 1842, and was chaplain at Malligaum and afterward at Surat; visited England on account of his health in 1847, but returned to India in 1849; was stationed at Colaba, where he remained till his death, Dec. 13, 1857; was editor of "Bombay Quarterly Review." His principal work is "The English in Western India."

Anderson (Richard Clough, Jr.), born in Louisville, Ky., Aug. 4, 1788, graduated at William and Mary College, was a member of Congress from Kentucky (1817–21). He was appointed minister to the republic of Colombia in 1823, and envoy extraordinary to the Congress at Panamá in 1826. Died July 24, 1826.

Anderson (Richard Henry), born in South Carolina about 1822, graduated at West Point in 1842, and served with honor in the Mexican war; was brig.-gen. of the Confederate States in 1861, maj.-gen. in 1862, and commanded a division at Gettysburg July, 1863. D. June 26, 1879.

Anderson (Robert), M. D., a Scottish biographer, born in Lanarkshire Jan. 7, 1750, became a resident of Edinburgh in 1784. He wrote a "Life of Dr. Johnson," and published a good edition of "The Works of the British Poets; with Prefaces Biographical and Critical" (14 vols., 1792–1807). Died Feb. 20, 1830.

Anderson (Robert), an American officer, born June 14, 1805, near Louisville, Ky., graduated at West Point, 1825, and May 15, 1861, brigadier-general U. S. A. His father was colonel in the Revolutionary army, and his mother a cousin of Chief-Justice Marshall. He was private secretary 1825–26 to a relative upon his mission as U. S. minister plenipotentiary to the republic of Colombia, served at artillery school for practice 1826–28, chiefly on ordnance duty 1828–35, assistant inspector-general of Illinois volunteers in the Black Hawk war 1832, engaged at the battle of Bad Axe, at Military Academy as instructor of artillery 1835–37, in Florida war 1837–38 (brevet captain), in several actions, as aide-de-camp to Major-General Scott while removing Cherokees to the West 1838, as assistant adjutant-general eastern department 1838–41, chiefly in garrison 1845–53, in war with Mexico 1847, engaged at Vera Cruz, Cerro Gordo, Amozoque, and Molino del Rey (severely wounded and brevet major), member of artillery boards 1841–60, governor of Harrodsburg Military Asylum 1853–54, inspector of iron-work for public buildings 1855–59; in command of defences of Charleston harbor, S. C., 1860–61. In the civil war, after evacuating Fort Moultrie, he moved to Fort Sumter, which he surrendered, after a heavy bombardment, April 12–13, 1861 (brevet major-general); in command of department of Kentucky and of the Cumberland 1861, which his shattered health compelled him to relinquish. Till he was retired from active service, Oct. 27, 1863, he performed but little duty. He translated "Instructions for Field Artillery, Horse and Foot," 1840, and "Evolutions of Field Batteries," 1860. In vain he sought restoration of health abroad, his strength gradually failing till he died Oct. 26, 1871, at Nice, France, aged sixty-six.

George W. Cullum.

Anderson (Rev. Rufus), D. D., LL.D., born in North Yarmouth, Me., Aug. 17, 1796, graduated at Bowdoin College in 1818. He studied theology at Andover from 1819–22. In 1824 he became assistant secretary, and in 1832 corresponding secretary, of the American Board of Foreign Missions, which position he filled with distinguished ability for thirty-four years. He visited officially a part of the Mediterranean missions 1828–29, and another part 1843–44, the Indian missions 1854–55, and the Sandwich Islands in 1863. At the age of seventy he resigned his position in the Board of Missions (1866), at which time, without any previous knowledge on his part, he was presented, as a testimonial to his faithful and meritorious services, with $20,000 (contributed chiefly by the merchants of New York and Boston), which sum he made over to the Board, reserving to himself the right to draw from it whatever might be necessary for his support. Among Dr. Anderson's numerous publications may be named—"Observations on the Peloponnesus and Greek Islands" (Boston, 1830); "The Hawaiian Islands, their Progress and Condition under Missionary Labors" (Boston, 1864): "A Heathen Nation Evangelized: History of the Mission, etc. to the Sandwich Islands" (1870); "History of the Missions of the American Board of Commissioners for Foreign Missions to the Oriental Churches" (1872). He was one of the founders of Mount Holyoke Female Seminary, at South Hadley, Mass., several years president of trustees of Bradford Academy, Mass., and also a member of the board of trust of Andover Seminary, Mass. Died May 30, 1880.

Anderso'nian University, an institution of Glasgow, in Scotland, was founded in 1795 by John Anderson, noticed above. His design was to impart by popular lectures a knowledge of the sciences to mechanics. He bequeathed to it his valuable library and apparatus. It has a high reputation, especially in the medical department. The number of professors is about fifteen.

An'dersonville, near Anderson R. R. sta., Sumter co., Ga. (see map of Georgia, ref. 5–G, for location of county), 11 m. N. E. of Americus. During the civil war it was the site of a Confederate military prison for Federal soldiers. The mortality at this prison was very great; 12,926 prisoners of war died here. One Henry Wirtz, a Swiss adventurer, was the superintendent of the prison, and after the close of the war he was tried and convicted by a military commission on charge of excessive cruelty to the prisoners, and was executed Nov. 10, 1865. The Confederate authorities, in at least two official reports, attributed the excessive mortality to the bad management of the prison. Andersonville is now the site of a national cemetery, in which the deceased Union soldiers are buried. The cemetery is well laid out, trees have been planted, and the names, rank, etc. of most of the dead have been ascertained and inscribed on head-boards. Pop. in 1880, 308.

An'derssen (Adolf), a German chess-player, born at Breslau in 1818. At the London chess tournament in 1851 he defeated the famous player Staunton, but he was defeated by Paul Morphy in Paris in 1858. D. Mar. 14, 1879.

An'dersson (Charles John), a Swedish traveller, born in 1827, was the natural son of an Englishman. He went to Southern Africa in 1850, and passed several years in the exploration of the natural history and geography of that region. He published a narrative of his travels, "Lake Ngami" (1855), and "Okauango River" (1859). Died in Southern Africa July 5, 1867.

An'des [Sp. *Cordille'ra de los An'des*], a grand South American range of mountains which is one of the most prominent features in the physical geography of the globe. It extends along the western border of the entire continent, nearly parallel to the Pacific coast, from the Strait of Magellan to the Isthmus of Darien, a distance of about 4500 miles. In length it far exceeds every other mountain-chain on the earth. The general direction of this chain is nearly N. and S. The southern part of the Andes, for a distance of about 2500 miles, consists of a single range or ridge, extending through Patagonia and along the eastern border of Chili. The Patagonian Andes rise to the height of 8000 feet. The Chilian Andes, which are included between lat. 24° and 42° S., have an average width of about 130 miles, and in some places are not more than 100 miles from the Pacific. The highest summit of the Chilian Andes (but not of the whole chain, as formerly believed) is the porphyritic Nevado of Aconcagua, which rises 22,422 feet above the level of the sea, and is about 100 miles N. E. of Valparaiso. In Chili also occur the volcanic peaks of Tupungato, 20,270, and Maypu, 17,764 feet high. The line of perpetual snow in the Andes of Northern Chili is about 14,000 feet above the sea.

About lat. 19° S. the chain is divided into two parallel branches called the Cordillera of the Coast and the Cordillera Real. The former extends north-westward along the coast of Peru, the summits of the range being about 100 miles from the ocean. The Cordillera Real, which traverses Bolivia and is about 250 miles from the other range, is nearly equal in height to the Chilian Andes. The peak of Illampu, in Bolivia, has an altitude of 23,000 feet. These two parallel cordilleras are connected at several points by transverse ranges or groups called *knots*, and enclose the table-land of Desaguadero and Lake Titicaca, which is 12,800 feet above the level of the sea. The highest summit of the Peruvian Andes is the volcano of Arequipa, 20,300 feet high, and 55 miles from the Pacific Ocean.

Proceeding northward, we come next to the Andes of Ecuador, or Andes of Quito, which extend from lat. 5° S. to the table-land of Quito, enclosed between two ranges of enormous volcanoes. Among these the highest are Chimborazo, 21,414 feet, and Cotopaxi, 19,498 feet (Humboldt says 19,069). The form of the latter is almost a perfect cone. "Among all the volcanoes that I have seen," says Humboldt, "the conical form of Cotopaxi is the most beautifully regular." (See Cotopaxi.)

There are a number of passes which cross the Andes, but all at a great elevation, and mostly dangerous as well as arduous. Several passes among the Peruvian and Bolivian Andes are about 15,000 feet above the sea, and the lower passes are not less than 12,000 feet.

Minerals.—The rocky foundations of these grand barriers are granite, gneiss, mica-slate, greenstone, porphyry, quartz, limestone, red sandstone, and metamorphic rocks. Humboldt saw in Peru vast masses of quartz 7000 or 8000 feet in height. The Andes are celebrated for their mineral riches, consisting of large quantities of gold and silver. Platina, mercury, copper, tin, and iron are also found among them. The most productive gold-mines are in Peru and New Granada; the silver-mines of Potosi are among the richest in the world. Few parts of the globe are subject to so frequent and destructive earthquakes as the countries adjacent to the Andes and enclosed between its different ranges. The cities of Quito, Lima, Callao, and Valparaiso have been nearly ruined by them in recent times. The number of volcanoes among the Andes is about fifty, thirty-six of which are classified as active, and the others are doubtful, not having been seen in a state of eruption by any European. "It is but rarely," says Humboldt, "that the elastic forces at work within the interior of our globe have succeeded in breaking through the spiral domes which, resplendent in the brightness of eternal snow, crown the summits of the Cordilleras; and even where these forces have opened a permanent communication, with the atmosphere through circular craters or long fissures, they rarely send forth currents of lava, but merely eject ignited scoriæ, steam, sulphuretted hydrogen gas, and jets of carbonic acid." (*Cosmos.*) This illustrious traveller states that he found pelagic shells on a ridge of the Andes more than 15,000 English feet above the sea.

The geological structure of the Andes is as yet but imperfectly known, and is probably not the same in all parts of the chain. Like all great mountain-systems, the Andes have been produced by elevatory forces acting at different, and in some instances widely separated, periods. Carboniferous, triassic, Jurassic, and tertiary rocks have been recognized on their flanks; and the older palæozoic will undoubtedly be found to make up a part of their mass.

Climate.—The limit of perpetual snow on the Andes that are near the equator is about 15,000 feet, and among the Bolivian Andes, about lat. 20° S., it is said to be 17,000 feet. Glaciers rarely if ever occur in the central or tropical portions of the Cordilleras. Between the equator and lat. 30° S. the prevailing wind blows from E. to W., and the eastern side of the Cordillera intercepts nearly all the moisture, so that little or no rain falls in Peru and Northern Chili on the western slope, or on the narrow tract between the Andes and the ocean. The changes of weather among these mountains are sudden and violent, and the electric storms are very terrific. Here are exhibited greater variations and contrasts of climate than in any other region of the globe. The elevated plains within the tropics have a cool and salubrious climate, and the fruits of the temperate zone here flourish under the equator. Although the Andes are inferior to the Himalayas in altitude, they present a more remarkable variety of phenomena. "This portion of the surface of the globe," says Humboldt, "affords in the smallest space the greatest possible variety of impressions from the contemplation of nature. Among the colossal mountains of Cundinamarca, of Quito, and of Peru, furrowed by deep ravines, man is enabled to contemplate alike all the families of plants and all the stars of the firmament. There at a single glance the eye surveys majestic palms, humid forests of bambusa, and the varied species of Musaceæ, while above these forms of tropical vegetation appear oaks, medlars, the sweetbrier, and umbelliferous plants, as in our European homes. . . . There the depths of the earth and the vaults of heaven display all the richness of their forms and the variety of their phenomena. There the different climates are ranged the one above the other, stage by stage, like the vegetable zones whose succession they limit; and there the observer may readily trace the laws that regulate the diminution of heat as they stand indelibly inscribed on the rocky walls and abrupt declivities of the Cordilleras." (See also HUMBOLDT'S "Travels.") A. J. SCHEM.

Andes, Delaware co., N. Y. (see map of New York, ref. 6–H, for location of county), has a collegiate institute and a furnace. Pop. in 1880, 496.

And'esin, or **And'esite,** a mineral resembling felspar in appearance, is essentially a silicate of soda, lime, and alumina. It was originally brought from the Andes, but is found also in the Vosges, Canada, etc.

Andi'ra, a genus of plants of the natural order Leguminosæ. The *Andira inermis*, called cabbage tree or cabbage-bark tree, is a native of the W. I. The bark of the *Andira*, called worm-bark, is a powerful anthelmintic.

And'ira-Guacu is the popular name of a species of bat in South America; it is nearly as large as a pigeon.

An'diron [a corruption of *hand iron*], a term applied to the metallic utensils used to support the wood which is burned in an open fireplace. They are called firedogs in some parts of Great Britain. They are often called "dog irons" in many parts of the U. S. The andiron consists of a horizontal bar, supported by three feet, and having an upright standard at one end. This was sometimes silver, and ornamented with arabesques or a human figure.

And'law, von (HEINRICH), a German politician and zealous Catholic, born in 1802. He was chosen a member of the legislature of Baden in 1833, and opposed all liberal movements and reforms. He published in 1864 "The Priesthood and Christian Life, with Regard to the Great Questions of the Present." Died in Mar., 1870.

Andoc'ides [Gr. 'Ανδοκίδης], an Athenian orator, born about 467 B. C. He took an active part in public affairs, and was banished several times, returning from exile when the Thirty Tyrants were overthrown in 403 B. C., and returned when they ceased to rule. Died about 390 B. C. Several of his orations are extant.

Andor'ra, a valley and small republic among the Eastern Pyrenees, between the French department of Ariège and the Spanish province of Lérida. Area, 148 square miles. It is surrounded by high mountains, and has rich mines of iron and a lead-mine. It has been independent since the time of Charlemagne, and is governed by twenty-four consuls. The inhabitants are a hospitable and industrious people, and are mostly farmers and cattle-raisers. Capital, Andorra. Pop. in 1878, estimated at 12,000.

An'dover, a market-town and parish of England, in Hampshire, 63 miles W. S. W. of London. The origin of the town is very ancient. It has a handsome church, which cost about $150,000. Pop. in 1881, 5653.

Andover, on R. R., Essex co. Mass. (see map of Massachusetts, ref. 1–I, for location of county), on the S. bank of the Merrimack River. The village of Andover is pleasantly situated on the Shawsheen River, 23 miles N. of Boston. It has a free public library of over 3000 volumes. It also has extensive water-power, and manufactures of shoe-thread, woollen goods, rubber goods, printers' ink, lampblack, etc. Here are Abbot Female Academy, founded in 1829, and Phillips Academy, a well-endowed institution founded in 1778. It is also the seat of Andover Theological Seminary, founded in 1807, and under the direction of the Congregationalists. It has a library of about 30,000 volumes and a good system of public schools. Pop. of township in 1870, 4873; in 1880, 5169; in 1885, 5711.

Andover, on R. R., Allegany co., N. Y. (see map of New York, ref. 6–D, for location of county), 110 miles E. of Dunkirk, has several manufacturing establishments, one graded school, and is in a good farming region. Pop. of township in 1870, 1873; in 1880, 1988.

Andover, R. R. junction, Ashtabula co., O. (see map of Ohio, ref. 1–J, for location of county), has cheese-factories and mills. Pop. of township in 1870, 921; in 1880, 1166.

Andover Theological Seminary. See ANDOVER.

Andra'da (DIOGO PAYVA D'ANDRADE) was born in 1528 at Coimbra, Portugal; became a Jesuit and one of the Portuguese delegates to the Council of Trent. Died in Lisbon, Portugal, in 1575.—His brother, THOMAS DE JESUS, was an Augustinian monk; taken prisoner in the battle of Alcacer in 1578 and kept in a dungeon till his death, Apr. 17, 1582. He wrote while there his famous book, "The Labors of Jesus."

Andra'da, d' (ANTONIO), was born at Villa de Oleiros, Portugal, in 1580; entered order of the Jesuits in 1596 at Coimbra, Portugal; went to India as a missionary in 1601, and became superior of the missions of Mongolia. He made two journeys from there to Thibet, and published "New Discovery of the Grand Cathay, or Kingdom of Thibet" (1627). Died at Goa Aug. 20, 1633.

Andra'da, d' (FERNÃO PEREZ), was an officer in the Portuguese navy. He commanded a vessel in the fleet of Albuquerque, who made him admiral of a fleet of ten ships at Malacca in 1511. He defeated the sultan of Java in a naval engagement in 1513, was the commander of the first European fleet on the coast of China (1518), and opened commercial intercourse with that country.

Andra'da e Sil'va, or **Sylva** (JOZÉ BONIFACIO), a distinguished Brazilian, born at Santos June 13, 1765. He acted a prominent part in the revolution by which Brazil became independent in 1822, and was prime minister in 1822–23. He wrote some scientific treatises and poems. Died April 3, 1838.

Andral (GABRIEL), M. D., a celebrated French physician, born in Paris Nov. 6, 1797, married a daughter of Royer-Collard. He published an able work called "Clinique Médicale" (4 vols., 1824–27). In 1839 he succeeded Broussais as professor of pathology and therapeutics in Paris, and in 1842 became a member of the Institute. Among his works is a "Summary of Pathological Anatomy" (3 vols., 1829). D. Feb., 1876.—His father, GUILLAUME ANDRAL, was a celebrated physician.

Andrássy (JULIUS), COUNT, a Hungarian statesman, born Mar. 8, 1823, of an ancient and noble family. He took a prominent part in the revolution of 1848 as an adherent of the popular cause, and was condemned to death in 1849, but he escaped and went into exile. When the right of self-government was restored to Hungary, in Feb., 1867, Andrássy was appointed premier of a new Hungarian ministry by the emperor. He succeeded Von Beust 1871–79, as minister of foreign affairs in the common ministry of the whole empire.

An'dré (JOHN), a British officer, born in London, of Swiss parents, in 1751, entered the army in 1771. Having obtained the rank of lieutenant, he was sent to America in 1774. His superior talents and fine personal qualities procured for him a rapid promotion to the important position of adjutant-general, with the rank of major (1779). He was a good scholar, an artist, a versifier, and a man of varied accomplishments. Benedict Arnold having offered to betray West Point, Major André was selected by Sir Henry Clinton, the British commander, to make the necessary arrangements for carrying out the plot. André, assuming the name of Anderson, ascended the Hudson, and, having had a private interview with Arnold, by whom he was furnished with maps and plans of West Point and a pass through the American lines, was, while returning to New York City by land, intercepted near Tarrytown by three armed Americans, who, discovering by incautious remarks on his part that he was a British officer, took him prisoner. On searching his person, they found the plans in his boots. He made an unsuccessful effort to bribe his captors, who conducted him to Lieut.-Col. Jameson, who, with singular obtuseness, resolved to send him to Gen. Arnold, but was dissuaded by Major Tallmadge. Major André was tried as a spy, and condemned to be hung, by a board of six major-generals and several brigadier-generals. Sir Henry Clinton made earnest efforts to save his life, but they were unavailing, and he was executed at Tappan Oct. 2, 1780. He behaved with dignity and fortitude on this occasion, and his fate excited deep and general sympathy. The day before his death he drew with a pen and ink a portrait of himself, which is now in the Trumbull Gallery of Yale College. A monument was erected to his memory in Westminster Abbey.

Andre'æ (Abraham) was born at Angermannland, Sweden. On account of his opposition to King John, who desired to restore the Roman Catholic Church in Sweden, he was obliged to take refuge in Germany in 1580. He was, however, elected archbishop of Upsala, Sweden, after the death of King John, and was confirmed by King Sigismund, but was afterward confined in the castle of Gripsholm by Duke Charles, whose suspicions he had aroused. He died there in 1607. Wrote "Forum Adiaphororum."

Andre'æ (Jacob), D. D., a German Protestant theologian, born at Waiblingen, in Würtemberg, Mar. 22, 1528. He became professor of theology at Tübingen in 1562, and distinguished himself by his learning and eloquence. He wrote against the Calvinists and Roman Catholics, and was a principal author of the "Formula Concordiæ" which was adopted by the Lutherans in 1580. Died Jan. 7, 1590.

Andreæ, or **Andreä** (Johann Valentin), an eminent German writer, born at Herrenberg, in Würtemberg, Aug. 17, 1586, was a grandson of Jacob, noticed above. He became pastor at Calw in 1620, and chaplain or court-preacher at Stuttgardt in 1639. Among his chief works, which evince a liberal philosophical spirit, are a "Hundred Satirical Dialogues" (in Latin, 1617), a "Mythologica Christiana" (1619), an Autobiography, and an allegory in verse called "Die Christenburg." He has been regarded as the founder of the order of Rosicrucians, but without sufficient evidence. Died May 1, 1654. "Andreæ," says Hallam, "was a man above his age, and a singular contrast to the pedantic herd of German scholars and theologians."

Andre'æ (Laurentius), [Sw. *Lars Anderson*], a Swedish Reformer, born in 1482. He was converted to Protestanism, and in 1523 was appointed chancellor of Sweden by Gustavus Vasa. He produced in 1526 a Swedish translation of the New Testament. Died in 1552.

Andrea'ni (Andrea), a skilful Italian engraver, surnamed Il Mantua'no (*i. e.* "the Mantuan"), was born at Mantua in 1560. He improved the art of engraving on wood in chiaroscuro. Among his works is an engraving of a Deluge, after Titian. Died in 1623.

Andre'a Pisa'no, or **Andre'a da Pi'sa,** a distinguished Italian sculptor and architect, born at Pentedera, near Pisa, in 1270, was prominent in the effort to turn the attention of artists of his time from Gothic to Grecian art. Few relics of his work remain, his famous gates of the Baptistery at Florence having been displaced by those of Ghiberti and others. Andrea was one of the revivers of bronze sculpture. He worked at Venice, Florence, Pistoia, and Orvieto, but there are few architectural works or sculptures that can with any certainty be ascribed to him. Died after 1349.

An'dree (Karl Theodor), a German writer, born in Brunswick Oct. 20, 1808, was from 1838 to 1853 editor of several periodicals, as the "Deutsche Reichszeitung" and "Bremer Handelsblatt," and was 1858 appointed consul to Chili. Among his principal works are "Nordamerica" (2d ed. 1854), "Buenos Ayres und die Argentin. Republik" (1856), "Geographische Wanderungen" (2 vols., 1859), and "Geographie des Welthandels" ("Geography of the World's Commerce," 2 vols., 1863–69). D. Aug. 10, 1875.

Andreli'ni (Publio Fausto) [Publius Faustus Andrelinus, in Latin] was born at Forli, in the States of the Church, Italy, about 1450; received the poetical crown at Rome; was appointed by Charles VII. in 1489 professor of classical literature in the University of Paris; wrote Latin poetry, which is in the "Deliciæ Poetarum Italorum." Died at Paris, France, Feb. 25, 1518.

Andréossy (Antoine François), Count, an eminent French military engineer, born at Castlenaudary Mar. 6, 1761. He served in Egypt as general of brigade in 1798, and became a member of the Institute of Egypt. He was the chief of Bonaparte's staff on the 18th of Brumaire, 1799, obtained the rank of general of division, and was sent as ambassador to England in 1802. Between 1804 and 1814 he represented France at the courts of Vienna and Constantinople. In 1826 he was chosen a member of the Academy of Sciences. He wrote, besides other works, "Constantinople and the Thracian Bosphorus during the years 1812–14" (1828). Died Sept. 10, 1828.

An'drés (Juan), a Spanish Jesuit distinguished for learning, was born at Planes Feb. 15, 1740. He was versed in Hebrew, Greek, Latin, Italian, and French. On the expulsion of the Jesuits from Spain in 1767 he removed to Italy. He produced in 1776 an able "Essay on the Philosophy of Galileo," in Italian. His principal work is "On the Origin, Progress, and Present State of All Literature" (in Italian, 7 vols., 1782–99). He was appointed keeper of the royal library at Naples in 1806. Died Jan. 13, 1817.

Andrew [Lat. *An'dreas*], Saint, one of the twelve apostles, was, like his brother Simon Peter, a fisherman of Galilee. He is supposed to have been the first disciple of Christ. The latter part of his life is involved in obscurity. According to tradition, he preached the gospel in Greece and Scythia, and suffered martyrdom in Patræ, in Achaia. He is the patron saint of Scotland. A cross formed by oblique beams, thus, ×, is called Saint Andrew's cross.

Andrew (or **András**) **I.,** king of Hungary, was of the family of Arpad. He began to reign in 1046, and waged war against the emperor Henry III. Died in 1058.

Andrew II. of Hungary was born about 1176, and became king in 1205. He conducted an unsuccessful crusade against the Mohammedans in 1217. In 1222 he convoked a diet, to which he granted the Golden Bull, called the Magna Charta of Hungary. It confirmed the rights and privileges of the Hungarian bishops and nobility, whose revolts had disturbed his reign. Died Mar. 7, 1236.

Andrew III. of Hungary, a grandson of the preceding, was born in Venice. He succeeded Ladislas III. in 1290, and was the last king of the dynasty of Arpad. His claim to the throne was opposed by the pope, who supported Charles Martel (son of Charles II. of Naples) as the rival of Andrew. The latter defeated Charles Martel in battle in 1291. Died in 1301.

Andrew (James Osgood), D. D., bishop of the Methodist Episcopal Church South, was born in Wilkes co., Ga., May 3, 1794. He entered the itinerant ministry in the South Carolina Conference of the Methodist Episcopal Church Dec. 12, 1812, and was consecrated bishop at Philadelphia in May, 1832. Having become connected with slavery by marriage, the General Conference of 1844 took such action in his case as led to the division of the Methodist Episcopal Church, and the organization of the Methodist Episcopal Church South; in which he continued to exercise his episcopal functions efficiently till the session of the General Conference in New Orleans April, 1866, when he was placed on the retired list. He died at the residence of his son-in-law, the Rev. John W. Rush, in Mobile, Ala., Mar. 2, 1871. He was an eloquent, devout, and successful minister. He resided during a part of his episcopate in Oxford, Ga., and then in Summerfield, Ala. He published a work on "Family Government," which is highly esteemed, and a volume of "Miscellanies."

Andrew (John Albion), LL.D., an American statesman, born at Windham, Me., May 31, 1818; graduated at Bowdoin College in 1837, studied law and was admitted to bar of Boston in 1840. Having distinguished himself as an opponent of slavery, he was elected governor of Massachusetts by the Republicans in 1860. In answer to the President's call for volunteers, April 15, 1861, he despatched five regiments in one week from that date. He was again elected governor in 1861, and was afterwards thrice annually re-elected. During the civil war he rendered important services to the cause of the Union by his eloquent speeches and messages, and gained great popularity by his assiduous attention to the welfare of the soldiers. Died Oct. 30, 1867. A meeting of the members of the legislature of Massachusetts adopted a resolution "that in his decease the commonwealth and the nation alike have suffered an irreparable loss; that his reputation had become national, and we might well have hoped for him the highest national offices and honors."

Andrew, Saint (or **The Thistle**), Order of, a Scottish order of knighthood, named in honor of Saint Andrew, the patron saint of Scotland. It was founded in the reign of James V., was revived by James II. of England in 1687, and re-established by Queen Anne in 1703. The star of the order of the Thistle consists of a Saint Andrew's cross of silver embroidery, with rays emanating between the points of the cross, in the centre of which is a thistle of gold and green. On a circle which surrounds this thistle is inscribed the motto "Nemo me impune lacessit" (literally, "No one provokes me with impunity").

Andrew, Saint, Order of (Russian), founded by Peter the Great in 1698, is the highest in the empire, bestowed only on the imperial family, princes, generals-in-chief, and persons of high rank. The badge of this order bears on one side a cross enamelled in blue, and in the four corners of the cross the letters S. A. P. R. (*Sanctus Andreas Patronus Russiæ*). On the reverse is a spread eagle, with a legend signifying "For Religion and Loyalty."

Andrews (Charles) was born at Whitestown, Oneida co., N. Y., May 27, 1827; studied law in Syracuse, N. Y., and was admitted to the bar in 1849. He was in partnership with the Hon. Charles R. Sedgwick from 1851 until he was elected, May 17, 1870, associate judge of N. Y. court of appeals. Prior to this he had held various official positions. He was dist. atty. of Onondaga co., N.Y., 1853–56; mayor of Syracuse 1861, 1862, and 1868; was a delegate-at-large to the constitutional convention of 1867–68, and was appointed chief judge of N. Y. court of appeals in 1881.

Andrews (C. C.), an American general of volunteers during the civil war (1861–66), born in New Hampshire, appointed brigadier-general of volunteers Jan. 5, 1864, mustered out Jan. 15, 1866. Was U. S. minister to Sweden 1869–76, and became U. S. consul-gen. for Brazil 1882.

Andrews (Edward Gayer), D. D., an eminent preacher and bishop of the Methodist Episcopal Church, was born in New Hartford, N. Y., Aug. 7, 1825, graduated at the Wesleyan University, Conn., in 1847, entered the ministry in 1848, became teacher in the Oneida Conference Seminary, Cazenovia, N. Y., in 1854, was elected its president in 1855, resumed the pastorate in New York East Conference in 1864, and was elected bishop in 1872.

Andrews (Ethan Allen), LL.D., an American scholar, born at New Britain, Conn., in 1787. He graduated at Yale College in 1810. He published, besides a number of school-books, a good Latin-English lexicon (1850). Died Mar. 25, 1858.

Andrews (Gen. George L.) was born at Bridgewater, Mass., in 1828, and graduated first in his class at West Point in 1851. He was acting assistant professor of engineering at West Point (1854–55), and for distinguished services in the army of the Potomac became brigadier-general and brevet major-general of volunteers. In 1871 he was appointed professor of French, and in 1882 professor of modern languages, at West Point.

Andrews (James Petit), an English historical writer, born near Newbury, in Berkshire, in 1737. He published an amusing "Collection of Anecdotes, etc., Ancient and Modern" (1789). His most important work is a "History of Great Britain in connection with the Chronology of Europe" (1 vol., 1794, unfinished). Died Aug. 5, 1797.

Andrews (Joseph), born at Hingham, Mass., Aug. 17, 1806, was apprenticed to an engraver in 1821, studied his art in London (1836–37), and subsequently became a line engraver in Boston, Mass. His reputation is very high.

Andrews, or **Andrewes** (Lancelot), a learned English theologian, born in London in 1555, was educated at Cambridge. He was one of the chaplains of Queen Elizabeth, who appointed him dean of Westminster. He was one of the divines selected to translate the Bible under the auspices of James I., and became bishop of Chichester in 1605. In 1609 he was translated to the see of Ely, and appointed a privy councillor; was considered the most learned English theologian of his time, except Ussher, and had a high reputation as a pulpit orator, but his style was pedantic and artificial. He became bishop of Winchester in 1618; he was the author of religious works, among which was a "Manual of Private Devotions and Meditations for Every Day in the Week." Died Sept. 25, 1626.

Andrews (Rev. Lorrin), born in East Windsor, Conn., April 29, 1795, was educated at Jefferson College, Pa., and at Princeton, sailed as a missionary to Hawaii in 1827, founded in 1831 the Lahainalula Seminary, which became the Hawaii University, in which he was a professor. He was long a judge and privy councillor under the government, and published parts of the Bible in the native tongue, wrote a Hawaiian dictionary, and various works on the history, etc. of the Sandwich Islands. Died at Honolulu Sept. 29, 1868.

Andrews (Stephen Pearl), born in Massachusetts in 1812, devoted himself to the study of social questions, the civil and common law, theories of government, a universal language, etc., and wrote numerous works on these and kindred subjects. Died May 21, 1886.

Andrews (Timothy P.), an American officer, born in Ireland, died at Washington, D. C., Mar. 11, 1868. He was appointed paymaster in the U. S. army May 22, 1822, and served as such till April 9, 1847, when he was appointed colonel of a regiment of voltigeurs raised for the war with Mexico, and served in command of his regiment till July 20, 1848, when it was disbanded and he was restored to the pay department; deputy paymaster-general Dec. 17, 1851, and paymaster-general, with the rank of colonel, Sept. 6, 1862, brevet brigadier-general Sept. 13, 1847, for gallant conduct at the battle of Chapultepec, Mex.; retired from active service on his own application Nov. 29, 1864, but continued on special duty till the day of his death.

G. C. Simmons.

Andrews (William D.), born at Grafton, Mass., in 1818, removed to New York in 1840, and became distinguished as the inventor of an oscillating engine, and especially of a centrifugal pump of great excellence.

An′dria, a town of Southern Italy, in the province of Bari, 14 miles by rail E. of Canosa. It is the seat of a bishop, and has a fine cathedral, built in 1046; also a college. In the vicinity are numerous caverns (in Latin, *antra*), from which the name is said to be derived. Pop. in 1881, 37,182.

Andrieux (François Guillaume Jean Stanislas), a popular French dramatic poet, born at Strasburg May 6, 1759. He produced in 1787 a comedy called "Les Étourdis" ("The Giddy-heads"), which was performed with applause. In 1798 he was chosen a member of the Council of Five Hundred. He became professor of belles-lettres in the Polytechnic School in 1804, and professor of French literature in the College of France in 1814. He was admitted in 1816 into the French Academy, of which he was chosen perpetual secretary in 1829. Among his works are "Brutus," a tragedy, and a drama called "Molière with his Friends." He belonged to the classical school of literature. Died May 10, 1833.

An′dro, or **An′dros,** an island of Greece, in the archipelago, about 10 miles S. E. of Eubœa, is the most northern of the Cyclades. Length 21 miles, width 8 miles. The surface is hilly, the soil is fertile. Andros is also the name of a town and port on the eastern coast. Lat. of Cape Guardia, its N. W. point, 37° 58′ N., lon. 24° 43′ E. Pop. of the island 19,674.

An′drocles, or **An′droclus,** a Roman slave, whose adventures and friendship with a lion are mentioned by Aulus Gellius. He ran away from his master into Africa, and there entered a cave, in which he met a lion that was lame. The lion presented to him a paw, from which Androcles extracted a thorn. To recompense him for this service the lion afterwards supplied the man with food as long as he remained in that region. Androcles finally was captured, and was condemned to fight with a lion in the amphitheatre of Rome. This lion proved to be the same that he had met in the cave, and, though purposely kept from food to increase his ferocity, he instantly recognized his benefactor as a dog would his master. The man was then pardoned and liberated.

Androm′ache [Gr. 'Ανδρομάχη], a celebrated and beautiful Trojan lady, was the wife of Hector, and one of the most admired characters of the "Iliad." After the destruction of Troy she became the captive of Pyrrhus, and finally the wife of Helenus, a son of Priam. She is the subject of a tragedy of Euripides.

Androm′eda [Gr. 'Ανδρομέδη], in classic mythology, was a daughter of Cepheus, king of Ethiopia, and of Cassiopeia. She boasted that she was more beautiful than the Nereids. Neptune, to avenge this affront, sent a sea-monster to plague the Ethiopians. The oracle of Ammon having declared that the sacrifice of Andromeda would appease Neptune, she was chained to a rock, but was rescued by Perseus, and after death was transformed into a constellation.

Andromeda, a genus of shrubs of the order Ericaceæ, found in America, Europe, and Asia. The *Andromeda polifolia*, common to both hemispheres, has fine rose-colored flowers. The *Andromeda floribunda* of the U. S. also has abundant and very fine flowers, appearing in April. The *Andromeda nitida* of the Southern States has fragrant blossoms. The U. S. have at least eight species, some of which are reputed poisonous to cattle.

Androni′cus I., Comnenus [Gr. 'Ανδρόνικος Κομνηνός], a Byzantine emperor, was a grandson of Alexis I., Comnenus. He had superior talents, but was profligate and cruel. In his youth he engaged in treasonable intrigues against the emperor Manuel, who confined him in prison many years. Having been appointed regent during the minority of Alexis II., he murdered that prince and usurped the throne in 1182. He abused his power by the execution of many Greek nobles, victims of his revenge or jealousy, and carried his cruelty to such excess that his subjects revolted and tortured him to death in 1185.

Andronicus II., Palæologus, a son of the emperor Michael, was born about 1260. He began to reign at Constantinople in 1283. He waged war against the Turks without decisive result. His reign was inglorious, and he was dethroned in 1328 by his grandson, Andronicus III. Died Feb. 13, 1332.

Andronicus III., Palæologus, was a grandson of the preceding. He became emperor of Constantinople in 1328, and was defeated by the Turks in 1330. His reign was disastrous, and the Turks conquered several of his provinces. Died June 15, 1341.

Androni'cus Cyrrhes'tes, a Greek architect and astronomer, who is supposed to have lived about 100 B. C., and to have erected at Athens the octagonal building called the Tower of the Winds, which is still standing. It was intended to indicate the direction of the wind.

Androni'cus Rho'dius (*i. e.* "of Rhodes"), a Greek Peripatetic philosopher who lived about 60 B. C. He collected and arranged the works of Aristotle.

Andropo'gon [from the Gr. ἀνήρ, a "man," and πώγων, a "beard," alluding to the bearded rhachis and flowers], an extensive genus of grasses, mostly coarse and many of them tropical. The U. S. have about fifteen species E. of the Mississippi. The most important of the genus is the *Andropogon Schœnanthus*, extensively cultivated in Ceylon and other Oriental regions for its oil. Ceylon exports several tons of this oil annually. It is called oil of citronella, and is chiefly used in perfuming the so-called "honey soap." Several foreign species are cultivated for their oils, which are sold as "oil of verbena," "lemongrass," "geranium," etc.

An'dros (Sir Edmund), an English governor, born in London Dec. 6, 1637. He was governor of New York from 1674 to 1682, and was appointed governor of New England in 1686. His arbitrary and oppressive conduct rendered him very unpopular. Recent historians, however, have asserted that his private character was excellent, and that he had to contend with the unjust prejudices of the colonists. In April, 1689, the people of Boston revolted and deposed him. He governed Virginia from 1692 to 1698. Died Feb. 24, 1714.

An'dros (Thomas), born at Norwich, Conn., May 1, 1759; joined the American army at Cambridge, Mass., in 1775, and was engaged in the battles of Long Island, White Plains, and also in other engagements; enlisted in a New London privateer in 1781; was taken prisoner and confined at New York in the Jersey prison-ship, but soon after escaped; studied theology at Plainfield, and preached at Berkeley, Mass., from 1788 to 1834. Died Dec. 30, 1845.

Androscog'gin, a river which rises in Umbagog Lake, and flows southward through Coos co., N. H., to the western boundary of Maine, which it crosses. Running then in a general S. E. direction, it passes through Oxford and Androscoggin counties in Maine, and enters the Kennebec River 4 miles above Bath. Its length is 145 miles.

Andujar', or **Anduxar** (the ancient *Illitur'gis*), a town of Spain, in the province of Jaen, on the Guadalquivir, at the foot of the Sierra Morena, 27 miles N. W. of Jaen. It has a trade in grain, fruit, and porous jars and pitchers, of which great numbers are made here for the purpose of cooling water. Pop. 14,096.

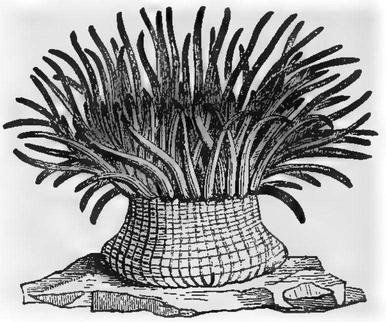
Anduze, a town of Southern France, in the department of Gard, 7 miles S. W. of Alais. It has manufactures of silks, hats, and leather. Pop. in 1881, 4662, principally Protestants.

Anel (Dominique), an eminent French surgeon and oculist, born at Toulouse in 1678, practised in Paris. He invented a probe and syringe, and was skilful in the treatment of aneurism and *fistula lachrymalis*. Died about 1728.

Anemom'eter [from the Gr. ἄνεμος, the "wind," and μέτρον, a "measure"], an instrument used for measuring the force or velocity of the wind. Several different kinds of anemometers have been invented, but the one most generally used was devised by Dr. Robinson of Armagh, and made by Casella of London. It consists of four hemispherical cups affixed to the ends of two horizontal crossrods, which are attached to a vertical axis. The cups are so arranged that their diametrical planes catch any passing current, and are caused to rotate. Motion is thus communicated to a combination of wheelwork, and by two indices the velocity of the wind is shown. Dr. Robinson found that the cups, as well as the vertical axis to which they were attached, revolve with a velocity equal to one-third of the wind's velocity. Lind's anemometer is also used. Whewell and Casella have devised instruments for registering the direction and velocity of the wind. (See Meteorological Instruments.)

Anem'one [from the Gr. ἄνεμος, "wind"], a genus of herbaceous plants of the natural order Ranunculaceæ, natives of Europe, Asia, and North and South America. The species of anemone are numerous, and mostly have beautiful flowers, the size of which is increased by cultivation. The *Anemone hortensis*, or garden anemone, is highly prized and is extensively cultivated in Holland. It prefers a light soil. Among the other beautiful species are the *Anemone coronaria*, sometimes called poppy anemone; the *Anemone Japonica*, a native of Japan; the *Anemone pratensis*, which has blue flowers; the *Anemone pulsatilla* (pasque flower), which grows wild in England, and has purple flowers; and the *Anemone nemorosa* (wood anemone), which has white flowers. In North America are found several species peculiar to this hemisphere, besides some which are common also in the Old World. Pulsatilla, a favorite remedy with homœopathists, is produced by a plant of this genus.

Anemone, Sea, a popular name of marine radiated animals belonging to the order Actinaria. They are polypes of a soft gelatinous texture, and have numerous tentacles disposed in circles and extending like rays around the mouth. When they are expanded in the water they resemble a polypetalous flower, and are admired for beauty of form and color. They abound on the shores of the sea, and are generally attached to rocks, stones, or shells, but have some power of locomotion. When they are left dry by the receding tide they contract into a mass of jelly. They are very voracious, and will seize by their tentacules and swallow animals as large as themselves. Some species of the Actinaria can be kept in an aquarium, and can be fed on fish or other animal food. Among the most beautiful of the sea anemones are the *Actinia mesembryanthemum*, which is common on the British shores, and has around the margin of its mouth a circle of azure tubercles; the *Actinia crassicornis*, which is also found on the British shores, and displays a variety of colors; and the *Actinia dianthus*, which is found in deep water.



Sea Anemone.

Anem'oscope [from the Gr. ἄνεμος, "wind," and σκοπέω, to "look"], an instrument which indicates the direction of the wind, as a vane or weathercock. Sometimes the vane turns a spindle which descends through the roof of the house into the chamber of the observer. An index fixed to the spindle indicates the direction of the wind on a compass-card fixed to the ceiling.

Aneroid Barometer. See Barometer.

Anet, a town of France, in the department of Eure-et-Loir, 9 miles N. E. of Dreux. Near it is the plain of Ivry, where Henry IV. gained a decisive victory over the army of the League in 1590. Pop. in 1881, 1447.

An'eurism [Gr. ἀνεύρυσμα, a "widening"], a pulsating tumor filled with blood, and communicating more or less directly with an artery, the tunics of which are wholly or partially destroyed. A "true" aneurism has one or more arterial coats in its wall. A "false" aneurism has a wall of condensed areolar tissue, the arterial coat having disappeared. A "traumatic" aneurism originates in a wound or other accidental injury. A "varicose" aneurism communicates with both an artery and a vein, but the term sometimes signifies a mere symmetrical dilatation of an artery. When such dilatations occur in groups or knots, it is a "circoid" aneurism. When the blood gets between the coats of an artery, and thus forms a tumor, it is a "dissecting" aneurism. The heart and its valves are liable to aneurismal dilatations.

Aneurisms not traumatic are frequently traceable to the degeneration of the arterial coats known as atheroma. In general, aneurism of the extremities, when sufficiently near the surface, as when it occurs in the "popliteal space" (the hollow of the knee), may be treated with a fair prospect of success by long-continued compression, mechanical or digital. "Ligation," or tying the artery, sometimes succeeds. Galvano-puncture has its advocates as a means of cure. The injection of powerful astringents has succeeded in some cases, but is not to be regarded as a safe proceeding.

The prospect, especially in aneurisms of the aorta and its great branches, is that the disease will prove fatal, though there are very unfrequent cases which spontaneously recover by the formation of a clot within the tumor, which gradually shrinks into a hard, sometimes a chalky, mass. The administration of sedatives and medicines which increase the proportion of fibrine in the blood has been often advocated. Prolonged fasting has been recommended; but in general the safest way is for the patient to avoid all excesses, and to make use of a nutritious diet, without attempting a cure. One of the most remarkable effects of aneurism is the absorption of neighboring tissues, and even of bones, from the continual pressure. The aneurism sometimes finally bursts internally, causing almost immediate death. REVISED BY WILLARD PARKER.

Angara′, or **Upper Tungus′ka,** a river of Siberia, rises in Lake Baikal, about 30 miles S. of Irkutsk. Passing by that town, it flows first northward and afterwards in a westerly direction, and enters the Yenisei, of which it is the principal tributary. Length, about 1000 miles.

An′gel [from the Gr. ἄγγελος, a "messenger"], a ministering spirit; a spiritual, intelligent being employed by God to carry commands, to announce glad tidings, and administer comfort to men. The Scriptures record many instances in which angels became visible to men. The ancient Hebrews believed in the existence of several orders of angels, among which were the seraphim and cherubim, and archangels. The only angels mentioned by name in the Bible are Michael and Gabriel. Raphael is mentioned in Tobit, a book of the Apocrypha. The popular notion that angels have wings is rather a poetical invention than a revealed truth. The belief in guardian angels has been cherished by Jews and Christians of all ages.

ANGEL, an ancient English gold coin, so called from the figure of the archangel Michael piercing the dragon, which was on its obverse. The value of the angel (which continued to be coined until 1650) varied from 6s. 8d. to 10s.

An′gela (MERICI), or **Angela of Brescia,** was born at Desenzano, on Lake Garda, Lombardy, Italy, Mar. 21, 1470, and was the founder of the order of the Ursulines (an order of celibate women in the Roman Catholic Church); entered a Franciscan convent, but returned to the world and began to teach young children; was called for that occupation to Brescia, where she spent the rest of her life. With eleven other maidens, she organized, Nov. 25, 1535, in Brescia, an association under the patronage of St. Ursula for teaching small children, nursing the sick, and helping the poor, and she became its superior in 1537. It was at first not strictly a religious order, but soon became so. Died Jan. 27, 1540. The order was confirmed by Paul III. in 1544.

Angel-Fish (*Squati′na*), called also **Monk-Fish** and **Shark-Ray,** a fish allied to the shark, is found on the coasts of England and France and the southern coasts of the U. S. It is about seven feet long, and is remarkable for its ugliness of form. The body is nearly four feet wide, and is flattened horizontally.

An′geli (FILIPPO), an eminent painter of the early seventeenth century, was born in Rome and patronized by Cosimo, grand duke of Florence. His aërial perspectives are famous, and his works are highly prized.—GIULIO CESARE ANGELI (1570–1630), and GIUSEPPE ANGELI of Venice (born 1715), were also successful painters.

Angel′ica [so called from its supposed angelic virtues], a genus of plants of the natural order Umbelliferæ, natives of the north temperate zone. They are mostly herbaceous and perennial, having bipinnate or tripinnate leaves. The *Angelica archangelica* (garden angelica) grows to the height of six feet, has greenish flowers, is aromatic, and contains resin and essential oil. Its root is used in medicine as an aromatic stimulant and tonic. This plant was formerly cultivated for the table, being blanched and used as celery. The U. S. have several species of *Angelica* and *Archangelica*, a kindred genus. It yields angelica balsam and angelic acid.

Angelica, on R. R. and Angelica Creek, cap. of Allegany co., N. Y. (see map of New York, ref. 6–D, for location of county). The village is 262 miles W. by S. from Albany, and has excellent water-power and a beautiful park. Pop. in 1870, 991; in 1880, 705.

Angelica Tree, or **Hercules' Club,** a small tree or large shrub, found from Florida to Pennsylvania and westward. It is the *Aralia spinosa* of the order Araliaceæ. It has a stout trunk, covered, like the branches, with prickles, and its leaves are very large and decompound. Its flowers appear in July and August in great clusters, composed of very numerous umbels. This tree is common in cultivation.

Angelico, Fra. See FIESOLE.

Ange′lio, or **de′gli An′geli** (PIETRO), [Lat. *Pe′trus An′gelus*], an eminent Italian scholar and Latin poet, born at Barga, near Lucca, in 1517. He was professor of belles-lettres at the University of Pisa for many years. His chief works are a poem on hunting called "Cynegeticon vel de Venatione" (1562), and a mediocre Latin epic poem entitled "The Syriad" (1591), the subject of which is the Crusades and the conquest of Palestine. This poem was admired by his contemporaries. Died Feb. 29, 1596.

Angelis (PIERRE), a French painter of landscapes and conversation-pieces, was born at Dunkirk in 1685. He worked in England, and his productions were praised by H. Walpole. Died in 1734.

Angel Island, California, is in the bay of San Francisco, 5 miles N. of San Francisco. It has an area of 800 acres, and extensive quarries of valuable brown sandstone.

An′gell (JAMES BURRILL), LL.D., born at Scituate, R. I., Jan. 7, 1829, graduated at Brown University, studied two years in Europe, was professor of modern languages and literature at Brown University (1853–60), editor of the "Providence Daily Journal" (1860–66), president of the University of Vermont (1866–71), and became president of the University of Michigan in 1871. He is the author of various articles in the "North American Review" and other quarterlies. U. S. envoy extraordinary and minister plenipotentiary to China 1880–82.

Angell (JOSEPH KINNICUT), an American lawyer and able legal writer, born at Providence, R. I., April 30, 1794, graduated at Brown University in 1813. Among his works are a "Treatise on the Right of Property in Tide-Waters" (1826) and "The Limitation of Actions at Law and in Equity and Admiralty." Died May 1, 1857.

An′gelo (or, more correctly, **Ag′nolo**) **Buonarro′ti** (MICHAEL), a sculptor, born probably at Settignano, 13 miles from Florence, on Mar. 6, 1475. The Buonarroti (or Buonarroti Simoni, as they designated themselves) were a distinguished Florentine family. The name is often found in connection with offices in the state. They held fast to a tradition that the Simoni were descended from the counts of Canossa, in whose veins flowed imperial blood; but modern historians attach no value to the tradition. The child was entrusted to a nurse, wife of a stone-mason, and Michael used in after years to say in jest that it was no wonder he had such love for his profession, since he had imbibed it with his mother's milk. He began to draw as soon as he could use his hands. They used to show his early paintings on the walls of the house in which he grew up. He was destined to be a scholar, but gained little from his teachers, preferring to lounge in the studios of the artists and try his hand at drawing. His father and uncles protested against his pursuing the artist's career, but he persevered till he carried his point. On the 1st of April, 1488, the lad being fourteen years old, he was apprenticed for three years to David and Domenico Ghirlandajo, the latter being one of the first masters at Florence. He agreed to pay him six gold florins the first year, eight for the second, and ten for the third. While with him, Michael produced his first painting, a copy of a plate of Martin Schöngauer representing the temptation of St. Anthony. The copyist colored the animals from nature. The pupil left the studio before the three years had expired—some say because the master was jealous of his ability. The gardens of Lorenzo the Magnificent, richly stored with works of art, were tempting and accessible to a youth of his promise, and soon the attention of the merchant-prince was attracted by a fawn modelled by his hand. Lorenzo took the young Michael into special favor, showed him his treasures, and introduced him, among others, to Poliziano, at whose suggestion the group of Hercules and the Centaurs was executed. At this time, too, he made a Madonna, after the manner of Donatello. Such advantages as these were of the rarest, and they were improved to the utmost. On the death of his patron and the overthrow of the Medici, the artist left the city and hastened to Venice; thence to Bologna, where he stayed about a year. In July, 1495, he was again in Florence, executing works for the Medici, a Sleeping Cupid among others, which became the occasion of his going to Rome under strong inducements from an agent of the cardinal San Giorgio, who had purchased the Cupid, but whose after-promises were finer than his performance.

The first great work executed in Rome was the statue of the Drunken Bacchus, a naked youth intoxicated with wine. Next came a *pietà*, the mourning Mary with the dead Christ in her lap, now placed in a side-chapel of St. Peter's, near the entrance. On the completion of the "pietà" in 1499, the artist was induced by a change in the government to return to Florence. Two years later he received an order to cut a statue from an immense block of marble, eighteen feet long, which had been brought from Carrara for a figure of colossal size designed for the church of Santa Maria del Fiore. The order had not been executed, and the block, the despair of architects, lay in the workshop yards adjoining the cathedral. From this block Michael Angelo evoked the "David" of the Piazza del Gran Duca. The statue was finished early in 1504. Owing to its enormous weight, 18,000 pounds, three days were required to transport it from the studio to the square in front of the Palazzo Vecchio, where it stood till 1873. The erection of the "David" was an event in Florence; occurrences were dated from it; a superstitious feeling even attached to it in the minds of citizens, who apprehended disaster to their city in case it should be disturbed.

The fame of the great sculptor had by this time reached the ears of Pope Julius II., who was meditating the erection of a colossal mausoleum for himself in St. Peter's, which was already enriched with costly monuments of art. A dispute arising between the pope and the sculptor, the high-spirited artist abruptly left Rome for Florence. It was there that he designed the great painting for the ducal palace, of which the cartoon only was finished, representing soldiers startled by the trumpet while bathing in the Arno. At present only a copy of small size remains, but this discloses the wonder of the work, the drawing of so many naked bodies in the various attitudes required by such a subject. A reconciliation with the pope having been effected, his next work was a bronze statue of Julius II., placed at the principal portal of San Petronio in Bologna. The unveiling took place Feb. 21, 1508. On All Saints' Day, 1509, so swiftly did this extraordinary man work, all Rome was gazing enraptured at the ceiling of the Sistine Chapel, which he literally covered in twenty months with frescoes by the order of Julius, the astonished but impatient pope admiring with the rest. In 1513 the sumptuous pontiff died, mentioning the mausoleum in his will, with directions for its completion; and Michael resumed work on it. New plans were drawn on a reduced scale, and a new contract was made, with higher estimates of cost. For three years the architect was completely absorbed in this task. It was estimated that the bronze ornaments for the tomb would require more than 22,400 pounds of metal. The blocks of marble were conveyed from his studio near the Vatican to the neighborhood of the Capitol, where were the sculptor's workshops, and where he himself took up his abode. He seems to have begun with the "Moses," with which the photograph has made all men familiar. Then, perhaps, come the two chained youths which now stand in the Museum of the Louvre in Paris.

The construction of the façade of San Lorenzo was the next great task proposed to the sculptor by Leo X., the pope undertaking that the work should not interfere with the completion of the mausoleum, which he was under contract to finish. The new work required not only a sculptor, but an architect, and besides these an engineer and a superintendent of authority. Angelo undertook the whole, would accept no aid, passed a spring and summer in the mountains, discovered and opened marble-quarries, directed workmen in several places, arranged for transportation, manufactured figures in wax; in a word, made himself felt in every department of the enterprise. Buonarotti possessed prodigious powers, and tasked them to the utmost, but it seemed to be his destiny to complete none of his gigantic enterprises. Partly through the impetuosity of his own nature, partly from the multitude and splendor of his ideas, and partly by reason of the caprices of his princely employers, his career was full of abortive schemes. The designing of the façade of San Lorenzo, the work at which he had toiled for years as he had at no other —a work the magnitude whereof threw the mausoleum into the shade—was brought to a stand-still finally by the disasters which befell the family of Medici. Instead of it, the construction of the Medicean chapel in Florence was assigned to him by Clement VII. But neither was this completed. The two statues of Lorenzo, duke of Urbino, and of Giuliano, duke of Nemours, the two famous figures which all the world are familiar with, attest the grandeur of the design. The efforts of the sculptor were amazing; he worked with passion; the toil would have killed another man. In a few months the colossal statues Morning, Evening, Day, and Night, which are regarded as his greatest conceptions, were placed in their niches.

In 1533, at the age of fifty-eight, and after a rest from similar labor of thirty years, Angelo, at the instance of the pope, took up his brush to paint the "Last Judgment" on the altar-wall of the chapel whose ceiling had been covered with the creations of his hand. The mausoleum was perforce discontinued again. The artist wished to resume it on the completion of the Last Judgment, but was again overruled by papal authority; a new chapel, the Capella Paolina, had been added to the Vatican, and no one but Michael Angelo must adorn it. The dilemma was painful, for he felt bound in honor to complete the mausoleum; but being released finally, he went forward with the decorations of the chapel. The two vast paintings representing the "Crucifixion of Peter" and the "Conversion of Paul" were finished, but they no longer exist as he left them.

Michael Angelo was an old man when Antonio di San Gallo, the director of St. Peter's church, died, and the responsible office was conferred on him. Other architects were talked of. Had Rafael been living, the post would doubtless have been his. Giulio Romano declined being a candidate for the position, on account of his ill-health. Bramante had laid the foundation of the present structure in 1506. After him several architects submitted plans and made alterations—Rafael, Fra Giacondo, Peruzzi. Antonio di San Gallo succeeded him. But Angelo took the work up as from the beginning, with full power to do as he would; and though his designs were never carried out, the main credit for what was done afterwards belongs to him. The front façade was not his work; the colonnades surrounding the square were not his design; the obelisk and the fountains were placed where they are by later hands; in other points his designs were crippled; but to him belongs the glory of the great dome, which he never saw suspended, but which he lived to model. What the whole would have been could his conceptions have been put into stone, none can tell, for his inward vision alone contemplated it.

The touch of the mighty hands was felt on other Roman buildings. It converted the Baths of Diocletian into the magnificent church "Degli Angeli." His brain teemed with ideas. He would have rebuilt half Rome had he possessed the power. His actually-formed plans would have transformed a conspicuous portion of the city if they could have been executed. But years impaired even his prodigious force. He drew till his hand could no longer hold a pencil; he carved as long as he could guide a tool; but he felt old; to use his own language, "Death often pulls me by the coat to come with him." His last group, a Christ lying dead in his mother's lap, was unfinished; a flaw in the marble condemned it, and nearly sacrificed it. The artist gave it to one of his pupils. It is now in Florence, beneath the dimly-lighted dome of the Santa Maria del Fiore. Urgent solicitations to return to his native Florence might have prevailed with him at this time but for his unwillingness to leave the milder climate of Rome, and his deeper unwillingness to abandon his great labor on St. Peter's, now running through five pontificates, which political disturbances, and failing funds, and continual misunderstandings had suspended. Saddened and solitary from the loss of friends, shadowed by the disappointment of unrealized hopes, he dwelt in Rome, his thoughts turning sometimes gloomily to things immortal and invisible.

"The fables of the world have robbed my soul
Of moments given me for thoughts of God."

He pours out his heart in sonnets which betray a spirit of fatigue and passionate longing for rest. The end came on the 18th of Feb., 1564, when he was ninety years old. He sank exhausted under the weight of three laborious generations.

The above is the barest possible outline of the career of this great man. An attempt to characterize his work even thus baldly would be impossible here; nor is it necessary, for the main features of his genius are familiar to all who are in the smallest degree acquainted with the productions of his hand. He was architect, sculptor, painter, poet, eminent in each, skilful in anatomy, a master of mechanics. In poetry, Dante was his model for style, the delight of his kindred spirit. He entreated the pope's permission to erect a worthy monument to Dante at his own expense in an honorable place. The finer monument he is said to have actually erected—a book of drawings illustrating the "Inferno"—was lost.

Michael Angelo was rather short of stature, with broad shoulders, firm and strong limbs, thin but robust frame. Habits of abstemiousness, continence, frugality, and industry steeled his constitution. The wealth his genius brought him did not spoil his simplicity. "Rich as I am," he once said in his old age, "I have always lived like a poor man." His head was wide, his forehead prominent, his eye small and light. His face was disfigured in early life by a blow dealt him by a fellow-student in the Medici gardens, which broke his nose. The disfigurement had its effect on a temper inclined to melancholy; but by nature he was kind, gentle, generous, self-reliant, independent, ambitious, proud, but magnanimous; too tenacious of his own rights, but not unready to concede the claims of others. His family position, his genius, and his fame gave him every social advantage, but he lived in retirement, rarely appeared on public occasions, avoided the companionship of artists, wrote Italian, the language of Dante, instead of Latin, and was satisfied to stand on his merit as an artist. The great sculptor lies buried in Santa Croce, in Florence. In the same church the duke had a monument erected in his honor.

Many points relating to the life and works of Michelagniolo, as he signed himself, have been left obscure from the withholding of important family papers—first, by the count Buonarroti, and afterwards by the city of Florence, to which the count bequeathed them. Even yet all is not known.

The Life by Herman Grimm, translated into English by Miss Bunnett (reprinted in Boston, 1866), contains much new matter of interest. A list of Michael Angelo's works may be found in the shorter biography by Richard Duppa, LL.B. (Bohn's "European Library"). An edition of the "Poems" was published in Florence about ten years ago. O. B. FROTHINGHAM.

An'gelus Dom'ini ("the angel of the Lord"), a form of prayer which Roman Catholics repeat at sunrise, noon, and sunset, when they ring a bell called the Angelus-bell.

An'gelus Sile'sius, one of the most prominent German poets of the seventeenth century, whose proper name was JOHANN SCHEFFLER, was born at Breslau, in Silesia, in 1624, was brought up a Protestant, and was physician to the duke of Würtemberg, but in 1652 joined the Roman Catholic Church and took orders as a priest. He wrote several mystical devotional works, among which are the "Cherub's Guide-Book" and the "Angelic Book of Wonders" (1674). Died July 9, 1677. Special works on him have been written by Kahlert and Schrader (1853).

An'germann, a navigable river of Sweden, rises in the mountains between Sweden and Norway, collects the water of several lakes, and flowing south-eastward enters the Gulf of Bothnia near Hernösand. Length, about 250 miles. Its banks abound with beautiful scenery.

An'germannland, or **Angerma'nia,** an old province of Sweden, is now included in the province of Hernösand or Westernorrland.

Ang'ermün'de, a town of Prussia, in the province of Brandenburg, on Lake Münde, and on the Berlin and Stettin Railway, 44½ miles by rail N. E. of Berlin. Pop. in 1880, 6833.

Angers, formerly **Angiers** (the ancient *Juliom'agus*), a fortified city of France, capital of the department of Maine-et-Loire, and once the capital of the province of Anjou. It is on the Mayenne River, 4 miles N. of the Loire, and on the railway which connects Tours with Nantes, 60 miles by rail S. W. of Le Mans. The old walls are converted into boulevards lined with handsome houses. It has a cathedral, a college, a library of about 35,000 volumes, a museum, and a school of arts and trades; also manufactures of linen and woollen stuffs, hosiery, silk twist, leather, etc. Here are the ruins of an ancient castle of the dukes of Anjou, and the Hospice of St. Jean, founded by Henry II. of England. Lord Chatham and the duke of Wellington attended a military school in Angers. Pop. of commune in 1881, 68,049.

Anghie'ra, de (PIETRO MARTIRE), [Lat. *Pe'trus Mar'tyr Angie'rius*], an eminent Italian scholar and historian, born of a noble family at Arona, on Lake Maggiore, in 1455. He emigrated to Spain in 1487, and became a priest. In 1501 he was sent by King Ferdinand on a mission to the sultan of Egypt, and in 1505 he was appointed prior of the church of Granada. He was also a member of the Council of the Indies. His most important work is a history of the New World and American discovery, entitled "De Rebus Oceanicis et Orbe Novo Decades" (1530), which is highly esteemed. Died in 1526.

An'gilbert, or **En'gilbert** [Lat. *Angilber'tus*], SAINT, an eminent statesman and Latin poet, was born in Northwestern Gaul. He married Bertha, a daughter of Charlemagne, and became a confidential minister of that monarch. In the latter part of his life he entered a monastery. He wrote several short poems, and was called the Homer of his time. Died Feb. 18, 814 A. D.

Angi'na [from the Gr. ἄγχω; Lat. *an'go*, to "strangle"], applied to diseases attended by a sense of suffocation. (See next article.)

Angi'na Pec'toris ("angina of the breast"), called also **Breast Pang** and **Heart Stroke,** an intense pain occurring in paroxysms, and usually commencing in the region of the heart or at the lower end of the breast-bone, and extending along the left arm, more rarely going towards the right side. It is characterized by a sense of suffocation, faintness, and often by the apprehension of approaching death. This symptom has been called the "spasm of a weakened heart," and is very seldom experienced by any but persons with an organic disease of that organ. The exciting cause is not unfrequently a strong and sudden emotional disturbance. Men over fifty years of age are most frequently attacked. Valerian, gentle aromatic stimulants, and saline cathartics are considered useful in the attack, which is usually, not always, short. Between paroxysms the patient should lead a tranquil, retired life, and make use of a plain, nutritious diet.

Ang'le [from the Lat. *an'gulus*, a "corner"], in popular language is a point formed by the meeting of two lines whose direction is not the same. In geometry a *rectilineal angle* is the inclination of two straight lines which meet, but have not the same direction. The point of meeting is called the *vertex* of the angle, and the lines are its *sides* or *legs.* Angles are measured by degrees of a circle, as their magnitude depends on the quantity of rotation round the vertex which would be required to make the lines coincide. An angle of ninety degrees is called a *right angle;* if it is more than ninety, it is *obtuse,* and if less than ninety, it is *acute.* When three or more planes meet at the same point, the corner thus formed is a *solid* angle.

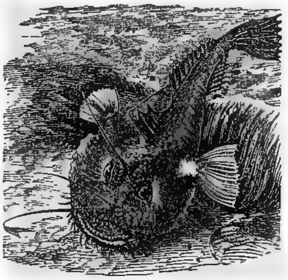
ANGLE, CURVILINEAR, is the angle formed by the tangents to two curves at the point where the latter meet.

ANGLE, DEAD, in fortification, an angle of the wall so formed that a small piece of ground in front of it can neither be seen nor defended from the parapet.

ANGLE, FACIAL, in zoology, is regarded as an important indication of the relative intelligence and sagacity of men and other animals. It signifies the angle made by the meeting of two straight lines, drawn, the one from the most prominent part of the frontal bone to the anterior margin of the upper jaw; the other from the external auditory foramen to the same point. The facial angle of a European is about eighty degrees; of an African negro, about seventy; of an ape, about fifty. (See FACIAL ANGLE.)

ANGLE, VISUAL, in optics, is the angle formed by two rays of light, or two straight lines drawn from the extreme points of an object to the centre of the eye. The apparent magnitude of an object depends on the magnitude of the visual angle which it subtends.

Ang'ler (*Lo'phius America'nus*), a fish found on the American coasts, and called the sea-devil or goose-fish. It belongs to a family of acanthopterygious fishes called Lophiadæ. It is from three to five feet long, has an enormous head and a very large mouth, furnished with worm-like appendages. By means of these, and the filaments which rise from the top of its head, it is supposed to attract the fishes on which it preys. The Lophiadæ are remarkable for the elongation of the carpal bones, by which they are enabled to leap up suddenly and to seize fish that are above them.



Angler, or Fishing-Frog.

Ang'les [Lat. *An'gli*], an ancient Low German tribe from which England derives its name (*Angle-land,* England). They occupied a narrow district in the S. of Sleswick, between the Schlei and Flensburg, whence some of them passed over, in the fifth century, in conjunction with other Saxon (or Low German) tribes, into Britain, where they conquered the native Britons and established the Anglo-Saxon Heptarchy. That the Anglian settlers of Britain should have given their name to the island is due, possibly, to the fact that the tribal name "Angles" had come to be used as a generic term for the Saxon (or Low German) tribes; just as the word "Yankee" has come to signify, to a European, any citizen of the U. S.; but, more probably, to the fact that the Anglians were the first of the Low German settlers of Britain to accept Christianity, and hence to be recognized in the Latin literature of the period. (See ANGLO-SAXON, by PROF. J. H. GILMORE, A. M.)

Ang'lesey, or **Ang'lesea** (*angle's* + *ei,* or "island;" anc. *Mo'na*), an island and county of North Wales, in the Irish Sea, about 1 mile from Caernarvon, from which it is separated by the Menai Strait. It is about 20 miles long and 17 miles wide. The surface is nearly level and the scenery rather tame; the soil is generally fertile, producing wheat, barley, oats, and potatoes. The principal rocks are mica-schists and limestone. Here are rich mines of copper and lead. The island is connected with the mainland by the Menai suspension bridge and the great Britannia tubular bridge, over which the Chester and Holyhead Railway passes. The ancient *Mona* was an important seat of Druidical power. Pop. in 1881, 50,964.

Anglesey, Earls of, and Barons Newport-Pagnell, in the English peerage (1661), Viscounts Valentia and Barons Mountnorris in the Irish peerage. The earldom was established in the Annesley family by Charles II., but became extinct 1761 in Richard Annesley, the sixth earl of this family. The title had been borne by Christopher Villiers, brother of the duke of Buckingham, and his son Charles.

Anglesey (Henry William **Paget**), Marquis of, a British general and statesman, born May 17, 1768, was the eldest son of the earl of Uxbridge. He entered the army, gained distinction as a cavalry officer, and became a major-general in 1808. He inherited the title of earl of Uxbridge on the death of his father in 1812, and entered the House of Lords. At the battle of Waterloo, 1815, he commanded the British cavalry, and lost a leg. Soon after this event he received the title of marquis of Anglesey. In 1828 he was appointed lord lieutenant of Ireland, but having become an advocate of Catholic emancipation, he was removed by Wellington in 1829. He held the same office from 1831–33, and was raised to the rank of field-marshal in 1846. Died April 29, 1854.

Anglesey, Marquesses of (1815, in the United Kingdom), earls of Uxbridge (1784, in Great Britain), Barons Paget (1550, in England) and baronets (1730, in Ireland).—Henry William George Paget, the third earl, was born Dec. 9, 1821, and succeeded his father in 1869. He was a member of Parliament for South Staffordshire from 1854 to 1857. D. Jan. 30, 1880.

Ang'lesite, a sulphate of lead produced by the decomposition of galena, was so named because first observed in Anglesey. It occurs in rhombic prisms with dihedral terminations, and of a white, gray, or yellowish color.

Ang'lican Church, a name of the Established Church of England, sometimes called the Anglo-Catholic Church. The creed of this Church is legally defined in the Thirty-nine Articles, first adopted in 1562. The term is also sometimes used as a collective name for all the religious denominations comprised under the name of Episcopalians. (See England, Church of, by Rev. B. R. Betts, A. M.)

Ang'ling [from the Lat. *an'gulus*, a "corner" or "angle," a "hook"], catching fish by means of a hook attached to a line and rod, the hook being furnished with bait, which is either some object upon which the fishes naturally prey, or is a counterfeit of such an object. The practice has prevailed through all ages and in almost all countries. In 1496, Wynkin de Worde "emprented at Westmestre a 'Treatise of Fysshinge with an Angle,' by Dame Juliana Berners." Izaak Walton in 1653 gave to the world his "Complete Angler," afterwards enriched with additions by his friend Charles Cotton, highly esteemed for correctness of details and happy humor. In angling the first consideration is what is termed "fishing-tackle," which consists of the rod, line, and hook, with the requisite baits, worms, flies, etc. The line should be strong, smooth, or even, flexible, and of a material not easily injured by wet. To the rod is attached a reel, on which a part of the line is wound when it is too long for the occasion, but especially when, having caught a strong fish, it is necessary to draw it in gradually and cautiously, lest the line should be broken. The reel should be made so as to wind or unwind freely. The baits may consist of various kinds of worms or flies, little fishes, small pieces of fish, meat, etc. Artificial lures are much used, particularly for catching the trout and salmon. They are variously made; usually the feathers of some bird (as the cock or pheasant) are so disposed as to resemble insects on which the fish are wont to feed. (See G. C. Scott, "Fishing in American Waters;" H. W. Herbert, "Fish and Fishing in the U. S.," 1850; Hallock, "The Fishing Tourist," 1873; Roosevelt, "Superior Fishing," 1865.)

Anglo-Cath'olics, a party of High Church Anglicans, often called **Puseyites,** from one of their leaders, Dr. Pusey, otherwise known as **Tractarians,** from the series of ninety tracts issued by them between 1833 and 1841. They emphasize these four "Catholic principles:" apostolic succession, baptismal regeneration, the real presence in the Eucharist, and the authority of tradition.

Angloma'nia [from the Lat. *An'glus*, "English," and the Gr. *μανία*, "madness" or "infatuation"], a term applied among the French and Germans to an indiscriminate admiration of English institutions and national peculiarities, or a propensity to imitate English customs and conventionalities. An Anglomania prevailed in France just before the revolution of 1789. The opposite state of feeling is called *Anglophobia*.

An'glo-Sax'on, a name given to the people and language which resulted from the consolidation of the different Low German tribes which in the fifth century overran Southern Britain. The name would seem to point to a blending of two distinct races, the Angles (which see) and the Saxons; but according to Latham ("Ethnology of the British Islands"), there is no distinction to be made between the Angles and the Saxons on the ground of the difference in name. "If," says he, "the Saxons of Anglo-Saxon England were other than Angles under a different name, they were North Frisians." According to the "Saxon Chronicle," which is, with reference to these events, a mere paraphrase of Bede's "Ecclesiastical History of Britain"—the latter work being written about 150 years after the last of the Saxon invasions, which the "Chronicle" records as if it were contemporaneous with them—there were seven distinct Teutonic "invasions" of Britain, beginning A. D. 449, and including parties of Jutes, Frisians, Saxons, and Angles. That Jutes, in the sense of people from Northern Denmark or people of Scandinavian stock, were the first of the Gothic invaders to land in Southern Britain, is highly improbable; and the topographical nomenclature of Kent, where Hengist and Horsa, with their party of Jutes, are said to have settled, bears no traces of Danish influence. By "Jutes" we are probably to understand, generically, "Goths." Indeed, in Alfred's Anglo-Saxon translation of the passage in Bede which the "Chronicle" manifestly follows, the Latin *Jutis* is rendered by *Geatum* (Goths), a term which is elsewhere applied to Alfred himself. The "Chronicle" itself, by the way, explicitly asserts (Bohn's ed., p. 341) that 787 was the first year when ships of Danish men sought the land of the English nation; one manuscript of the "Chronicle" says that Hengist landed with a party of *Angles;* while tradition calls him a Frisian, which he probably was.

The Saxon settlement of Britain was probably participated in by all the Low German tribes between the Elbe and the Schlei, although, on the ground of linguistic affinity, the Frisians would seem to have been most prominent. (See Latham's "Ethnology of the British Islands;" Marsh's "Origin and History of the English Language;" Nicholas's "Pedigree of the British People;" "Proceedings of the London Philological Society," vol. v.) As soon as the Saxons had subjugated the Keltic inhabitants of Britain (who resolutely opposed the invaders, and many of whom were driven before them into the fastnesses of Wales, and across the sea into Armorica, though most of them were, doubtless, amalgamated with the invading race), they began to contend with each other. The various kingdoms forming the famous "Heptarchy" (or, to speak more correctly, the "Octarchy"*) were at length, in 827, reduced by Egbert, king of Wessex, into a single monarchy, which attained its highest point of power and glory under Egbert's grandson, Alfred the Great (871–901). The Saxon power was completely overthrown by William the Conqueror at the battle of Hastings, in 1066. (For a full account of the Anglo-Saxons, their history, their laws, customs, etc., see Sharon Turner, "History of the Anglo-Saxons;" J. M. Kemble, "The Saxons in England;" also, Lappenberg's "History of the Anglo-Saxon Kings," and Freeman's "Old English History.") J. H. Gilmore.

Anglo-Saxon Language and Literature. The pagan conquerors of England described in the article Anglo-Saxon spoke many dialects, but all of them were Low German. Missionaries were sent from Rome (A. D. 597) to convert them to Christianity. The Roman alphabetic writing was thus introduced, and a single tongue gradually came into use as a literary language through the whole nation. It was at its best in the reign of Alfred the Great (A. D. 871–901). It continued to be written till the colloquial dialects, through the influence of the Normans, had changed so much as to make it unintelligible to the people; then there grew out of these dialects of mingled Anglo-Saxon and Norman a new literary language, the English. The old language was long called Anglisc, Englisc (English), and some scholars insist that it should still be called so, and that it is nothing but Early English. But it differs more from English than Latin does from Italian, and it needs a separate name, and has come to be called Anglo-Saxon. It belongs to the Indo-European family—has similar roots and grammatical structure with German, Latin, Greek, and Sanskrit. It was the most highly cultivated of the Germanic languages of its time; it attained the capacity of translating the Latin classics with accuracy and ease; and it has original literature worthy of study. Its chief interest, however, is as the mother-tongue of the English. It has given us the names of the objects, relations, and affections which we speak of most, the words laden with the dearest associations, the idioms on which the beauty of our poetry and the power of eloquence, wit, and humor depend. From it almost all our grammatical forms are derived. The following sketch of its grammar has been made full enough to explain our English grammar.

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* See on this particular subject, Sharon Turner's "History of the Anglo-Saxons," vol. i., book ii., chap. 4.

Phonology.—The alphabet has twenty-four letters.

Old Forms.	Roman.	Names.
A a	A a	â
Æ æ	Æ æ	â
B b	B b	bâ
C c	C c	kâ
D ꝺ	D d	dâ
Ð ð	DH dh	edh
E e	E e	â
F ꝼ	F f	ef
Ᵹ ᵹ	G g	gâ
Þ h h	H h	hâ
I ı	I i	ee
L l	L l	êl
M m	M m	êm
N n	N n	ên
O o	O o	o
P p	P p	pâ
R ꞃ	R r	êr
S ꞅ	S s	êss
T ꞇ	T t	tâ
Þ þ þ	TH th	thorn
U u	U u	oo
Ƿ ƿ	VV vv (W) (w)	wên
X x	X x	ex
Y ẏ	Y y	ypsilon

The vowels sounded nearly as in German: *a* as in *far;* *â* as in *fall;* *æ* as *a* in *glad;* *ǣ* as *a* in *dare;* *e* as in *let;* *ê* as in *they;* *i* as in *dim;* *î* as *ee* in *deem;* *o* as in *opine;* *ô* as in *holy;* *u* as in *full;* *û* as *oo* in *fool;* *y* nearly like *u* in *music*, or the French *u;* *ŷ* the same sound prolonged. There were many dialectical variations of the vowels, and there are also certain regular variations which are carefully represented in the Anglo-Saxon writing. Words originally spelt with *a* sometimes appear with *æ*, sometimes with *ea*, sometimes with *e*, sometimes with *o*, showing that the sound of *a* was as seldom pure, and as variously flattened and broken, as it is in the Middle and Southern States of America. When *a* or *i* would come before *l*, *r*, or *h*, the broken sound produced by those letters, such as we make in *hear*, *leer*, is written as *ea* and *eo*. So after *c* and *g* the breaking heard in our Southern States in *cear* for *car*, *gearden* for *garden*, is carefully represented by the same *ea*, *eo*. Before *m* or *n*, *o* often appears for *a;* as *mon* for *man*.

A vowel is also modified by the vowel of the following syllable, the German umlaut: *a* followed by *i* changes to *e:* man, *man*, meni, *men;* *ô* to *ê:* gôs, *goose*, gêsi, *geese;* *û* to *ŷ:* mûs, *mouse*, mŷsi, *mice;* and the like.

Many of the niceties of pronunciation were neglected in the Norman spelling, but they were long kept up in the folk-speech. The changes of the old to the present sounds of these vowels have been made in modern times, mostly during the Elizabethan age and since. These changes have an important peculiarity. All through the Indo-European languages, beginning with Sanskrit and coming down through Greek, Latin, Gothic, Anglo-Saxon, and the like, there is a regular gradual weakening of the vowels: *a* weakens to *o*, *e*, *i;* *u* to *o*, *e;* *i* to *ĕ*. But in English there is a vigorous strengthening of accented vowels. The weakest vowels, *u* and *i*, change to strong diphthongs: mûs becomes *mouse*, hûs, *house*, and the like; lîf becomes *life*, which is pronounced *lâife*, or nearly so; and *a*, though it becomes oftenest the mixed sound of *a* in *fate*, yet in words from Anglo-Saxon *â* is *aw* or *ô:* þâs becomes *those;* hâm, *home;* brâd, broad (brawd); and the like. Unaccented vowels weaken or disappear. This gravitation of our words to accentual centres indicates a special vigor of utterance accompanying the new manly vigor of the English race. Similar changes are found in modern German, French, and most vigorous modern tongues, but only in particular words, or within very narrow limits, compared with the English.

The consonants were pronounced in general as in English, but *c* was always pronounced as *k;* *g* like German *g*, as in *give*, or nearly enough to alliterate with it—never as in *George;* *i* consonant like *y;* ƿ like *w;* *qu* was represented by cƿ; *wh* by hƿ, in which a strong *h* was heard before the *w*, as a weak one now is in New England; the two sounds of *th*, as in *thin* and *thine*, had two characters, þ *thin*, and ð *thine*, which, however, are not found in any manuscript uniformly so used. *Hl*, as in hlâford, *lord;* *hr*, as in hraðor, *rather;* *ƿl*, as in ƿlâtung, *loathing;* *ƿr*, as in ƿrîtan, *write;* *cn* as in cniht, *knight*, had the first letter distinctly sounded, as the two last had in the Elizabethan age. The weakening of *c*, *sc*, and *g*, and of the combinations here mentioned, mostly occurred at the first mixture of Norman and Anglo-Saxon, several of the sounds being unpronounceable to the Normans.

Inflection.—The Anglo-Saxon has three genders, three numbers, and five cases. The dual number and the instrumental case are rare, except in the pronouns.

The Noun.—There are four declensions distinguished by the endings of the genitive singular—ES, E, A, and AN. The three first are from the old vowel declensions, and are called strong; the fourth is from the N-declension, and is called weak. Most nouns of the masculine or the neuter gender belong to the first or fourth declension, and are thus declined:

FIRST DECLENSION.

SINGULAR.	*Anglo-Saxon.*	*English.*	*Latin.*	*German.*
Nominative,	fisc,	*fish,*	sol,	Sohn.
Genitive,	fisces,	*fish's, of a fish,*	solis,	Sohnes.
Dative,	fisce,	*to* or *for a fish,*	soli,	Sohne.
Accusative,	fisc,	*fish,*	solem,	Sohn.
Instrumental,	fiscê, *or ŷ,*	*by* or *with a fish,*	sole	(ablative).
PLURAL.				
Nominative,	fiscâs,	*fishes,*	solês,	Söhne.
Genitive,	fiscâ,	*of fishes,*	solum,	Söhne.
Dative,	fiscum,	*to* or *for fishes,*	solibus,	Söhnen.
Accusative,	fiscâs,	*fishes,*	solês,	Söhne.
Instrumental,	fiscum,	*by* or *with fishes,*	solibus	(ablative).

FOURTH DECLENSION.

SINGULAR.	*Anglo-Saxon.*	*English.*	*German.*
Nominative,	oxa,	*ox,*	Knabe.
Genitive,	oxan,	*of an ox,*	Knaben.
Dative,	oxan,	*to an ox,*	Knaben.
Accusative,	oxan,	*ox,*	Knaben.
PLURAL.			
Nominative,	oxan,	*oxen,*	Knaben.
Genitive,	oxena,	*of oxen,*	Knaben.
Dative,	oxum,	*to oxen,*	Knaben.
Accusative,	oxan,	*oxen.*	Knaben.

From the first declension the English endings of the possessive case and of the plural number are derived. In Anglo-Saxon, as in German, most secondary formations and new words were declined according to the N-declension, and that seemed likely to be the leading one; but the Normans formed their plural in *-s*, and in English the Norman *-s* joined with the Anglo-Saxon *-s* to kill it, and *oxen*, with the irregular *children*, *brethren*, is almost its only memorial in current speech.

The possessive *-es* is a distinct syllable, and is so in English as late as Shakspeare. Many persons imagined it to be a contraction of *his*, and we often find *his* written in its place in Early English and Semi-Saxon: *Anak his children* for *Anak's children;* and Bacon, carrying out the mistake, has *Pallas her glass* for *Pallas's glass*.

The plural *-âs* is also a separate syllable, and the English *-es* remains so in words ending with a hissing sound: *glass, glasses;* *church, churches;* *box, boxes;* in other words it is now contracted: *king, kings*.

Words from Anglo-Saxon ending in *f* change it to *v:* *wolf, wolves;* while those from French mostly retain *f:* *chief, chiefs;* *gulf, gulfs*.

Some words in Anglo-Saxon from stems in *-i* have umlaut, as described under *Phonology*, in the dative singular and in the nominative and accusative plural. Thus, man, *man*, is declined: Nom. man; Gen. mannes; Dat. men(i); Acc. man; Plural Nom. men(i); Gen. mannâ; Dat. mannum; Acc. men(i). The *i* is dropped, and hence our plural *men;* so fôt, *foot*, plu. fêt(i), *feet;* gôs, *goose*, plu. gês(i), *geese;* tôð, *tooth*, têð(i), *teeth;* mûs, *mouse*, plu. mŷs(i), *mice;* brôðer, *brother*, brêðer, whence *brethren*, with the *-en* of the fourth declension irregularly added.

Neuters generally have no plural sign; sceâp, *sheep*, for example, is the same in the singular and plural. Hence several English words from such neuters remain without any plural sign: *sheep, deer, swine;* and some are used with or without one; as *folk, hair, head, hundred, pound, sail, score, year, yoke*.

A few neuters end in *-ru:* cild, *child*, plu. cildru, whence first *childer*, and then, with a second plural ending from the fourth declension, *childer-en, children*.

Gender has two aspects: (1.) It represents a tendency to use different sounds for relations to males from those to females; long vowels and liquids are oftenest used for females. (2.) A tendency to couple words agreeing in their endings. From the first point of view there can be but three genders; some languages have two, some one, some none. From the second point of view there may be as many genders as there are sets of endings. Some languages have none; some (*e. g.*, Congo and Caffer) have many.

In Anglo-Saxon the endings control the gender; pîf-man, *woman*, is masculine, because it ends in *man;* pîf, *wife*, is neuter, as in German.

Many stems have pairs of endings—one masculine, the other feminine. Remains of these in English are sang-ere, masc., *singer*, sang-estre, fem., *songster ;* bæc-ere, m., *baker*, bæc-estre, f. (whence the old bakster), a female baker; pebb-ere, m., *weaver*, pebb-estre, f., whence webster, a female weaver. Such pairs are also: fox, m., *fox*, fixen, f., *vixen ;* hlâford, m., *lord*, from hlâf, *loaf*, and peard, *keeper*, hlâf(or)dige, f., *lady ;* gans, gôs, *goose*, gandra, m., *gander*.

Many compounds are formed whose first part marks sex, and last part gender. pæpned-, *weaponed*, carl-, man-, are common for males; pîf-, *wife*, mægden-, *maiden*, cpên-, *queen* or *quean*, for females: pæpned-man, m.; carl-cat, not now *Charles-*, but *Tom-cat ;* man-cild, n., *man-child ;* pîf-man, m., *woman ;* mǣden-cild, n., *girl ;* cpên-fugol, m., *quean-bird ;* so also the expressions spere-healf, f., *spear-half*, on the male side; spindel-healf, f., *spindle-half*, on the female side.

Man in his various relations and the common domestic animals have pairs of words from different roots in use through many of the Indo-European languages. The English come mostly from Anglo-Saxon: fæder, môdor, *father, mother ;* sunu, dôhtar, *son, daughter ;* oxa, cû, *ox, cow ;* for *sheep*, ram, m., eôpu, f.; for *dogs*, hund, *hound*, bicce, f.; for *poultry*, coc, m., hen, f.; for *bees*, drân, *drone*, m., beô, f.; and the like.

The gender adopted for objects without life, when personified in English, often differs from the Anglo-Saxon gender; sunne, *sun*, is feminine; môna, *moon*, is masculine; scip, *ship*, is neuter. The German generally agrees with the Anglo-Saxon. English literature has rather taken these genders from the mythology of Greece and Rome.

THE ADJECTIVE.—The Anglo-Saxon adjective, like the Greek, Latin, and others, is declined; and, like the German, has two sets of endings for each gender. The common forms are called the strong, or indefinite, or pronominal declension, and are like those of the demonstrative pronoun. When an adjective is preceded by a definite article, demonstrative, or like word, or is in the vocative case, it is declined like a weak noun (see *oxa*, above), and this is called the weak or definite declension. Thus blind, *blind*, is commonly declined in the masculine thus: Nom. blind; Gen. blindes; Dat. blindum; Acc. blindne; Instrumental, blindê: Plural Nom. blinde; Gen. blindrâ; Dat. blindum; Acc. blinde; Instr. blindum; but "the blind man" would be thus declined: Nom. se blinda man; Gen. þæs blindan mannes; Dat. þam blindan men; Acc. þone blindan man; Vocative, blindan man; Instrumental, þŷ blindan men, etc. English adjectives, especially monosyllables, sometimes in Chaucer have an *-e* added, a relic of the definite declension or the plural number; but they are now undeclined.

Comparison.—Adjectives are generally compared by adding *-ir, -er, -ôr* for the comparative, *-ist, -est, ôst* for the superlative. The *i* of the endings works umlaut like that of *man, men* described in the declension of nouns: strang, *strong*, compar. streng(i)ra, superl. strengest; ald, *old*, compar. eld(i)ra, superl. eldest, whence the English *elder, eldest*.

Some words form their superlative in *-ma:* for-ma, *first*. Some of these form a double superlative, fyr-m-est, from forma; æfte-m-est, which the English has converted into *aftermost*, as though compounded with *most*. In the same manner are to be explained *hindmost, uttermost, southmost*, and the like.

The irregular comparison of *good, bad, much, little*, is already in Anglo-Saxon. The comparison by *more* and *most* is not used.

PRONOUNS.—The personal pronouns are thus declined:

First Person.

SINGULAR.	*Anglo-Saxon.*	*German.*
Nominative,	ic,	[ich], *I.*
Genitive,	mîn,	[meiner or mein], *mine*, or *of me.*
Dative,	mê,	[mir], *me*, or *to me.*
Accusative,	mec, mê,	[mich], *me.*
DUAL.		
Nominative,	pit,	*we two.*
Genitive,	uncer,	*of us two.*
Dative,	unc,	*to us two.*
Accusative,	uncit, unc,	*us two.*
PLURAL.		
Nominative,	pê,	[wir], *we.*
Genitive,	ûser, ûre,	[unser], *our*, or *of us.*
Dative,	ûs,	[uns], *us*, or *to us.*
Accusative,	ûsic, ûs,	[uns], *us.*

Second Person.

SINGULAR.	*Anglo-Saxon.*	*German.*
Nominative,	þû,	[du], *thou.*
Genitive,	þîn,	[deiner or dein], *thine*, or *of thee.*
Dative,	þê,	[dir], *thee*, or *to thee.*
Accusative,	þec, þê,	[dich], *thee.*
DUAL.		
Nominative,	git,	*ye two.*
Genitive,	incer,	*of you two.*
Dative,	inc,	*to you two.*
Accusative,	incit, inc,	*you two.*
PLURAL.		
Nominative,	gê,	[ihr], *ye.*
Genitive,	eôper,	[euer], *your*, or *of you.*
Dative,	eôp,	[euch], *you*, or *to you.*
Accusative,	eôpic, eôp,	[euch], *you.*

The dual was rare, and has disappeared. The English pronouns are plainly from the Anglo-Saxon. It is worth notice that gê, *ye*, is nominative, eôp, *you*, always objective in the English Bible. The first person plural is used for the singular by authors, preachers, and chiefs in Anglo-Saxon sometimes; *ye* and *you* appear first as pronouns of reverence for *thou* in Old English.

Third Person, Singular.

Masculine.

	Anglo-Saxon.	*German.*
Nominative,	he,	[er], *he.*
Genitive,	his,	[seiner or sein], *his*, or *of him.*
Dative,	him,	[ihm], *him*, or *to him.*
Accusative,	hine,	[ihn], *him.*

Feminine.

Nominative,	heô (or hie),	[sie], *she.*
Genitive,	hire,	[ihrer or ihr], *her*, or *of her.*
Dative,	hire,	[ihr], *her*, or *to her.*
Accusative,	heô (or hie),	[sie], *her.*

Neuter.

Nominative,	hit,	[es], *it.*
Genitive,	his,	[seiner or sein], *its*, or *of it.*
Dative,	him,	[ihm], *it*, or *to it.*
Accusative,	hit,	[es], it.

Plural for all the Genders.

Nominative,	hî, hie (or heô),	[sie], *they.*
Genitive,	heorâ (hyrâ, or hirâ),	[ihrer], *their*, or *of them.*
Dative,	him,	[ihnen], *them*, or *to them.*
Accusative,	hî, hie (or heô),	[sie], *them.*

The article and demonstrative *se* is thus declined:

Singular.

	Masculine.	*Feminine.*	*Neuter.*
Nom.,	se,	seô,	þæt, *the*, or *that.*
Gen.,	þæs,	þǣre,	þæs, *of the*, or *of that.*
Dat.,	þam,	þǣre,	þam, *to the*, or *to that.*
Acc.,	þone,	þa,	þæt, *the*, or *that.*
Instr.,	þŷ,		þŷ, þê, *by the*, or *that.*

Plural of all the Genders.

þâ, *the*, or *those.*	þâm, *to the*, or *to those.*
þǣrâ, *of the*, or *of those.*	þâ, *the*, or *those.*

Þis, "This."

Singular.

	Masculine.	*Feminine.*	*Neuter.*
Nom.,	þis,	þeos,	þis, *this.*
Gen.,	(þisses),	þisse,	þises (or þisses), *of this.*
Dat.,	(þissum),	þisse,	þisum (or þissum), *to this.*
Acc.,	þisne,	þas,	þis, *this.*
Instr.,	þŷs,		þŷs, *by this, thus.*

Plural for all Three Genders.

Nom., þâs, *these.*	Dat., þisum, *to these.*
Gen., þisserâ (or þissâ), *of these.*	Acc., þâs, *these.*

Interrogative.

	Masculine. Feminine is wanting. *Singular (Plural wanting).*	*Neuter.* *Singular.*
Nom.,	hpâ, *who*,	hpæt, *what.*
Gen.,	hpæs, *whose*,	hpæs, *of what.*
Dat.,	hpam, *to whom*,	hpam, *to what.*
Acc.,	hpone (or hwæne), *whom*,	hpæt, *what.*
Instr.,	hpŷ,	hpŷ, *by what, why.*

In the third personal pronoun it will be noticed that the feminine heô has given place in English to *she*, from seô, the demonstrative, and the plural throughout to *they, their, them*, from the same demonstrative. This personal pronoun is a weak demonstrative. Hit, *it*, has lost its *h;* the neuter genitive his has given way to *its*, a late English growth, not in the first edition of our Bible, and seldom used by scholars even as late as Milton. The English OBJECTIVES come from the old datives, and *him, them*, etc. are still datives in some idioms: *I gave him the book, I taught them grammar*, and the like.

The origin of English *that, this, them, they, these, those* (þâs), *who, what, whom,* is obvious; *which,* hƿylc, German *welcher*, is from hƿâ, *who,* and lîc, *like,* and means *of what kind.* Hƿâ and hƿæt are interrogatives in Anglo-Saxon; whas, *whose*, and wham, *whom*, appear as relatives in Semi-Saxon; the nominative *who* is not a full relative till the fourteenth century, and *what* does not now admit of an antecedent.

From these pronouns are derived a large number of ADVERBS in Anglo-Saxon, which have come into English: *where,* at *what* place; *there,* at *that* place; *here* (from *he*), at *this* place; so *whither,* to *what* place; *thither,* to *that* place; *hither,* to *this* place; and *whence,* from *what* place; *thence; hence; when,* at *what* time; *then; how, why* (from hû, hƿŷ), in *what* way; *thus,* in *this* way.

The DEFINITE ARTICLE *the* is a weakened form of the demonstrative *that,* like French *le* from Latin *ille;* it is common in Anglo-Saxon. The indefinite article *an, a,* is a weakened form of the numeral ân, *one,* like French *un* from Latin *unus;* though not uncommon, it is not as frequent as in English.

The personal pronouns are used as REFLEXIVES. *Self* is sometimes added, and then the pronoun and *self* are both declined: ic selfa, *I self,* not *my self;* Gen. mîn selfes, *of my self,* etc. The English *him-self, it-self, them-selves, her-self,* preserve the old construction.

NUMERALS.—The cardinals are like the English: ân, *one;* tƿâ, *two;* þreô, *three;* . . . endleofan, *eleven;* tƿelf, *twelve;* þreô-tŷne, *thirteen;* . . . tƿêntig, *twain-ten, twenty;* . . . from seventy to one hundred and twenty, the great hundred, *hund* is prefixed: hund-seofon-tig, *seventy;* . . . hund-teôn-tig, or hund alone for *hundred;* hund-endleofan-tig, *one hundred and ten;* hund-tƿelf-tig, *one hundred and twenty;* then hund and þrittig, *one hundred and thirty.*

The ordinals are—fyrsta, *first;* ôðer, *other, second;* þridda, *third;* feôƿerða, *fourth;* and so on as in English, except fift, sixt, twelft, which have only lately changed to *fifth, sixth, seventh;* and except that a modern *-teenth* has taken the place of the old -teôða in *thirteenth, fourteenth,* etc.

VERBS.—The CONJUGATIONS are determined by the past tenses, the old perfects. The old way of forming the perfect in the Indo-European languages was by repeating the root, a process familiar in Greek and Latin under the name of reduplication; tan, *to extend,* has its perfect tan-tan; these two syllables tend to run together, either by weathering out the unaccented one or by contraction. In Sanscrit we have *ta-tan,* in Greek *te-ta(n)-ka,* Latin *te-tin-i,* Gothic *than* and *thên.* In this way grew up five conjugations in Anglo-Saxon, called ancient or strong conjugations:

1. Root vowel *a* unchanged in the past tense; as, gife, *give;* geaf, *gave;* gifen, *given:* bidde, *bid;* bæd, *bade;* beden, *bidden.*
2. Root vowel *i* changed to *â* in the past tense; as, drîfe, *drive;* drâf, *drove;* drifen, *driven:* rîse, *rise;* râs, *rose;* risen, *risen.*
3. Root vowel *u* changed to *eâ* in the past tense; as, cleôfe, *cleave;* cleâf, *clove;* clofen, *cloven.*
4. Root vowel *â* changed to *ô* in past tense; as, tace, *take;* tôc, *took;* tacen, *taken.*
5. Root long or diphthong contracting with reduplication to *eô, ê* in the past tense; as, feallen, *fall;* feôl, *fell;* feallen, *fallen.*

In this classification the variations produced on the root vowel by adjacent vowels and consonants, as described above under *Phonology,* are not taken into account; and they are so numerous as to leave few verbs exactly alike to serve as models for new forms. Hence all new forms took the sixth or weak conjugation:

6. Past formed by suffixing *-de,* from dide, *did;* lufe, *love;* lufô-de, *loved;* lufôd, *loved.*

English verbs which change their vowel in the past tense come from Anglo-Saxon, and generally from verbs of the strong conjugations; but there are a few from weak verbs which had umlaut or breaking; thus selle, *sell,* sealde, *sold,* where the root *a* has umlaut to *e* in *sell,* as in *man, men,* and has breaking to *ea* before *ld;* so sêce, *seek;* sôhte, *sought,* where root *ô* has umlaut to *ê,* like *goose, geese,* and the *-de* is changed to *-te.* Similar are *tell, told; bring* from brengen, *brought; think, thought; buy, bought; work, wrought.* The vowels are pretty badly mixed up in English irregular verbs, and it is an inviting field for the grammarian to clear them up one by one.

Some of our auxiliaries come from old perfects used as presents, on which new past tenses are formed: mæg, *may,* meahte, *might;* can, cûðe, *cou(l)d;* the *l* is bad spelling, in analogy with *would* from *will, should* from *shall.*

Verbs without a connecting vowel are eom, *am;* dôn, *do;* gân, *go,* past eôde, *yode.* Stande, *stand,* stôd, *stood,* has an *n* inserted, a relic of an old Sanscrit conjugation.

INDICATIVE MOOD.

Present and Future.	*Past.*
ic hŷre, *I hear.*	ic hŷrde, *I heard.*
þû hŷrest, *thou hearest.*	þû hŷrdest, *thou heardest.*
hê hŷreð, *he heareth,*	hê hŷrde, *he heard.*
ƿê hŷrað, *we hear.*	ƿê hŷrdon, *we heard.*
gê hŷrað, *ye hear.*	gê hŷrdon, *ye heard.*
hî hŷrað, *they hear.*	hî hŷrdon, *they heard.*

SUBJUNCTIVE MOOD.

ic, þû, *or* hê hŷre.	ic, þû, *or* hê hŷrde.
ƿê, gê, *or* hî hŷren.	ƿê, gê, *or* hî hŷrden.

IMPERATIVE.	INFINITIVE.
hŷr þû.	hŷran.
hŷrað gê.	Gerund, tô hŷranne.

PARTICIPLES.

Present, hŷrende, *hearing.* Passive, hŷred, *heard.*

The *-s* of *hears* is a softening of -ð, used already in Anglo-Saxon in the northern dialect. The same *-s* is found in the plural. In the Midland Counties the plural -eð changed to *-n* to conform with the past tense and the subjunctive: forms like *those loves, they loves, they loveth* and *they loven,* are found as late as Shakspeare and Spenser. There are said to be 168 plurals in *-s,* and 46 in *-th* in the Shakspeare folio of 1623.

The subjunctive is used for our potential and imperative, as well as the subjunctive. Relics of these uses are in English: *It were a grievous fault*=It *would be* a grievous fault; *Be it so*=*Let it be so.* But a periphrastic potential, with the auxiliaries *may, can, must, might,* etc., is used in Anglo-Saxon as in English. The infinitive is regularly without *tô,* hence forms with auxiliaries still reject it, and familiar idioms in which the infinitive is the object of a verb, and *to* is not needed to express purpose or the like.

There was a verbal noun ending in *-ing, -ung,* which seems to have been confused with the participle in *-ende,* and given form to our present participle.

The participle (hŷred or gifen) is the only passive form. All the modes and tenses of the passive voice are made by joining auxiliaries with it, as in English, German, and other like languages.

The two tenses given above answer for all times—one for all past times, the other for present and future; but forms with auxiliaries are also used. Hæbbe, *have,* for the perfect, and hæfde, *had,* for the pluperfect, are in full use: hê hæfð mon geƿortne, *he has made man,* in which it is to be noticed that mon is the object of hæfð, and geƿortne a participle in the accusative masculine, agreeing with mon.

Some intransitives form these tenses by the verb *to be:* hê is hiðer gefered, *he is* (has) *come hither;* hê ƿæs âgân, *he was* (had) *gone.* These forms, which are like the German, are common in Shakspeare, Bunyan, and some of them still in conversation. *Have* with an intransitive does not bear analysis, but we do not want two tense signs for the same tense.

For the future, sceal, *shall,* and ƿille, *will,* are common, though seldom free from some meaning of *duty, promise, determination,* such as indeed goes with them in English. The present distinction between *shall* and *will* in the different persons is not established in Anglo-Saxon; *will* is more common in Northumbrian, as now in Scottish. The future perfect is not discriminated.

Other ways of expressing the future occur: hê gæð rǣdan, *he is going to read*—French, *Il va lire;* ic tô drincenne hæbbe, *I have to drink*=*I shall drink;* is tô syllenne, *is to be betrayed*=*will be betrayed.*

The progressive form is common, with also a slightly different use from the English: is feohtende, *is fighting, continues fighting;* beôð feohtende, *will continue fighting,* etc. The passive progressive *is being fought* does not occur; an ambiguous verbal noun in *-ing* answers the purpose: he ƿæs on huntinge, *he was a-hunting,* said both of the hunter and the game.

Of the emphatic form in *do* only rare examples are found, perhaps only when the verb is repeated.

PARTICLES.—Most English prepositions and conjunctions are from Anglo-Saxon, and the forms are often so full that we can easily connect them with corresponding words in other languages, and trace their origin and primary meaning. Most of those which look most primitive are from pronouns.

SYNTAX.—There is nothing in which Anglo-Saxon differs more from English than its syntax, which is that of a highly inflected language like Latin or Greek. The most general laws are common to all speech; a much larger number are common to all Indo-European tongues. The frequency with which different combinations are used by each makes the great difference between them. Apparent anomalies of English syntax may often be easily understood by study of the Anglo-Saxon from which they sprang: "*Me thinks I* *saw him,"* seems strange; but in Anglo-Saxon the *thinks* is found to be a different verb from the common English *think*, and to mean *seem*, and govern a dative; *it seems to me=methinks.* "*He taught me grammar*"—tǽcan, *teach*, governs an accusative and dative, *taught to me.* "*I asked him a question*"—âcsian, *ask*, governs an accusative of the person asked. "*He went a-hunting*"—*a* is the preposition *on* in Anglo-Saxon. "*I loved him the more*"—*the* is in Anglo-Saxon the instrumental case of the demonstrative (þŷ, þê), more *for that*, or *by that*. And so examples might be given without end. No difficult point in English syntax can be safely discussed by one who does not know its history.

For study of the language the English books are—March's "Comparative Grammar of the Anglo-Saxon," New York, 1870; Hadley's "Brief History of the English Language," in Webster's Dictionary, 1865; Klipstein's "Anglo-Saxon Grammar," New York, 1853; Rask's "Grammar," translated by Thorpe, London, 1865; Bosworth's "Anglo-Saxon Dictionary," London, 1837; Marsh's "English Language, and its Early Literature," New York, 1862; Corson's "Hand-book of Anglo-Saxon and Early English," New York, 1871; Shute's "Manual," New York, 1867; March's "Introduction to the Study of Anglo-Saxon," New York, 1870. In German: Heyne, "Kurtze Laut- und Flexionslehre," Paderborn, 1862; Koch, "Historische Grammatik der Englishen Sprache," Weimar, 1863; Maetzner, "Englische Grammatik," Berlin, 1865; Ettmüller, "Lexicon cum Synopsi Gram.," Qued. & Lips., 1851; Grein, "Sprachschatz der Angelsächs. Dichter," Cassel and Göttingen, 1864; Grimm, "Deutsche Grammatik," Göttingen, 1840.

Anglo-Saxon Literature.—The pagan Anglo-Saxons had their poets and orators, and after their conversion to Christianity there was an unbroken succession of good scholars in England. Most of their writings are, however, in Latin.

The *prose* writings in the Anglo-Saxon language may be classified as follows:

1. *Theological.*—The Gospels were read in the native tongue as part of the church service, and several manuscripts are preserved. Editions have been printed by Parker, 1571, Marshall, 1665, Thorpe, 1842, reprinted in America by Klipstein, Bouterwek, 1857, Surtees Society, 1854–63, Bosworth, 1865. Ælfric's translation of the Heptateuch was published by Thwaites, 1698. We have also versions of the Psalms. There are many *Homilies.* Ælfric, an eminent scholar, compiled or translated a series of eighty of them about A. D. 990, which were edited by Thorpe for the Ælfric Society, 1844–46. Others are promised by the Early English Text Society.

2. *Philosophical.*—King Alfred translated Boethius, "De Consolatione Philosophiæ." It is freely rendered, with large additions and omissions by the royal author. Editions are by Rawlinson, 1698, Cardale, 1829, and Fox in Bohn's Library, 1864.

3. *Historical.*—The most illustrious of the Anglo-Saxon scholars, Beda, known to many generations as "the Venerable Bede," wrote in Latin an "Ecclesiastical History of the Angles and Saxons," translated by King Alfred into Anglo-Saxon, abounding in picturesque details of the heroic adventures and characters of his time, which has been often reprinted, and its best scenes repeatedly rendered into verse. (See, for some of them, Wordsworth's "Ecclesiastical Sonnets.") The Anglo-Saxon translation was edited, with a Latin translation, by Abraham Wheloc, folio, 1644, and by Dr. John Smith, 1722.

"The Anglo-Saxon Chronicle" gives an outline of the history of Britain from the earliest times to Henry II., A. D. 1154. Copies were kept at the monasteries as early as the time of Alfred. As far as Beda's history extends, the Chronicle has been drawn from it or a common source. It is in general a meagre affair. There are many editions: Thorpe's, 1861, has seven parallel texts, a translation and indexes.

The general "History of the World," by Orosius, was translated by Alfred, with additions of some value. It has often been printed. Thorpe's edition in Bohn's Library has a translation and glossary, 1857.

Many brief biographies are found in Beda and the Homilies, and some separate lives. That of St. Guthlac (see Wright's "Biographia Literaria") has been several times printed; Goodwin, London, 1848.

4. *Law.*—A considerable body of laws has been got together. They begin with those of Æthelbirht, who was king of Kent at its conversion. Those of Alfred have an introduction on the history of law, the laws of Moses, and their relations to Christ and Christian nations. The laws are full of valuable knowledge. The ecclesiastical rules relating to confession, penance, and the like are particularly suggestive. The best editions are Thorpe's and that of Schmid, Leipsic, 1858. The latter has translations into Latin and German, and valuable notes and a glossary.

5. *Natural Science and Medicine.*—Such are in "Popular Treatises of Science," Wright, 1841, and Leechdom's, Cockayne, 1864–66.

6. *Grammar.*—There is a grammar by Ælfric in Somner's Dictionary, 1659; A Colloquy and glossaries, Wright, 1857.

Anglo-Saxon Poetry is very different in metrical structure from the English. It is like the Old Icelandic, the Old Saxon, and the Earliest German. It is marked off into verses by alliteration, the recurrence of the same initial sound in the first accented syllables of words. A perfect verse of the common narrative kind has three alliterating syllables—two in the first section, and one in the second; but the first section has but one in many verses. A very artificial rhythm is used. Each section has four beats or metrical accents. Every root-syllable has its beat, and so has the final syllable of each section, and almost any syllable may have a beat if the poet chooses.

þǽr' pæs *h*æl'eðâ *h*leah'tor'; *h*lyn' spyn'sôde',
*w*ord' pǽr'on *w*yn'sume', Eôd'e *W*ealh'ðeôp' forð',
*c*pên' Hrôð'gâr'es' *c*yn'nâ' gemyn'dig',
*g*rêt'te *g*old'-hrod'en' *g*um'an' on heal'le,'
and' þâ *f*reô'lîc' pîf' *f*ul' ge'seal'de',
ǽr'est *E*âst'-Den'â' *ê*ð'el'-pear'de',
*b*æd' hin'e *b*lîð'ne' æt þǽr'e *b*eôr'-þeg'e'.

There was *l*ordly *l*aughter; there the *l*ute's vibration,
*w*ords were *w*insome. Forth yode *W*ealhtheow.
*q*ueen of Hrothgar, of *c*ourtesies mindful,
*g*reeted in *g*old-array the *g*uests in the hall,
and then the *g*ladsome wife *g*ave the beaker
first to the sovereign *l*iege, *l*ord of the East-Danes,
*b*lithe she *b*ade him be at the *b*eer-drinking.

Knowledge of the popular poetry was universal. It was disgraceful not to be able to chant in turn at the feasts. Beda, Aldhelm, Alfred learned and loved the old ballads, and made verses. Most of the poetry has perished. The early Christians condemned whatever was mixed with the old superstitions, and the Normans despised or neglected all Anglo-Saxon literature. But we have specimens of various kinds:

1. *The Ballad Epic.*—The old ballads are brought together, beautified, exalted, and fused into a long poem. "Beowulf" is the "Iliad" of the Anglo-Saxons. The exploits celebrated in it are for the most part combats with monsters after the manner of Hercules, but it has the usual epic variety—the wrath of the monster, the rousing of the hero, the fitting out of the ship, the voyage, the banquet, the wordy war of rivals, woman's graceful presence, the arming for fight, and desperate and long-drawn struggles. Only one manuscript of it remains. Little notice of it was taken till the late revival of Anglo-Saxon scholarship; but the interest in it has risen to a great height, and many editions, translations, and essays of elucidation and interpretation have appeared in Germany, England, and Denmark. We may mention Kemble, 1833–37; Ettmüller, 1840; Thorpe, 1855; Grein, two editions, 1857–67; Gruntvig, 1861; Heyne, two editions, 1863–68.

There are a few fragments to be classed with "Beowulf." Such are the "Traveller's Song" and the "Fight at Finnsburg," both which are given with "Beowulf" in many editions.

2. *The Bible Epic* is a treatment of the Bible narrative similar to that of the ballad epic. The great master in this sphere is Cædmon, who is often called the Anglo-Saxon Milton. Beda, who lived in the same region, and may have seen him, tells us that he was an unlearned man, who could not sing the common secular ballads, and that a vision appeared to him and directed him to sing the Creation, and that his success was esteemed inspiration. He had many imitators, and whether the poems which remain are his is not known. These are four poems, called, by Grein, Genesis, Exodus, Daniel, Christ and Satan. Similar are a fragment of Judith, Cynewulf's "Christ," "The Harrowing of Hell," and some fragments. Of all these we have a critical edition and translation by Grein, and of Cædmon editions by Thorpe, 1832; Bouterwek, 1849–54. The manuscript is illuminated, and the illuminations were copied and published in 1833.

3. *Ecclesiastical Narratives.*—These are versified lives of saints and chronicles. We have Andreas (1724 lines), Juliana (731 lines), Guthlac (1353 lines), Elene (1321 lines).

4. *Psalms and Hymns.*—Translations of a large part of the Hebrew Psalms, and a few Christian hymns and prayers.

5. *Secular Lyrics.*—A few from the "Chronicle," celebrating the kings or others.

6. *Allegories, Gnomic Verses, and Riddles.*—"The Phœnix" (677 lines), "The Panther" (74 lines), "The Whale" (89 lines), Gnomic Verses and Riddles; "Dialogue between Solomon and Saturn," in Grein, vol. ii., pp. 339–407—a favorite style with the Anglo-Saxons.

7. *Didactic, Ethical.*—Alfred's "Metres of Boethius" are versifications of parts of Boethius referred to under Prose Writings above. The best edition is Grein, vol. ii., pp. 295–339. Grein's "Bibliothek der Angelsächsischen Poesie," Göttingen, 1857, with his translations and complete glossary, gives the apparatus for the study of all these poems. His "Bibliothek der Angelsächsischen Prosa," now in process of publication, promises to render an equal service for Anglo-Saxon prose.

(Outlines of this literature are to be found in March's "Introduction to Anglo-Saxon," New York, 1870; Morley's "English Writers," London, 1867; Wright's "Biographia Brit. Literaria," London, 1842; Ettmüller's "Scopas" and "Boceras," Qued. and Lips., 1850.)

F. A. March.

Ango'la (formerly **Don'go** or **Ambonde**), a country in the S. W. part of Africa, bordering on the Atlantic Ocean, is bounded on the N. by Congo, from which it is separated by the Danda River, and on the S. by the Coanza River. It is included between lat. 8° and 10° S. The interior is said to be mountainous or hilly; the land is well watered, and produces a luxuriant tropical vegetation. Angola is rich in minerals, among which are gold, silver, copper, and iron. Lions, leopards, elephants, and hippopotami abound here. The chief articles of export are ivory, gold, wax, and slaves. This country is subject to the Portuguese, who have several forts on the coast. Nominally, a large proportion of the population belongs to the Roman Catholic Church, which, since the middle of the sixteenth century, has had a bishop in the capital; but their Christian belief is still largely mixed with pagan notions and practices. Pop. of the colony, about 600,000. Area, 25,500 sq. miles. Capital, San Paulo de Loando. Pop. of cap. 12,500.

Angola, on R. R., capital of Steuben co., Ind. (see map of Indiana, ref. 1–G, for location of county), has a large school building and various manufactures. Pop. in 1870, 1072; in 1880, 1280.

Ango'ra (the ancient *Ancy'ra*; in Turk., *Engoor'*), a town of Asiatic Turkey, about 217 miles E. S. E. of Constantinople. It is situated on an elevated plain adapted to pasturage, and is celebrated for its breed of goats, having long silky hair which is manufactured into shawls and a stuff called mohair. Large quantities of this hair are exported, and goats of this breed have been successfully introduced into the U. S. Here are remains of Greek and Byzantine architecture. The most remarkable is a white marble temple which was built by the ancient inhabitants in honor of Augustus; it has on its wall a famous inscription, much of it still legible, stating the most important events in the emperor's life. On July 20, 1402, a decisive victory was gained near Angora by Tamerlane, the Tartar conqueror, over Bayazeed (Bajazet), the Turkish sultan, who was taken prisoner. It was recovered by the Turks under Mahomet I. in 1415, and from that time has continued to be a part of the Ottoman empire. The pop. does not exceed 20,000, one-third of whom are Armenians. (For a notice of the ancient city, see Ancyra.)

Angor'no, or **Angornu,** a town of Central Africa, in Bornu, is near the W. bank of Lake Tchad and 15 miles S. E. of Kuka. It has an extensive trade in cotton, amber, and slaves. Pop. estimated at 30,000.

Angostu'ra, or **Bol'ivar City,** an important city of Venezuela, capital of the province of Guiana, is on the right bank of the Orinoco River, 263 miles S. E. of Caracas. It is advantageously situated for trade, and exports cotton, indigo, coffee, tobacco, cattle, etc. It contains a college, a hospital, and a fine hall in which the congress of Angostura met in 1819. Pop. in 1881, 10,861.

Angostura Bark, or **Angustura Bark,** the aromatic bitter bark of certain trees of the natural order Rubiaceæ, natives of the tropical parts of South America. The bark is so named because it is imported from Angostura. It is tonic and stimulant, and has been used in the cure of fever, dysentery, diarrhœa, etc. It is obtained chiefly from the *Galipæ'a officina'lis* or *Cuspa'ria febri'fuga.*

Angoulême (anc. *Inculis'ma* or *Iculis'ma*), a city of France, capital of the department of Charente, on the river Charente and on the Paris and Bordeaux Railway, 83 miles by rail N. E. of Bordeaux. It is situated on a hill, and has a cathedral, college, theatre, public library, and several paper-mills. Linen and woollen stuffs are manufactured here. This town was the birthplace of Marguerite de Valois and Balzac. Pop. in 1881, 32,567.

Angoulême, d' (Charles de Valois), Duke, a natural son of Charles IX. of France, born April 28, 1573. Having formed a plot against King Henry IV., he was imprisoned from 1604 to 1616. He had the chief command of the royal army when it began the famous siege of Rochelle in 1628. Died Sept. 24, 1650.

Angoulême, d' (Louis Antoine de Bourbon), Duke, born Aug. 6, 1775, was the eldest son of the Comte d'Artois, afterwards Charles X. of France. He emigrated with his father in 1789, and in 1799 married his cousin, Marie Thérèse Charlotte, a daughter of Louis XVI., with whom he lived in exile until 1814. He commanded the French army which intervened against the Spanish liberals in 1823, and restored Ferdinand VII. to absolute power. His abilities were mediocre. Died at Göritz June 3, 1844.

Angoulême, d' (Marie Thérèse Charlotte), Duchess, the wife of the preceding, was born Dec. 19, 1778, and was a daughter of Louis XVI. In Aug., 1792, she was confined in the Temple with the king and her mother, Marie Antoinette. She was released in 1795, and exchanged for Camus and others who had been captured by the Austrians, after which she passed many years in exile. She appears to have had more energy than the other Bourbons. She became again an exile in 1830. Died Oct. 19, 1851.

Angoumois, a former province of France, included the present department of Charente and part of Dordogne. Its capital was Angoulême.

An'gra,[*] a seaport-town, and the capital of Terceira, one of the Azores; lat. 38° 39′ N., lon. 27° 12′ W. It has a beautiful situation and a good harbor. It contains a cathedral, a military college, and an arsenal. Wine, grain, honey, etc. are exported from this town. Pop. in 1878, 11,070.

An'gri, a town of Italy, in the province of Salerno, on the railway from Naples to Eboli, 15 miles by rail N. W. of Salerno. Pop. 10,332.

Anguil'la, or **Snake Island,** an island in the Leeward group, in the West Indies, 4 miles N. of St. Martin. Area, 34 square miles. The island is low and covered with forests, and belongs to Great Britain. The staple products are sugar, tobacco, and cotton. Pop. about 3100.

Anguil'lula (*i. e.* "little eel," from the Lat. *anguil'la*, an "eel"), a genus of minute animals allied to the nematoid worms. Best known are those called "vinegar eels," found abundantly in cider vinegar. They are remarkable for tenacity of life. *Anguillula fluviatilis*, after being dried until it becomes brittle, will recover its activity when placed in water. *Anguillula tritici*, found on blighted wheat, has been known to revive after being kept dry for five years.

An'guis [a Latin word signifying "serpent"], a systematic name of a genus of serpent-like reptiles having the maxillary teeth compressed and hooked, and the palate not armed with teeth. (See Blind Worm.)

Anguiscio'la, or **Angusso'la** (Sofonisba), an eminent Italian painter, born at Cremona about 1534, excelled in portraits. Invited by Philip II. of Spain, she went to Madrid, and painted portraits of the queen and others. In the latter part of her life she became blind. It is said that Van Dyke acknowledged he had derived much benefit from her conversations on art. Died in 1626.

Angular Motion of a point or a body is the same as that of the line or radius vector joining the moving point to some fixed point. The *angular velocity* of the body in reference to the fixed point is the ratio of the angle described by the radius vector to the time occupied by its description.

Angus, Earl of. See Douglas.

An'gus (Rev. Joseph), D. D., born Jan. 16, 1816, educated at the University of Edinburgh, president of Regent's Park College (Baptist), London, and author of "The Bible Handbook," "Handbook of English Literature," "Handbook of the English Tongue," and other works, and editor of the best edition of Butler's "Analogy" (1855, 12mo, pp. 551). He was one of the revisers of the English New Testament for the American Bible Union, a member of the committee of the convocation of Canterbury for revising the New Testament, and a prominent member of the Evangelical Alliance, as a delegate of which he visited the U. S. in 1873.

Angus (Samuel), a naval officer born at Philadelphia in 1784. He became a captain in the U. S. navy, and commanded the vessel which in 1814 conveyed Adams and Clay to Ghent on a diplomatic mission. He served with distinction in the French troubles of 1800, in the war of 1812, and was four times wounded. Died May 29, 1840.

An'halt, a duchy of Germany, almost completely surrounded by the Prussian province of Saxony, consists of two larger parts and four enclaves, having together an area of 869 square miles. The duchy is traversed by the Saale, the Elbe, and the Selke. While the eastern part is level, the western is mountainous and wooded. The soil is generally fertile. Cattle-raising is extensively and successfully carried on here. Here are also mines of silver, copper, iron, and lead. The duchy has five gymnasia and three seminaries. Pop. in 1880, 232,747. Capital, Dessau. According to the budget of 1881–82, the receipts and the expenses were both estimated at 16,528,100 marks. The public debt in 1879 amounted to 7,445,417 marks. The dukes of Anhalt claim to have descended from the celebrated Albert the Bear (which see), the first margrave of Brandenburg. In 1212 Anhalt was divided into three parts; it was united in 1570 by Joachim Ernst, and again divided into four branches—Dessau, Bernburg, Köthen, and Zerbst—upon his death in 1586. In 1793, after the extinction of the house of Anhalt-Zerbst, its dominions were divided by the remaining three. In 1807 the three houses joined the Confederation of the Rhine, and in 1814 the German Confederation. In 1847 the house of Anhalt-Köthen became extinct, and the duke of Anhalt-Dessau took the administration of its dominions upon himself; and when, in 1863, the house of Anhalt-Bernburg also became extinct, Anhalt was again united under one ruler. (See the works of Heine, 1865; Krause, 5 vols., 1861–66; and Siebigk, 1867.)

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[*] *Angra* in Portuguese denotes a "creek," "bay," or "station for ships."

An'halt-Bern'burg (Christian), Prince of, a German general, born in 1568, was a man of superior abilities. He was the chief promoter of a league of Protestant princes formed against the emperor in 1608. He commanded the army of Frederick elector Palatine, which was defeated at Prague in 1620. Died in 1630.

An'halt-Des'sau (Leopold), Prince of, an able German general, born in 1676, commanded the Prussian troops under Prince Eugène in Italy and Flanders in 1706–12, and was second in command of the Prussian army which opposed Charles XII. of Sweden in 1715. Died in 1747.

Anhandu'hy-Mirim' and **Anhandu'hy-Guazu',** two rivers of Brazil, in the province of Matto-Grosso. They rise in the Serra Galhano, and enter the Rio Vermelho. The former is about 150 miles, and the latter about 200 miles, in length.

An'holt, an island of Denmark, in the Cattegat, is 7 miles long and about 4 miles wide; lat. of the lighthouse, 56° 44′ N., lon. 11° 39′ E. It is surrounded by dangerous shoals. Pop. 200.

Anhy'dride, an oxygen compound formed by the abstraction of water from an acid. Thus, for instance, by taking (new notation) water, H_2O, from carbonic acid, H_2CO_3, we have carbonic anhydride, CO_2. (See Chemistry.)

Anhy'drite [from the Lat. *adhy'drus*, and the Gr. λίθος, a "stone"], a mineral composed of anhydrous sulphate of lime. It is harder and heavier than common sulphate of lime (gypsum), into which it is slowly converted by the absorption of water. It occurs in several varieties—viz. granular, fibrous, radiated, and translucent, sparry anhydrite or cube-spar, and compact anhydrite.

Anhy'drous [from the Gr. ἀν, priv., and ὕδωρ, "water"], "without water," a chemical term applied to a compound which contains no water, as pure and absolute alcohol, which is called *anhydrous alcohol;* quicklime as it comes from the kiln is *anhydrous lime*, but when it comes into contact with water, the lime and water combine and form *hydrated* lime.

Anice'tus, Saint, was bishop of Rome about 155 A. D. The time of his death is uncertain.

An'il, one of the plants from which indigo is obtained; a kind of indigo said to be a native of America, but now cultivated in the East Indies. It is very similar to *Indigof'era tincto'ria.*

An'iline [from *anil*, "indigo"], **Phenyl'amine,** or **Am'ido-benzol',** discovered in 1826 by Unverdorben as a product of the distillation of indigo, and called by him *crystalline*, on account of the ready crystallization of its salts. It attracted much attention from chemists, and was made the subject of many researches, which contributed greatly to enlarge the facts and theories of modern chemistry. It did not acquire any commercial importance till 1856, when Perkin prepared from it the beautiful purple dye *mauve.* The brilliancy and intensity of this color attracted the attention of chemists and dyers, and in a short time an entirely new series of colors was discovered, by which the art of dyeing has been almost revolutionized.

Aniline is found among the products of the distillation of bituminous coal (in "coal-tar"), of peat, bones, etc. It is prepared, however, from benzol derived from the more volatile portions of coal-tar. The benzol, C_6H_6, is converted by the action of nitric acid into nitrobenzol, $C_6H_5NO_2$, and this compound is changed by the action of ferrous acetate, produced by iron filings and acetic acid, into aniline:

$$\underset{\text{Nitro-benzol.}}{C_6H_5NO_2} + 6FeO + H_2O = \underset{\text{Aniline.}}{C_6H_7N} + 3Fe_2O_3.$$

Aniline is a colorless, mobile, oily liquid, having a faint vinous odor and aromatic burning taste. Its specific gravity is 1.002; boiling-point, 182° C. It is very poisonous. It dissolves very slightly in water, in all proportions in ether, alcohol, wood-naphtha, bisulphide of carbon, and in oils, fixed and volatile. The aqueous solution is faintly alkaline, and precipitates many metallic bases from solutions of their salts. With bleaching-powder it produces a violet-blue color, with sulphuric acid and potassic bichromate, a bluish-black precipitate, and when treated with arsenic acid, stannic chloride, etc., it is converted into rosaniline. When exposed to the air, aniline acquires a yellow or red color, which is always noticed in commercial "aniline oil." It forms a numerous class of salts, most of which crystallize readily.

Aniline is an amine, a monamine, or an ammonia, in which one atom of hydrogen is replaced by a radical *phenyl*, C_6H_5:

$$\text{Ammonia, } N\left\{\begin{array}{l}H\\H\\H\end{array}\right.;\ \text{Aniline, } N\left\{\begin{array}{l}H.\\C_6H_5.\\H.\end{array}\right.$$

Aniline is now manufactured in enormous quantities for the preparation of the different colors. (See Amines, Benzol, Phenyl.) C. F. Chandler.

Aniline Colors. In 1835, Runge noticed the violet-blue color produced by chloride of lime with aniline, and Fritzsche subsequently showed that chromic acid formed with aniline a blackish-blue precipitate. In 1853, Beissenhirtz obtained a blue by acting upon aniline with potassic dichromate and sulphuric acid. It remained for W. H. Perkin to develop this reaction, and to lay the foundations of the great aniline industry which is now so extensive. In 1856 he isolated the color found in the last-mentioned reaction, called it mauve, and showed that it could be used as a dye. Many chemists at once turned their attention to the subject, and a great number of new colors of almost every tint and shade were discovered, which have taken the place in dyeing, and to a considerable extent in calico-printing, of the animal and vegetable colors in previous use. The chemical composition of many of these colors has been established, and many chemical facts of great importance have been developed by their study. (See article Coal-Tar Colors.)

Aniline Reds.—*Rosaniline* salts are the most important of all the aniline colors. They are not only used for the production of brilliant tints on cotton, wool, and silk, but they constitute the material from which many of the other colors are prepared. Rosaniline has been shown by Hofmann to be a colorless base, a triamine (see Amines), having the formula $C_{20}H_{19}N_3$, or $N_3\left\{\begin{array}{l}(C_6H_4)''.\\2(C_7H_6)''.\\H_3.\end{array}\right.$ It is produced by the union of one molecule of aniline with two molecules of toluidine, and the abstraction of six atoms of hydrogen:

$$\underset{\text{Aniline.}}{C_6H_7N} + \underset{\text{Toluidine.}}{2C_7H_9N} = \underset{\text{Rosaniline.}}{C_{20}H_{19}N_3} + H_6.$$

A great variety of dehydrogenizing agents may be employed to effect this reaction. It is found that the best results are obtained when an aniline oil is employed which contains about 25 per cent. of toluidine. Hofmann in 1858 prepared rosaniline by treating aniline with tetrachloride of carbon, but on a manufacturing scale Medlock's process with arsenic acid is now in most general use. The aniline oil, 1 part, is heated with 1½ parts of a 75 per cent. solution of arsenic acid in a closed iron still provided with a stirrer. The product is boiled with water and filtered, and on adding to the solution common salt in excess, the crude hydrochlorate of rosaniline is precipitated. This is dissolved in boiling water, filtered, and allowed to crystallize. This salt of rosaniline, $C_{20}H_{19}N_3.HCl$, is known as *aniline red, magenta, fuchsine, solferino, roseine, azaleine*, etc. It appears in magnificent green crystals, with a metallic lustre like that of the wing-covers of Brazilian beetles or cantharides. It is soluble in water and in alcohol, with a color varying from a beautiful cherry-red to a crimson.

Verguin and Rénard of Lyons, who first made aniline red on a manufacturing scale, used tetrachloride of tin, $SnCl_4$. Gerber-Keller prepared rosaniline nitrate, *azaleine*, by the action of mercuric nitrate. Lauth and Depouilly heat aniline with nitrate of aniline. Laurent and Castelhaz prepare aniline red directly from the crude nitrobenzol, which contains nitrotoluol, by heating it with iron filings and hydrochloric acid. The first reaction of the $FeCl_2$ on the nitrobenzol results in the removal of oxygen from the nitrobenzol and nitrotoluol, and the addition of hydrogen, producing aniline, toluidine, and Fe_2Cl_6. On heating this mixture further, the Fe_2Cl_6 removes hydrogen from the aniline and toluidine, and rosaniline is the result. Coupier heats together aniline, nitrotoluol, hydrochloric acid, and a little iron. Rosaniline hydrate, $C_{20}H_{19}N_3.H_2O$, may be precipitated from the solutions of its salts by alkalies; it is rose-red and somewhat crystalline, but by proper care may be obtained colorless.

Ammonic sulphide, or zinc-powder, converts rosaniline salts into leucaniline, $C_{20}H_{21}N_3$, which is colorless; by adding H_2, oxidizing agents change it back to rosaniline. Advantage is taken of this fact to produce discharge patterns, the zinc-powder, thickened with gum, being printed upon goods previously dyed with aniline red. Silk and wool take up aniline red very readily, but cotton must be previously mordanted. For dyeing cotton the mordant generally used is tannate of tin, produced by subjecting the cotton first to a solution of sumach, then to sodic stannate, and finally to dilute sulphuric acid. In calico-printing the color is mixed with albumen or the preparation of Perkin and Schultz, a solution of aluminic arsenite in aluminic acetate. On drying and steaming the goods the color is rendered insoluble or fixed.

Other reds of less importance are di-hydriodate of trimethyl chrysaniline, $C_{20}H_{14}(CH_3)_2N_3.(HOI)_2$, called chrysaniline red; nitrosophenyline, $C_6H_6N_2O$; toluidine red, xylidine red, etc.

Aniline Pink.—*Safranine* is a coloring-matter produced by the oxidation of aniline. It is supposed to be $C_{21}H_{20}N_4$. It forms crystallizable salts.

Aniline Violets and Blues.—These colors shade into each other so gradually that they cannot well be separated.

1. *Mauve*, or aniline purple (of Perkin), was the first of the aniline products used as a dye. It is the sulphate or other salt of the base mauveine, $C_{27}H_{24}N_4$. It may be prepared from pure aniline, free from toluidine, by the action of potassic dichromate and sulphuric acid. It may also be prepared by the action of cupric chloride (Dale and Caro), or by chloride of lime. This dye has been entirely superseded by other preparations. It was known while in commerce as mauve, aniline purple, Perkin's violet, indisine, aniline harmaline, violine, and mauve rosolane.

2. *Hofmann's Violets and Blues.*—Rosaniline contains, as shown in the formula given above, three atoms of replaceable hydrogen. By substituting for one, two, or all of these, various alcohol radicals, as *methyl, ethyl, amyl,* etc., a great variety of colors, ranging from the red of rosaniline salts through purples and violets to the purest blue, are obtained. Hofmann's violets are produced by heating rosaniline, alcohol, and the iodide of methyl, ethyl, or amyl under pressure. A violet syrup results, containing the hydriodate of the new substitution product; for instance, hydriodate of trimethyl rosaniline, $C_{20}H_{16}(CH_3)_3N_3.HI$. To recover the iodine, the solution may be boiled with caustic potash, which precipitates trimethyl rosaniline, which may be washed, and redissolved in alcohol containing hydrochloric acid, or in acetic acid and water. The following are some of the more important colors of this group: Hydrochlorate of methylrosaniline, $C_{20}H_{18}(CH_3)N_3,HCl$; hydrochlorate of dimethylrosaniline, $C_{20}H_{17}(CH_3)_2N_3,HCl$; hydrochlorate of trimethylrosaniline, $C_{20}H_{16}(CH_3)_3N_3,HCl$; hydrochlorate of monethylrosaniline, $C_{20}H_{18}(C_2H_5)N_3,HCl$, called also Hofmann's red violet; hydrochlorate of diethylrosaniline, $C_{20}H_{17}(C_2H_5)_2N_3.HCl$, called also Hofmann's blue; hydrochlorate of triethylrosaniline, $C_{20}H_{16}(C_2H_5)_3N_3,HCl$, called also Hofmann's blue; ethylbromate of triethylrosaniline, $C_{20}H_{16}(C_2H_5)_3N_3,C_2H_5Br$, called also brimula; ethyliodate of ethylrosaniline, $C_{20}H_{18}(C_2H_5)N_3,C_2H_5I$, called also fuchsine with a blue tint, and Hofmann's violet red. Wauklyn used isopropyl iodide in a similar manner.

As the successive atoms of hydrogen are replaced by the alcohol radical, the shade passes farther and farther from the original red, giving first a reddish-purple, then a full purple, then violet, then reddish-blue, finally a full blue. The picrate of triethylrosaniline yields a fine green tint.

3. *Paris violet* or *methyl violet* is the pentamethyl rosaniline hydrochlorate: $[N(CH_3)_2.C_6H_4]_2.C(C_6H_4.NH.CH_3)HCl$. It is prepared by the action of cupric nitrate, sodium chloride, and acetic acid on dimethyl aniline. This color has largely superseded Hofmann's violets.

Acid violet is prepared by converting this color into a sulpho-acid.

4. *Phenyl-rosanilines.*—By heating rosaniline salts with aniline (phenylamine) the radical phenyl, C_6H_5, is introduced in the place of H, giving rise to a series of purples and violets, terminating in the most beautiful blue triphenylrosaniline—*bleu de Lyon*, the only blue which has come into extensive use. This blue is insoluble in water, which rendered its application somewhat troublesome, as an alcoholic solution was necessary. Nicholson found that sulphuric acid produced a compound analogous to sulphindigotic acid, soluble in water; this is now extensively manufactured under the name of "Nicholson's blue" or "soluble blue." The following are the more important compounds of this series: Hydrochlorate of monophenylrosaniline, $C_{20}H_{18}(C_6H_5)N_3,HCl$, called also rosaniline violet, red monophenylrosaniline, and Hofmann's violet; hydrochlorate of diphenyl rosaniline, $C_{20}H_{19}(C_6H_5)_2N_3$, HCl, also known as rosaniline violet and Hofmann's violet; triphenylrosaniline or triphenylic rosaniline, $C_{20}H_{16}(C_6H_5)_3N_3$, called also aniline blue, rosaniline blue, Hofmann's blue, bleu de Paris, bleu de Lyons, bleu de Mulhouse, bleu de Mexique, bleu de nuit, bleu lumière, bleuine, azurine, and night blue; hydrochlorate of triphenylrosaniline, $C_{20}H_{16}(C_6H_5)_3N_3,HCl$, known also by the same names as the above; acetate of triphenylrosaniline, $C_{20}H_{16}(C_6H_5)_3N_3,H,CH_3O_2$, known also by the same names as the above; bisulphotriphenyl rosaniline acid, $C_{20}H_{16}(C_6H_5)_3N_3,(H_2SO_4)_2.H_2SO_4$, called also Nicholson's blue and soluble blue. In this acid the last H_2 are replaceable by metals with the formation of salts.

5. *Tolyl-rosanilines* correspond to the phenyl-rosanilines. The most important is tritolyl-rosaniline, $C_{20}H_{16}(C_7H_7)_3N_3$, known as toluidine blue.

6. *Diphenylamin blue* is prepared by oxidizing methyl diphenylamin. The variety soluble in water is the sulpho-acid.

7. *Methylen blue* is produced from dimethyl-aninline by first converting it into nitroso dimethyl aniline, reducing with H_2S, and treating with ferric chloride. It appears in commerce as a double salt with zinc chloride.

8. Many other derivatives of aniline, rosaniline, etc. have been introduced, which exhibit shades from red to blue, passing through purple and violet.

Aniline Greens.—1. *Aldehyde green,* called also *aniline green, viridine,* and *emeraldine.*—In 1861, Lauth obtained a beautiful but fugitive blue by the action of aldehyde on a solution of a rosaniline salt in sulphuric acid. A young chemist, Cherpin, endeavored to fix the color, and was advised by a photographer's apprentice to use sodic hyposulphite, a salt used for fixing photographs, on account of its property of dissolving argentic chloride, bromide, and iodide. Cherpin followed the unscientific advice, and obtained the most beautiful green. The original process of Lauth and Cherpin is still pursued, and is so simple that many dyers prepare the color for themselves. Aldehyde green is principally employed in silk-dyeing.

2. *Iodine green,* known also as *iodide of methyl green.*—It is produced by heating trimethyl or triethyl rosaniline violets (Hofmann's violets), or methylaniline violets, with the iodide of methyl, ethyl, or amyl. The color is a salt of a new base, which may be separated by the action of sodic hydrate. It is extensively used for cotton and silk. Its tint is bluer than that of aldehyde green, and it is more useful, as it yields a greater variety of shades in connection with picric acid.

3. *Perkin's green,* or *iodide of ethyl green.*—This dye resembles iodine green, but differs in solubility; it is much used, especially in calico-printing.

4. *Methyl green* is the double salt of trimethyl rosaniline-dimethyl chloride with zinc chloride.

5. *Malachite green* is produced by the action of benzotrichloride on dimethyl aniline. It appears in commerce as a double salt with zinc chloride. Salts of its sulpho-acid are known as *Helvetia green.*

Aniline Yellows.—Aniline yellows are little used in dyeing or printing.

1. *Chrysaniline,* $C_{20}H_{17}N_3$, called also *phosphine, aniline yellow, yellow fuchsine,* is a secondary product in the manufacture of rosaniline. Owing to the insolubility of its nitrate, it has been proposed to use its acetate or hydrochlorate as a reagent to precipitate nitric acid.

2. Other yellows are chrysotoluidine, $C_{21}H_{21}N_3.H_2O$, the isomeric compounds diazo-amidobenzene and amido-diphanylimide, $C_{12}H_{21}N_3$.

Aniline Browns and Maroons.—Several browns have been produced directly or indirectly from aniline. De Laire obtained a maroon by adding rosaniline hydrochlorate to fused aniline hydrochlorate. Schultz prepared a fine garnet color by passing nitrous vapors through a solution of soda holding rosaniline in suspension. Jacobsen prepares a rich brown by heating picric acid and aniline together, dissolving the product in hydrochloric acid, and precipitating with caustic soda. He obtains another by heating ammonium chromate with aniline formate. Koechlin produces a brown on wool by printing on a mixture of rosaniline hydrochlorate (fuchsine), oxalic acid, and potassium chlorate, and on cotton by adding to this mixture some cupric sulphide. Browns are generally made from the residues of rosaniline.

Aniline Gray.—Castelhaz has patented a process by which a beautiful gray is produced, which has, however, found little favor among dyers on account of its high cost. He subjects mauveine (Perkin's violet) to the action of sulphuric acid and aldehyde. Carves and Thierault prepare a rich gray, called by them *murein,* by mixing aniline, hydrochloric acid, potassic dichromate, copperas, and sulphuric acid.

Aniline Black.—No one has yet succeeded in producing a good black dye from aniline, though the color produced on cotton, silk, or wool by immersing first in a solution of an aniline salt, and then in potassic dichromate, is very near a black. In calico-printing, however, blacks of great intensity and durability have been discovered, which are now extensively used; in fact, except for mourning goods, in which the black predominates over the white, the aniline black is now used almost exclusively. Lightfoot discovered the first aniline black in 1863. He printed on the cotton a mixture of aniline hydrochlorate, potassic chlorate, cupric chloride, sal-ammoniac, acetic acid, and starch paste; exposed the cloth to the air for two days, and fixed the color with an alkali. Lauth improved the process by substituting cupric sulphide for the cupric chloride. Cordillot substituted potassium ferridcyanide for the copper salt. Alfred Paraf in 1865 introduced a mixture of aniline hydrochlorate, potassic chlorate, and hydrofluosilicic acid, properly thickened. On exposing the goods in the "ageing-room" to a temperature of 32° to 35° C., the chloric acid is liberated, and oxidizes the aniline to a black. In 1867, Paraf patented the use of a new agent, the "chromium chromate." His mixture for printing contained aniline hydrochlorate, potassic chlorate, chromium chromate, starch, and water. In the ageing-room chromic acid is set free to act upon the aniline salt.

Application of Aniline Colors in Dyeing and Calico-printing.—In silk-dyeing no mordant is required; to produce an even color, however, it is found best to use a weak soap solution with the dye; and sometimes a little acid is added, sulphuric or tartaric. For printing on silk the colors are thickened with gum-senegal, printed from blocks, and when dry the goods are steamed and washed. A discharge style may be produced by dyeing silk with a rosaniline salt, then printing on zinc-dust thickened with gum. The rosaniline is reduced to colorless leucaniline, producing white figures on a colored ground. By mixing colors with the zinc which are not affected by it, colored figures are produced. For dyeing wool no mordant is required; the goods are simply handled in hot solutions; except in the case of Nicholson's blue, which is dissolved in an alkali, the goods after passing through the solution being subjected to an acid bath. For dyeing cotton, mordants are necessary. By subjecting the goods to (1) a decoction of sumach, (2) to sodic stannate, and finally (3) to dilute sulphuric acid, a stannic tannate is produced on the fibre which has a great affinity for aniline colors. For printing, the colors are thickened with albumen, or a solution of aluminum arsenate in aluminum acetate, and fixed by steaming.

Aniline colors are also used for inks, for coloring leather, soaps, vinegar, candies, ivory, horn, etc.; and lakes are prepared from them for paper-staining, printers' ink, etc. etc.

The high cost of aniline colors is counterbalanced by the brilliancy of their tints and the simplicity of dyeing. The aniline color industry has acquired greater proportions in Germany than in any other country. In the U. S. manufacturers chiefly confine their attention to rosaniline salts. Although coal-tar is extensively distilled here, and benzole is exported, all the aniline is imported.

(For further details see Watt's "Dictionary of Chemistry" and supplement; Wurtz, "Dictionnaire de Chimie," and specially "Die Farbstoffe," von M. P. Schutzenberger; "Deutsche Uebertragung," von Dr. H. Schröder, Berlin, 1868–73. Special works on the subject are Becker's "Anilin-Färberei," Berlin, 1871; Reimann's "Aniline and its Derivatives," New York, 1868; Krieg's "Theorie und practische Anwendung von Anilin in der Färberei und Druckerei," Berlin, 1866. Wagner's "Jahresbericht der chemischen Technologie," from 1858 to date, contains the record of the progress of this important branch of chemical industry.)

C. F. Chandler.

An′imal [Lat. *animal*, from *animus*, "spirit;" Gr. ἄνεμος, "wind," "breath"], an organized being, distinguished from plants, at least in the higher and more developed groups, by the power of voluntary motion, the faculty of digesting food, which is usually, not always, received into an alimentary canal, and the possession of a nervous system, which regulates the acts of the animal and receives impressions from without. An organism, according to Kant's felicitous definition, is that structure wherein each part is at the same time the means and the end of all the rest. The distinction is not easily made out between some of the lower animals and plants; but recent observers claim to have made the discovery that all plants, even the most minute, have the power of taking up nitrogen from ammonia compounds—a power which, it is asserted, is possessed by no animal. The power possessed by green plants of taking up carbon from carbonic acid, and by other plants of taking it from hydrocarbons, is probably not shared by animals.

(The structure and functions of animals are treated of under the heads Comparative Anatomy, Physiology, Embryology, etc. See also Zoology, and the names of the various groups of animals.)

Animal′cule [Lat. *animal′culum*, the diminutive of *animal*], literally, a "minute animal," commonly denoting one whose figure can only be discerned by the aid of a microscope. In popular language it is mostly applied to the microscopic animals which zoologists call Infusoria and Protozoa. Many of the so-called animalcules are now known to belong to the lower ranks of the vegetable kingdom.

Animal Electricity. See Electricity, Animal.

Animal Heat is the persistent and uniform elevation of temperature which a great proportion of living animals possess. This elevation does not appear to be a constant factor of animal any more than vegetable life; for in those animals which are fixed and almost motionless there is often great difficulty in detecting any animal heat. But even in the so-called cold-blooded animals there is a normal range of elevated temperature. Infusoria, earthworms, snails, fishes, and especially reptiles, possess an appreciable amount of animal heat, and the temperature in health of some species has been pretty accurately determined, though it appears to vary decidedly in these animals with seasons of functional activity or rest. In all animals there seems to be a relation between the temperature and the habitually fast or slow rate of motions.

Mammals, birds, and insects have special powers of maintaining heat. In insects it is scarcely discernible in the pupa state, except when the pupa is about to enter the condition of perfect development. Hymenopterous insects especially have a high range of temperature. Humble-bees' nests have been observed with a heat 18° above that of the surrounding earth. Mr. Newport in one instance found a bee-hive with a temperature of 102° F. while the bees were aroused, though in a neighboring hive with quiet bees the thermometer stood at 48½°. It would appear that the variation of heat within the limits of health is greater in insects than in birds and mammals.

The heat of birds is in most species much higher than that of mammals; that of the swallow, an extreme example, reaching 111¼° F. The temperature of mammals varies from 94° to 107°, that of man being 98° F. in health, while in some fevers it exceeds 105°. It appears that any excess over the latter temperature is a bad symptom in fevers, while any long-continued depression of even a very few degrees below the normal range is also a prognostic of approaching dissolution. The thermometer of late has become an important means of diagnosis and prognosis in disease. Many of the Rodentia and Cheiroptera during a part of the year lose a great proportion of their ordinary heat, the temperature falling nearly to the freezing-point, while many of the vital functions pass into a state of abeyance. This condition is called *hibernation*.

The principal direct source of animal heat is generally believed to be the slow oxidation of carbon (perhaps also hydrogen, sulphur, and phosphorus), the material thus slowly burnt being introduced in the food, while the oxygen comes in from the air by the lungs; but it is objected by many physiologists that the amount of material consumed, with all possible economy of heat, seems inadequate to the effect produced. It is observed that the cutting of certain nerves in vivisection (notably those belonging to the sympathetic system) leads to great temporary increase of heat in the parts which had been supplied by the wounded nerve, the increase being followed by a permanent decrease of heat. This appears to show that the production of animal heat is, to some extent at least, under control of the nervous system.

Chas. W. Greene.

Animal Magnetism. See Mesmerism.

Animal Mechanics. See Locomotion of Animals.

Animals, Worship of, a form of worship prevalent in many ancient lands, as once in Egypt and Persia, and even now in India, where the earlier and purer knowledge of God had become obscure, and the likeness of the Deity was sought, and supposed to be found, in the forms of animated nature. The historical fact is exactly sketched by Paul in Romans i. 21–23.

An′ima Mun′di is a Latin phrase signifying "soul of the world." It was used by ancient philosophers, who supposed that nature or all matter was pervaded by an ethereal essence and vital force, which organized and actuated created beings, but was inferior to the Divine Spirit. The Atmăn (Atmâ) or Părămâtmâ of the Hindoos was also regarded as the soul of the world in a somewhat different sense. The Atmăn was supposed to be the original life-principle from which the universe was evolved.

An′imé, a resin which exudes from *Hymenæa Courbaril*, a tree of the natural order Leguminosæ, and a native of Brazil. It has been used as a medicine and as incense. In England the name animé is applied to a resin known in India as copal, and obtained from the *Vateria Indica*.

A′nio (the modern *Tevero′ne*), a river of Latium (Italy), flowed nearly westward, passed by Tibur, and entered the Tiber 4 miles N. of Rome. Length, about 55 miles. Ancient Rome was in part supplied with water from the Anio by two aqueducts, respectively 43 and 62 miles long.

Anion. See Anode.

An′ise, Oil of, an essential oil obtained by distilling anise seeds or star anise with water. Oil of fennel, from *Anethum fœniculum* and *Artemisia Dracunculus*, is of a similar chemical composition. Oil of anise and of fennel contain a hydrocarbon oil, said to be isomeric with oil of turpentine, and an oxidized oil, $C_{10}H_{12}O$, called anethol or anise camphor, which solidifies at temperatures below 10° C.

An′ise Seed, the fruit of the *Pimpinel′la Ani′sum*, an annual herbaceous plant of the order Umbelliferæ, is a native of Egypt. It is cultivated in Syria, Malta, Spain, and Germany, and is used in medicine as a stimulant and a carminative. It is also used to flavor liqueurs and as a condiment. Anise seed contains a volatile oil which is employed for similar purposes. A large part of the anise oil of commerce is from star anise, the fruit of *Illicium anisatum*, a small tree of the order Magnoliaceæ. The whole plant is carminative, and is used by the Chinese as a spice. Its properties are those of the *Pimpinella*. It is imported from Anam and China.

An′ise Tree [so named from the smell, which resembles that of anise], a name applied to two small trees or large shrubs of the order Magnoliaceæ, growing in the Gulf States—the *Illicium Floridanum* and the *Illicium parviflorum*. Both are evergreen, the former with dark purple and the latter with small yellow flowers, appearing in May and June. The star anise oil of commerce is the product of the *Illicium anisatum* of Eastern Asia; and it is believed that the same oil might be obtained from the *Illicium Floridanum*. The *Illicium parviflorum* has a taste and smell resembling those of sassafras. The *Illicium religiosum* of China yields a fragrant incense for temple-worship.

Anis′ic Ac′id ($H.C_8H_7O_3$), produced by the oxidation of anise-camphor and of the oils of anise and fennel. Hydride of anisyl, $C_8H_7O_2.H$, is formed at the same time.

Anis′ic Al′cohol ($C_8H_9O.H.O$) is formed by heating hydride of anisyl with potash.

Anisodac′tyls, or **Anisodac′tylæ** [from the Gr. ἄνισος, "unequal," and δάκτυλος, a "finger" or "toe"], the term applied to an order of birds, including those insessorial species the toes of which are of unequal length, as in the nuthatch. The name has been also applied to the odd-toed section of ungulate Mammalia, in which the toes are of unequal number, more often called perissodactyls.

An′isol, or **Phe′nate of Me′thyl,** ($C_7H_8O = CH_3.$-C_6H_5O), a colorless aromatic liquid formed by the action of caustic baryta on anisic acid.

Anisol Red. See Azo-Colors.

Anisson-Duperron (Alexandre Jacques Laurent), a French political economist, born in 1776. He was created a peer in 1844. He wrote, besides other works, a treatise in favor of free trade.

Aniu′y, or **Aniuj** (Greater), a river of N. E. Siberia, rises about lat. 67° N., and, after a course of 270 miles, enters the Kolyma near lat. 68° N. The Lesser Aniuy rises in lat. 66° 30′ N., and falls into the Kolyma near the mouth of the Greater Aniuy. Length, about 250 miles.

Anjier′, a seaport of Java, on the Sunda Straits, 69 miles W. of Batavia, is often touched at by vessels bound for Batavia, to take in provisions, and to land the mails and passengers, which go to Batavia overland.

Anjou, a former province and duchy of France, intersected by the river Loire, was inhabited in ancient times by the Andegavi, who were conquered by Cæsar. It now forms the department of Maine-et-Loire and part of Sarthe, Mayenne, and Indre-et-Loire. Its capital was Angers. Geoffroy, count of Anjou, married Matilda, a daughter of Henry I. of England, and was the founder of the royal house of Plantagenet. His son Henry was count of Anjou and king of England. Anjou was annexed to the crown of France about 1204, and was bestowed as a fief on Charles (a brother of Saint Louis), who became king of Naples. Louis, a son of King John, was the first duke of Anjou, which was erected into a duchy about 1360. Anjou was finally annexed to the French crown in 1480, after which the younger sons of several kings bore the honorary title of duke of Anjou. Pop. about 550,000.

Ank′arström (Johan Jakob), a Swedish regicide, born in 1761, was a partisan of the aristocracy. Having formed a conspiracy with Count Horn and others, he assassinated Gustavus III. at a masked ball, Mar. 16, 1792. He was condemned to death, and, after he had been publicly whipped, was beheaded April 29 of that year.

An′ker, the name of an old European liquid measure of capacity, now disused everywhere except in Denmark and Norway, and having different values in different countries. The anker of Copenhagen is a little more than 9⅞ U. S. gallons, or a little less than 8¼ imperial gallons. The anker of Hamburg was 9.54 gallons; of Bremen, 9.57 gals.; of Lubec, 9.89 gals.; of Amsterdam, 10¼ gals.; and of Berlin (old measure), 12.45 gals.; later measure, 9.07 gals.

Ank′lam, or **Anclam,** a town of Prussia, in Pomerania, is on the Peene, 109 miles by rail N. of Berlin. It has manufactures of linen and woollen goods. It belonged formerly to the Hanseatic League. Pop. of the town in 1880, 12,361.

Anko′ber, Ankobar, or **Ancober,** a town of Abyssinia, the capital of Shoa, is situated 8200 feet above the level of the sea, and about 265 miles S. E. of Góndar. It contains a royal palace, and is a favorite residence of the monarch. Pop. estimated at from 12,000 to 15,000.

Ankylo′sis, or **Anchylosis** [from the Gr. ἀγκύλος, "bent"], in surgery, a stiffened and more or less fixed and immovable joint, so called from the crooked position often seen in limbs with such joints. Ankylosis may result from suppurative inflammation, as in "white swelling" of the knee, and is to be regarded as a favorable termination of such disease. These cases result often in neo-plastic exudations—new tissues—adhering to the cartilages of both articulating bones; and not unfrequently these new growths are partly or completely ossified, converting the two bones into one. The cartilages or ligaments of a joint may become shrunken from disease, the opposing synovial membranes may adhere to each other, or other important structural changes may prevent motion. "Spurious ankylosis" is a case in which a spasm or cicatricial contraction of the muscles, or even of the skin, prevents motion, while the joint itself is not the seat of disease. Cases of so-called hysteria, sometimes are accompanied by a stiffness of one or more joints; but such cases are readily detected after the adminstration of an anæsthetic, when the joint at once becomes movable.

The prospect of recovery of motion in an ankylosed joint is small indeed. Joints stiffened at an inconvenient angle may be put into better shape during anæsthesia, and then be allowed to become ankylosed again in the desired position. Excision of joints has been considerably practised, and with some success as a means of cure.

An′na, on R. R., Union co., Ill. (see map of Illinois, ref. 11–E, for location of county), 37 miles N. of Cairo. Pop. in 1870, 1269; in 1880, 1494.

Anna, Saint, is supposed to have been the mother of the Virgin Mary, but she is not mentioned in the Bible. The Roman Catholic Church in Austria and other countries celebrates an annual festival in her honor July 26th.

An′naberg′, a mining-town of Saxony, in the Erzgebirge, 18 miles S. of Chemnitz. It has mines of silver, cobalt, and tin, and manufactures of lace and silk ribbons. Pop. in 1880, 12,956.

An′na Carlov′na, regent of Russia, born in 1718, was a daughter of the duke of Mecklenburg, and a niece of Anna Ivanovna, empress of Russia. She was married in 1739 to Anton Ulrich, duke of Brunswick-Wolfenbüttel, and had a son, Ivan, whom Anna Ivanovna designated as her successor. Soon after the death of that empress, in Oct., 1740, Anna Carlovna assumed the office of regent. She was deprived of power by a conspiracy which raised Elizabeth to the throne in Dec., 1741. Died Mar. 18, 1746.

An′na Comne′na, a learned Byzantine princess and writer, born Dec. 1, 1083, was a daughter of Alexis I., emperor of Constantinople. She was carefully educated in poetry, science, and Greek philosophy, was famous for her beauty and talents, and became the wife of Nicephorus Bryennius. On the death of her father, in 1118, she conspired against her brother John, and attempted to usurp the crown or to place it on the head of her husband, but failed. She afterward became engaged in literary pursuits, and wrote in Greek a life of her father, entitled the "Alexiad," which is an important historical document. The style is rather affected. Died in 1148.

An′na Ivanov′na, empress of Russia, born at Moscow Jan. 25, 1693, was a daughter of Ivan, a brother of Peter the Great. She was married in 1710 to the duke of Courland, who died in 1711. She succeeded Peter II. on the throne in 1730, and permitted her favorite Biren to control the empire. He abused his power with great cruelty, and executed and banished many thousand persons. She died Oct. 28, 1740, and was succeeded by Ivan.

An'nals, official chronicles of events kept by the Roman *pontifex maximus* down to 131 B. C. When Rome was sacked by the Gauls, 390 B. C., all the existing annals were destroyed except a few fragments, which is one cause of the obscurity of early Roman history. History in the form of annals was afterward written by private citizens. The Chinese claim similar annals of the history of their nation back as far as 3000 B. C.

Annam, Asia. See ANAM.

An'nandale, Duchess co., N. Y. (see map of New York, ref. 6–J, for location of county), the seat of St. Stephen's College (Epis.). Pop. in 1870, 347; in 1880, 221.

An'na Peren'na was a goddess of the Roman mythology. According to Virgil and Ovid, she was a daughter of Belus and sister of Dido. She went to Italy, and was received kindly by Æneas. Her favor was invoked by the Romans to obtain health and long life.

An'na Petrov'na, eldest daughter of Peter the Great of Russia and his empress Catharine, born in 1708, was married to Charles Frederick, duke of Holstein, in 1725. She was mother of Peter III. of Russia. Died in 1727.

Annapolis, or **Annapolis Royal,** a seaport of Nova Scotia, at the mouth of the river Annapolis (which enters the Bay of Fundy). It is one of the oldest settlements in North America, and was founded in 1604 by the French, who called it Port Royal. The harbor is good, but difficult of access. This town was the capital of the province until 1750. Pop. of census subdistrict in 1881, 2833.

Annapolis, city, on R. R., capital of Maryland, and of Anne Arundel county (see map of Maryland, ref. 3–F, for location of county), is a port of entry on the S. bank of the Severn River, 2 miles from its entrance into Chesapeake Bay, 20 miles S. by E. of Baltimore, and 22 miles E. by N. of Washington, 40 miles by rail to either of these cities, and 30 miles by water (steamboat) to Baltimore. Annapolis contains a state-house, governor's mansion, court-house and jail. It is also the seat of St. John's College and the U. S. Naval Academy, which was founded here in 1845. (See NAVAL ACADEMY, by PROF. R. S. SMITH). The harbor, or Annapolis Roads, is one of the finest in the country, there being a depth of 60 feet in the channel up to Round Bay in the Severn River, 7 miles from the city. The city has both gas and water works. Lat. 38° 58′ 50″ N., lon. 76° 29′ W. Pop. in 1870, 5744; in 1880, 6642.

State Capitol (Annapolis, Md.).

Ann Ar'bor, city and important R. R. centre, capital of Washtenaw co., Mich. (see map of Michigan, ref. 8–J, for location of county), on the Huron River, 38 miles W. of Detroit. The situation is elevated and pleasant. Here is the State University, a flourishing institution, founded in 1837. (See MICHIGAN UNIVERSITY.) Ann Arbor contains manufactures of wool, iron, ploughs, and furniture, and has a valuable mineral spring. Pop. in 1870, 7363; in 1880, 8061; in 1884, 7912.

An-Nâ'sir (or **Al-Nassir**) **Ledinil'lah** (*i. e.* "the defender of the religion of God"), one of the Abasside caliphs, began to reign at Bagdad in 1180. He was a liberal patron of learning, and successfully defended his dominions against several aggressive enemies. Died in 1225.

An'nates (plu.), [Late Lat., from *annus*, a "year" (*i. e.* a "year's wages")], the tax of "first-fruits," a tax imposed by the popes on all bishops on their accession, and equal to one year's revenue of the benefice. The Council of Pisa (1409) complained of the custom; that of Bâle (1435) called it simony; that of Trent (Nov. 11, 1563) prohibited it, but it was recognized by concordat with Naples in 1818. In England, annates were first levied in 1213. In 1534 they were made payable to the king (Henry VIII.) instead of the pope. (See QUEEN ANNE'S BOUNTY.)

Annatto. See ANNOTTO.

Anne of Cleves, the fourth queen of Henry VIII. of England, who married her, to please the Protestants, in Jan., 1540. She was divorced in July of the same year, and retired to private life on a penson of £3000 per annum. She was daughter of John, duke of Cleves, and was born Sept. 22, 1515. Died at Chelsea July 16, 1557, and was buried at Westminster Abbey.

Anne, queen of Great Britain and Ireland, the last sovereign of the house of Stuart, was born at Twickenham, near London, on the 6th of Feb., 1664. She was the second daughter of James II. and Anne Hyde, who was a daughter of the famous Lord Clarendon. She was educated in the Protestant religion, to which she afterwards manifested a constant devotion, although her father, after his accession to the throne, attempted to convert her to the Roman Catholic faith. In 1683 she was married to Prince George of Denmark, a brother of Christian V. At an early age she formed an intimacy with Sarah Jennings (afterwards the duchess of Marlborough), who exercised an almost unbounded influence over her, both before and after her accession to the throne. Anne was the mother of many (seventeen) children, all of whom died young and before she became queen. In the revolution of 1688 she supported the cause of the prince of Orange, but she was afterwards implicated in intrigues for the restoration of her father. Anne succeeded William III., who died Mar. 8, 1702, at a time when the strife of parties was extremely violent. She pursued the foreign policy of the late king, which involved England in the long war of the Spanish succession as the ally of Austria and the enemy of France. Among the important events of her reign were a number of signal victories gained by the duke of Marlborough over the armies of Louis XIV., and the union of England and Scotland in 1707. Her political principles, if she had any, were favorable to royal prerogative rather than constitutional liberty, and rendered her partial to the Tories. Anne became gradually alienated from the duchess of Marlborough, who was a Whig, and transferred her favoritism to Mrs. Masham, whose intrigues undermined the Whig party so effectually that the Tory statesmen, the earl of Oxford and Lord Bolingbroke, came into power in 1710. The queen and these Tory ministers concurred in designs and intrigues to secure the succession to her brother, the Pretender. The European war was ended by the treaty of Utrecht, April 11, 1713. Lord Bolingbroke became prime minister in place of the earl of Oxford in July, 1714. Anne died of apoplexy on the 1st of Aug., 1714, and was succeeded by George I. The period of her reign, illustrated by the genius of Newton, Addison, Pope, Bolingbroke, Swift, De Foe, and Arbuthnot, was almost as celebrated in literature as the Augustan age of Rome. (See OLDMIXON, "Life of Queen Anne," 1716; STRICKLAND, "Lives of the Queens of England.")

Anneal'ing [from the Saxon *on-ælan*, to "set on fire," to "make hot," to "burn"], a process of tempering glass and certain metals by heating them and then cooling them slowly, in order to render them less brittle and more tenacious. The extreme brittleness of glass that has not been annealed is seen in the glass toys called "Prince Rupert's Drops," which if scratched with a file will collapse into powder or small fragments. Glass vessels are annealed in a long oven, one end of which is hotter than the other, and the trays in which the vessels are placed are slowly drawn into cooler and cooler parts. The operation of annealing large vessels requires several days. Iron, brass, and other metals which are hammered into plates or drawn into wire become brittle during the process, and require to be annealed by cooling them slowly in water or air. Steel is tempered and hardened by a process of annealing, being placed in an oil-bath or surrounded by a metallic compound which has a low fusing-point. The soft metals are annealed by immersion in water, which is boiled and then cooled slowly.

Annecy, a town of Eastern France, in Upper Savoy, is pleasantly situated at the N. W. extremity of Annecy Lake, 22 miles by rail S. of Geneva. It has a cathedral, a bishop's palace, a church in which are preserved the relics of St. Francis de Sales, an old castle, formerly the residence of the counts of Geneva), glass-works, cotton-mills, etc. It was once the capital of the counts of Geneva. It passed from them to the counts of Savoy, afterward kings of Sardinia, who ceded it to the French in 1860. It shows traces of Roman origin. Pop. in 1881, 11,334.

Annecy, Lake of, is in Upper Savoy, 22 miles S. of Geneva, about 24 miles W. of Mont Blanc, and 1426 feet above the sea. It is about 9 miles long and from 1 to 2 miles wide. Its waters are discharged through the Fieran into the Rhone.

Anneke (Mathilde F. G.). See Appendix.

An'nelides, or **Annel'ida** (plu.), [Lat. *annel'lus*, a "little ring"], an order of articulate animals belonging to the class Vermes, comprising those true worms which have red blood circulating in a complicated double system of vessels. As at present constituted, the order contains three families—1, the Serpuladæ, or Tubicolæ; 2, the Arenicolæ, or sand-worms, called Dorsibranchiatæ; 3, Lumbricidæ, or earth-worms—but writers variously expand or limit the order; some making it to include a part or all of the Brachiopoda and other molluscoids.

An'ni, or **Ani** (anc. *Ab'nicum*), a ruined city of Asiatic Turkey, on the Arpa-Chai River, 28 miles E. by S. of Kars. It was the capital of the Bagratian kings of Armenia until 1064, when it was taken by Alp-Arslân, and was destroyed by an earthquake in 1319. Here are ruins of an ancient palace and citadel; also some Armenian churches nearly entire. These ruins plainly show the former importance of the city, and many are of great architectural beauty.

Anniston, Ala. See Appendix.

An'nius of Viter'bo [It. *An'nio da Viter'bo*], a learned Italian Dominican monk, whose proper name was Giovanni Nanni, was born at Viterbo about 1432. He wrote a Latin "Treatise on the Empire of the Turks" (1471). He published at Rome, in 1498, "Seventeen Volumes of Various Antiquities, with Commentaries," containing extracts from the lost works of Berosus, Manetho, and other ancient historians, which proved to be forgeries. D. in 1502.

Anniver'sary [from the Lat. *an'nus*, a "year," and *ver'so*, to "turn"], the annual return of a memorable day; the day on which some remarkable event is annually celebrated. Among the Jews the Passover was an anniversary in commemoration of the exodus from Egypt. The principal religious anniversaries of Christians are Christmas, Epiphany, and Easter. Anniversary days in the Roman Catholic Church are days on which an office is annually performed for the souls of the deceased. The most popular anniversary of the U. S. is the Fourth of July.

Annobom', or **Annabo'na,** an island, 4 miles long and 2 wide, situated in the Gulf of Guinea, was discovered Jan. 1, 1473, by the Portuguese, and has a population of about 3000.

Annonay [Lat. *Annonæ'um* or *Annoni'acum*], a town of France, in the department of Ardèche, is situated 37 miles S. S. W. of Lyons, at the junction of the rivers Cance and Déaume. It has a suspension bridge and large manufactories of glove-leather. Paper of fine quality is made here. The Montgolfiers, who invented balloons, were natives of the town. Pop. in 1881, 17,291.

Annot'to, or **Annat'to,** a red coloring-matter, is the pulp of the seeds of the *Bixa orellana*, an exogenous shrub which grows in South America and the West Indies, and belongs to the natural order Flacourtiaceæ. It is soluble in alcohol, ether, and in potash and soda, either caustic or carbonated. It contains a yellow principle called bixin. It is used as a dye, but its colors are fugitive. The pulp is used to color cheese, is an ingredient in some varnishes, and is employed in medicine to color ointments and plasters. In South America annotto is mixed with chocolate to improve the flavor.

Annuaire [from the Lat. *an'nus*, a "year"], a name given to certain French publications which appear annually, as the "Annuaire historique" or "Annuaire des Deux Mondes," which corresponds to the English "Annual Register." The "Annuaire" published by the bureau of longitudes is a celebrated scientific periodical.

An'nual [Lat. *annua'lis*, from *an'nus*, a "year"], a botanical term applied to a plant which lives only one year; a plant which within the space of a year passes from a seed into a perfect plant, bears its fruit, and perishes. The duration of the life of annuals is generally much less than a year. Some plants which are annuals in one climate are perennial in another, as the castor-oil plant.

Annual, a name given by the English to a class of illustrated publications which were designed for Christmas gifts and birthday presents, and enjoyed for some years extraordinary popularity. They contained contributions in verse and prose from distinguished living authors, and were illustrated with engravings by the best artists of the time. The first of these annuals was the "Forget-me-Not," edited by Frederick Shoberl, in 1822. "The Literary Souvenir," edited by A. A. Watts, appeared in 1824; and the "Keepsake" was commenced by Charles Heath in 1827. It was afterwards edited by the countess of Blessington. Among the other remarkable annuals was Heath's "Book of Beauty," first issued in 1833. After 1840 the demand for annuals diminished and their quality deteriorated. They have all been long discontinued.

Annu'ity [Lat. *annu'itas*, from *an'nus*, a "year;" Fr. *annuité*], a rent or sum of money which a person is entitled to receive every year. If the payment is to be continued through a period of uncertain length, it is called a *contingent annuity;* if it is payable for a definite number of years, it is an *annuity certain.* A person who has unemployed capital may find it advantageous to convert it into an annual income, which he is entitled to receive as long as he lives, and which is called a life annuity. The person who receives an annuity is called an annuitant. An annual income which is not to be paid until a number of years have elapsed is a deferred annuity. Those who invest money in the national debt of England are entitled to an income which is virtually a perpetual annuity, so that when each annuitant dies he may leave it to his heir. The accurate determination of the value of annuities in present money is a complex question of great importance and considerable difficulty, for the solution of which correct tables of vital statistics are requisite. The rate of interest is also an important element in the calculation of annuities. Great labor has been expended by several learned men in the formation of tables of the value of life annuities at all the different ages of human life.

Annuity, in the law of England, is a sum of money payable every year, and charged on the person or personal estate of the individual who is bound to pay it; thus differing from a rent-charge, which is charged on real estate. Annuities are often paid by a person who borrows money (who is called the grantor) to the person who lends the money (who is the grantee). An annuity is either for a term of years, for a life or lives, or in perpetuity; and the last, although charged on personal property, may descend as real estate.

An'nulus [Lat., a "ring"], a botanical term used in several senses. In mosses it denotes a rim external with respect to the peristome; in ferns it is an elastic rib which girds the theca or spore-case, and by its contraction disperses the spores: the collar which surrounds the stipes of some fungi just below the hymenium is also called an annulus.

Annuncia'da (the Order of Knights of the Annunciation) was founded by Amadeus VI. of Savoy in 1362, and was originally called the Order of the Collar. The reigning king of Italy is grand master of the order.

Annuncia'tion, Feast of, a festival of the Church in commemoration of the announcement of the conception of the Saviour to the Virgin Mary by the angel Gabriel. It is celebrated on the 25th of March, which is called Lady Day.

Ann'ville, on R. R., Lebanon co., Pa. (see map of Pennsylvania, ref. 5–H, for location of county), is the seat of Lebanon Valley College. Pop. in 1880, 1431.

Ano'a, a species of ruminating animal of the genus *Bu'bulus*, having the horns erect; it is considered by some to be a connecting link between an antelope and a buffalo. It lives in Celebes.

An'ode [from the Gr. ἄνοδος, a "way up"], a term used in the science of electrolysis to denote the positive pole, or that surface by which the galvanic current enters the body (electrolyte) undergoing decomposition. The negative pole, or the surface by which the current goes out, is called *cathode.* The elements of electrolytes are called *ions*, and those which go to the anode are named *anions.* Thus, in the decomposition of water by a galvanic battery, water is the electrolyte, the platinum plate connected with the positive pole is the anode, and the oxygen is the anion.

An'odyne [from the Gr. ἀν, priv., and ὀδύνη, "pain"], a medicine which diminishes pain. Opium, morphine, the anæsthetics, belladonna, cannabis Indica, etc. are the chief anodynes—most of which tend actively to cause sleep. Some hypnotics, or sleep-producers, however, like chloral, are not anodynes.

Anoint'ing [from the Lat. *in*, and *un'go*, *unc'tum* (Fr. *oindre*, part. *oint*), to "anoint"], an Oriental custom of pouring aromatic oil on the head as a mark of honor. It was practised at the coronation of kings and the consecration of high priests and prophets, as in the case of Saul, David, Aaron and his sons. Spikenard, myrrh, and olive oil were sometimes used for this purpose. Anointing forms a part of the ceremonial of various sacraments in the Roman Catholic and the different Oriental churches.

Anoka, city on R. R., capital of Anoka co., Minn. (see map of Minnesota, ref. 9–F, for location of county), on the left bank of the Mississippi, at the mouth of Rum River, or Mille Lac, 27 miles N. N. W. of St. Paul. It has a valuable water-power. Pop. in 1880, 2706; in 1885, 4629.

Ano'lis [from a native name, *ano'li*], a group of iguanoid saurian reptiles, natives of the warm parts of America, most of which are remarkable for their power of inflating the skin of the throat. They move with great agility and exhibit great brilliancy of color, which is susceptible of change, and has consequently caused them to be popularly called chameleons, from which, however, they are very distinct. About sixty species are known.

Anomalis'tic Year, the interval of time in which the earth completes a revolution with respect to any point in its orbit, or the interval which elapses between two successive passages of the earth through its perihelion. It is four minutes and thirty-nine seconds longer than a sidereal year, and its length is 365 days, 6 hours, 13 minutes, and 45 seconds.

Anom'aly [Gr. ἀν, priv., and ὁμαλός, "level"], in astronomy, the angular distance of a planet from its perihelion. The anomaly as above defined is the *true anomaly*. If we suppose a fictitious planet to set out from perihelion with the true planet, and to revolve uniformly about the sun at such a rate as to return to perihelion at the same time as the true planet, the anomaly of the fictitious planet is called the *mean anomaly*. The difference between the true and the mean anomaly at any moment is the corresponding *equation of the centre*.

Ano'mia [from the Gr. α, priv., and νόμος, a "law," so called because it does not conform to the law of structure characterizing other mollusks], a Linnæan genus of the Vermes Testacea. Modern naturalists have limited the term to a genus of acephalous mollusks having two unequal, irregular thin valves, of which the flatter one is deeply notched at the cardinal margin. The central muscle traverses this opening to be inserted into a third piece (calcareous or horny), which is always attached to foreign bodies. Numerous species, living and fossil, are found in nearly all parts of the world.

Ano'na [from *ano'na*, the Sp. name of the custard-apple], a genus of exogenous trees of the natural order Anonaceæ, natives of hot climates. *Anona squamosa* bears an edible fruit called the custard-apple, because its seeds are surrounded by a whitish, sweet, cream-like pulp. The cherimoya, an excellent fruit of Peru, is produced by the *Anona Cherimolia*.

Anona'ceæ [so called from *Ano'na*, one of its genera], an order of exogenous trees or shrubs, mostly natives of tropical countries, and evergreen, having simple, alternate leaves. They are generally aromatic and fragrant. The distinguishing mark of the order is that they have trimerous polypetalous flowers and a ruminated albumen. This order comprises about 300 species, some of which bear delicious fruits. The fruit of the *Xylopia aromatica* is used as pepper by the natives of Africa. The order is represented in the U. S. by four species of pawpaw (*Asimina*) or custard-apple.

Anon'ymous [from the Gr. ἀν, priv., and ὄνυμα, a "name"], nameless; a term applied to books published without the name of the author. Those which appear under an assumed name are called *pseudonymous*. The political articles of the English journals are generally anonymous, and so are the critical articles in the great quarterly reviews. Anonymous books cause much difficulty and perplexity to bibliographers and the compilers of catalogues. The best account or catalogue of such works is Barbier's "Dictionnaire des Ouvrages Anonymes et Pseudonymes" (3 vols., 1822–24).

Anoplothe'rium [from the Gr. ἄνοπλος, "unarmed," and θηρίον, a "beast"], a genus of extinct artiodactyle quadrupeds, found in the strata of the upper eocene formation near Paris, and in Lapland, India, etc. They are characterized by the shortness and small size of the canine teeth, and have teeth arranged in a continuous series without vacant interspaces—a structure which occurs in no existing animal except man. The *Anoplotherium commune* was about the size of a wild boar.

Anor'thite, a felspathic mineral found at Vesuvius and elsewhere; essentially an anhydrous silicate of lime and alumina.

Anotto. See Annotto.

Anquetil-Duperron (Abraham Hyacinthe), an eminent Orientalist, was born in Paris Dec. 7, 1731. Having studied Arabic and Persian, his desire to visit India was so strong that he enlisted as a private soldier in an expedition which was sent thither in 1754. He traversed a great part of Hindostan, collected MSS., procured the religious books of the Parsees, and returned to France in 1762. In 1763 he became a member of the Academy of Inscriptions. He published in 1771 his "Zend-Avesta," the first translation of the sacred books of the Parsees that ever appeared in any European language. It is not esteemed very accurate. He wrote "India in Relation with Europe" (2 vols., 1798) and other works. Died Jan. 17, 1805.

Ansaries. See Nusairieh.

Anscha'rius, or **Ans'gar,** Saint, called the "Apostle of the North," was born in Picardy Sept. 8, 801 A. D. He propagated Christianity with success in Denmark and Sweden, and became the first archbishop of Hamburg in 832. Died Feb. 3, 865 A. D.

An'schütz (Karl), born at Coblentz, Germany, in Feb., 1813, became royal musical director at Coblentz, and was afterwards director in Nuremberg, Amsterdam, London, etc. In 1857 he came to America, founded the German opera in New York in 1862, and became a leading conductor and teacher of music. Died Dec. 30, 1870.

Ans'dell (Richard), an English painter of animals, born at Liverpool in 1815. He obtained the gold medal in Paris in 1855. Died Apr. 20, 1885.

Anse de Panier [literally, "handle of a panier"], a French term applied to arches which are the result of elliptical curves in section. This is the most elegant form of arch for bridges.

An'selm, archbishop of Canterbury and the father of scholastic theology, was born at Aosta in Piedmont in 1033, and died at Canterbury, April 21, 1109. He studied in the monastery of Bec, Normandy, whose school had obtained a great reputation under the leadership of his countryman Lanfranc. In 1078 he was himself elected abbot of Bec, and added new lustre to the institution both as a teacher and as a writer. In 1093 he was made archbishop of Canterbury; but, though he was a meek and humble man, having adopted the Gregorian views of the relation between Church and State, he was willing to brave exile (1097) rather than submit to the demands of the king. His principal works are "Proslogium," setting forth the ontological evidence of the existence of God, and "Cur Deus Homo," which has laid the foundation of the orthodox doctrine of atonement. He had originally studied law, and the fundamental conceptions on which he based his doctrine of atonement was derived from, or at least influenced by, the *jus Romanum*. He also wrote a number of devotional books distinguished by the ease and naturalness of his Latin style. The best collected edition of his works is that by Gerberon (Paris, 1675). English translations in "Bibliotheca Sacra" (viii., ix., and xii.). His "Life," by Hasse (translated from the German by W. Turner) (Lond., 1850) and by R. W, Church (Lond., 1875). (See "Life and Times of St. Anselm," by Martin Rule, 2 vols., 1883.)

An'son, on R. R., Somerset co., Me. (see map of Maine, ref. 6–C, for location of county), 8 miles N. W. of Norridgewock, has an academy. Principal business, farming and lumbering. Pop. of tp. in 1870, 1745; in 1880, 1555.

Anson (George), Lord, born in Staffordshire April 23, 1697, became a post-captain in the royal navy in 1724, after which he passed several years on the Carolina station. In 1740 he was appointed commander of an expedition to the South Sea, in which he exhibited great prudence and courage amidst disasters and dangers caused partly by the unseaworthiness of his vessels. Having circumnavigated the globe and made some important discoveries, he returned in 1744 with several Spanish prizes. He defeated a French fleet in May, 1747, and for this service was rewarded with the title of Baron Anson of Soberton. He was first lord of the admiralty from 1751 to 1757, and admiral of the fleet in 1761. Died June 6, 1762. A narrative of his voyage round the world was published.

Anso'nia, R. R. centre in the town of Derby, New Haven co., Conn., on the Naugatuck River, 10 miles W. N. W. of New Haven (see map of Connecticut, ref. 6-D, for location of county). It has a variety of manufactures of brass and iron, etc. Pop. in 1870, 2749; in 1880, 3855.

Ansonians, or **Ansyreeh.** See Nusairieh.

Ansorge (Charles) was born at Spiller, Silesia, in 1817, and graduated at the collegiate institute of Breslau; became a teacher and editor, and was banished by the Prussian government on account of his liberal opinions;

came to Boston, Mass., in 1849; was organist and chorister of the First church, Dorchester, Mass., thirteen years; also taught music for several years in the asylum for the blind in South Boston, Mass.; removed to Chicago, Ill., in 1863. Died Oct. 28, 1866.

Ans'pach, or **Ans'bach,** a fortified city of Bavaria, on the Rezat, 27 miles S. W. of Nuremberg. It has a castle, the former residence of the margraves of Anspach-Baireuth, a public library, and manufactures of cotton and half-silken stuffs, tobacco, earthenware, cutlery, etc. Pop. in 1881, 14,195.

Anspach (ELIZABETH BERKELEY), MARGRAVINE OF, a daughter of Augustus, earl of Berkeley, was born in 1750. She was accomplished, and remarkable for versatility of genius. In 1767 she was married to Mr. Craven, who became earl of Craven, and died in 1791. She was married in that year to the margrave of Anspach. She wrote and performed dramas, and published entertaining autobiographic memoirs. Died at Naples Jan. 13, 1828.

An'sted (DAVID THOMAS), F. R. S., an English geologist, born in London in 1814, was educated at Cambridge. He became in 1840 professor of geology in King's College, London, travelled in America and other countries, and published a great number of works, among which are "Geology, Introductory, Descriptive, and Practical" (2 vols., 1844), "The Ancient World, or Picturesque Sketches of Great Britain," "The Great Stone Book of Nature" (1863), and "The World we Live in" (1869). D. May 20, 1880.

An'ster (JOHN), LL.D., born in Cork county, Ireland, 1798. He was a friend of Coleridge, and regius professor of civil law in the University of Dublin. He produced "Poems and Translations from the German" (1819), and contributed many articles to "Blackwood's Magazine." His translation of Goethe's "Faust" (1835) was praised by the "Edinburgh Review." Died June 9, 1867.

An'swer [Ang.-Sax. *and,* "against," and *swarjan,* to "swear," to "affirm"], in the law of evidence, is the reply of a witness to a question put to him. It also means a pleading interposed in a court of equity by the defendant to the bill or information of the plaintiff. In New York, since the adoption of the code of procedure, and in a number of the other States, it is the name given to the defendant's pleading in all cases, except where he resorts to a demurrer. (See DEMURRER.)

Ant, or **Emmet** [Lat. *formi'ca*], a genus of hymenopterous insects remarkable for their industry, ingenuity, and muscular strength. It comprises numerous species, which are widely distributed in temperate and tropical countries. They have geniculate antennæ; strong jaws; a small, rounded, spoon-like ligula; a thorax compressed at the sides; an abdomen nearly oval. They live in societies composed of males, females, and neuters, the last of which are workers and are destitute of wings. Some of the neuters, it is said, serve the community as soldiers. The males and females have wings, and are larger than the neuters, but less numerous. After the pairing season is past the females are deprived of their wings to prevent their escape, as they have a propensity to desert their home and go astray. It appears that ants realize the advantages of a division of labor, as well as those of co-operation. In winter most species remain dormant, and neither work nor eat, although it is a popular notion that they collect in summer a hoard of grain for their subsistence during the winter. They are mostly carnivorous, and will attack a living animal many times larger than themselves, as a mouse, for example. Another favorite food of some species is honey-dew, the sweet excretion of aphides. According to some authorities, they confine these aphides in stables, as man does his milch cows, and obtain from them, by a process like milking, a regular supply of honey-dew. Perhaps the most remarkable of all this interesting group of insects are the "honey ants" of Mexico. The honey ants inhabit Mexico, New Mexico, and Arizona. They live in colonies, of which the greater number closely resemble the common brown ant of the United States. Certain members of the community, however, during the summer season secrete honey in the abdominal cavity, and soon become incapable of locomotion. They are then placed in subterranean galleries set apart for that purpose, and are systematically fed by the others. In time the distension of the abdomen becomes so great that the victim ants resemble small, spherical, pellucid grapes, the head and thorax simulating the grape-stem. Later in the season, when food is scarce, these fattened ants are in turn devoured by the other members of the colony. Ants appear to be endowed with greater muscular strength than almost any other insect of equal size. They display great ingenuity in the construction of their habitations, called ant-hills, which are mostly placed on the surface of the ground. The large ants of South America raise their ant-hills to the height of fifteen feet or more. Some species, called mason ants, perforate galleries in the clay, and support by pillars and arches the roof of their house. Others, called carpenter ants, excavate cells and labyrinthine galleries in the trunks of living trees. Ants are supposed to have a faculty of conversing or communicating with each other by means of their antennæ, which, according to some naturalists, are organs of hearing. These insects are generally very pugnacious, and often fight pitched battles with other ants. The Swiss naturalist Huber has given a detailed account of their battles, martial exploits, and predatory expeditions. Still more marvellous and paradoxical is the well-attested fact that some species, as the *Formica rufa* and the *Formica rufescens* (or amazon ant), reduce other ants to slavery, and that the principal motive of their wars and piratical excursions is to capture larvæ and pupæ or nymphs, which they carry home for slaves. "At the head of these daring slave-makers," says Pouchet, "we must put the red ant or amazon, the military expeditions of which have been most carefully observed by the naturalists of our epoch. They are so frequent that one may enjoy the sight of them any fine day during the summer season." After describing the siege and capture of a nest by these amazons, he adds: "Then the whole army, laden with booty, and sometimes stretching out in a line forty mètres in length (130 feet), triumphantly returns to its city in the same order as at its departure." (*The Universe.*) These slaveholding ants have a great aversion to labor, and when they perform a journey are carried by their slaves. These are darker colored than their masters, and are called *Formica fusca.* The fact that ants work all through the night, and seem never to sleep, was noticed more than one hundred and fifty years ago in the "Guardian" (vol. ii., No. 156). It is asserted that certain ants in warm countries (one species in Texas) actually plant grass-seeds, and cultivate, harvest, and store the grain. Some also construct, and even pave their roads. A battle of ants has been described by Huber in these terms: "I shall not say what lighted up discord between these two republics, the one as populous as the other. The two armies met midway between their respective residences. Their serried columns reached from the field of battle to the nest, and were two feet in width. . . . The field of battle, which extended over a space of two or three square feet, was strewn with dead bodies and wounded; it was also covered with venom, and exhaled a penetrating odor. The struggle began between two ants, which locked themselves together with their mandibles while they raised themselves upon their legs. They quickly grasped each other so tightly that they rolled one over the other in the dust." At the approach of night the two armies effected a retreat, but the next day the carnage was renewed with equal or greater fury. Some species of *Formica* eject from their abdomen a peculiar volatile, acrid, and pungent liquid called *formic acid,* the offensive odor of which defends them against other animals. The carnivorous species of ants perform a useful service by devouring the carcasses of dead animals. Their voracity is such that a clean skeleton of a small animal may be obtained by burying it for a short time in an ant-hill. The termites of tropical countries, sometimes called white ants, are not properly ants, but belong to another genus. (See TERMITES.) (See P. HUBER, "Traité des Mœurs des Fourmis Indigènes.") REVISED BY J. S. NEWBERRY.

Antaç'id [*anti* and *acid*], a remedy for acid in the stomach or in the blood. The alkalies, lime-water, magnesia, etc., are mostly used for this purpose, vegetable acids, like the citric (lemon juice, etc.), being often administered with them. These acids become carbonic acid in the blood, forming bicarbonates with the alkalies. This antacid treatment is much resorted to in acute rheumatism.

Antæ'us [Gr. 'Ανταῖος], a fabulous Libyan giant, a son of Neptune and Terra, was a famous wrestler. He was invincible as long as he continued in contact with the earth (Terra), but he was conquered by Hercules, who raised him into the air and strangled him to death.

Antagonist Muscles. Every muscle and set of muscles in the animal body is opposed in its action either by some other muscle or muscles, or by elastic ligaments. Generally it is the former; thus, in the human arm we have the *triceps extensor* muscle antagonized by the *biceps flexor* and the *brachialis anticus;* in the forearm, there are the *flexor* and *extensor* muscles of the hand and wrist, as well as the *pronators* and *supinators* of the hand. Similarly in the lower extremity opposed muscles exist, although not always of corresponding names. The great *adductor* muscles of the thigh, whose action draws the limbs together, are antagonized by the *glutei* and *obturator* muscles and others. The diaphragm, the contraction of which aids in expanding the cavity of the chest, is opposed by the external abdominal muscles, whose action is perceptible in expiration. So constant is this provision of muscular antagonism in the animal kingdom that there is no well-ascertained example of *active dilatation* of any muscle. The *diastole* of the heart in man and other vertebrates can be explained best by elasticity only, as it exerts very little power. In Myriapoda each section of the elongated aortic heart has triangular muscles connected with the sides of the body, by which the *diastole* after contraction is effected. The *predominance* of power in opposing groups of muscles determines the position of different parts of the body when at rest; hence, in man the naturally bent position of the fingers during sleep, from the prevailing power of the flexors. Disease sometimes disturbs the natural balance of the muscles.

Anta'kia, a city of Syria, on the Orontes, is situated on the site of the ancient ANTIOCH (which see).

Antal'cidas [Gr. 'Ανταλκίδας], a Spartan diplomatist, who was sent on a mission to Persia when Sparta was in a critical position, and negotiated a treaty called the Peace of Antalcidas, in 387 B. C. This treaty excited general indignation among the Greeks, whose interests the Spartans sacrificed to gratify their enmity to Athens and Thebes. One of the articles of this treaty stipulated that all the Greek cities of Asia Minor should be subject to the king of Persia.

Antanacla'sis [Gr. ἀντανάκλασις, from ἀντί, "against" (and hence implying contrast), and ἀνάκλασις, a "bending back"], in rhetoric, a figure in which a word is repeated, but in a different sense or different inflection from the first, which gives a kind of antithetical force to the expression; as, "Learn some *craft* when young, that when old you may live without craft."

Antanana'rivo', or **Tananarivo',** the capital and chief city of Madagascar, is situated in a mountainous region in the middle of the island, 166 miles S. W. of Tamative. It is about 7000 feet above the level of the sea. It is reported to be a large city, and to have manufactures of gold chains and silk stuffs. The private houses are mostly of wood. Pop. estimated at 80,000.

An'tar, An'tara, or **An'tarah-Ibn-Sheddâd',** a celebrated Arabian prince, poet, and warrior who lived about 550 A. D. He was the author of one of the seven poems which are called Mo'allakat, and were suspended in the Kaaba or temple at Mecca. His martial exploits were a favorite theme of Arabian poetry and romance. He is the hero of a celebrated romance, translated into English by T. Hamilton, entitled "Antar, a Bedouin Romance" (1819).

Antarc'tic [from the Gr. ἀντί, "against," "opposite," and ἀρκτικός, "pertaining to the north"], opposite to Arctic. The Antarctic Circle is one of the small circles of the sphere parallel to the equator, and distant 23° 27½′ from the South Pole.

Antarctic Current. This drift-current commences on the shores of Victoria Land, in the region of perpetual frost. It carries vast quantities of ice and cold water towards the N. E. and E., and becomes converted into a coast-current, washing and cooling the western shores of South America, thus performing a work nearly the converse of that performed by the Gulf Stream on the shores of Europe. It conveys drift ice to the latitude of about 55°.

Antarctic Ocean, or **Southern Ocean,** the name applied to that large body of water around the South Pole included within the Antarctic Circle; and also a general term designating that vast sea S. of the Atlantic, Pacific, and Indian oceans. It has not been explored so thoroughly as the Arctic Ocean, and was long considered impenetrable for ships, on account of the ice, which extends much farther from the Pole (about 10°) than in the Arctic Ocean. Sir James Ross has explored the Antarctic Ocean as far as 79° S. In Jan., 1841, he discovered in lat. 77° 32′ S. and lon. 167° E. a volcano 12,400 feet high, which he called Mount Erebus. The portions of land which have been discovered in this ocean are called New Georgia, Sandwich Lands, New Orkneys, Enderby's Land, Sabrina, Victoria Land, etc.

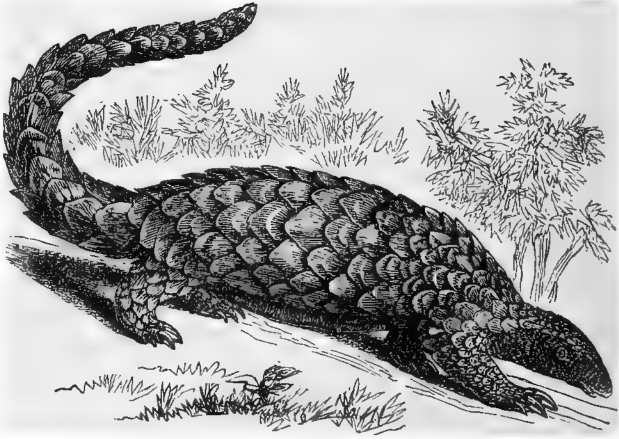
Antarctic Researches. The first navigator who explored these regions was Capt. Cook, who in Jan., 1774, reached lat. 71° 10′ S. in lon. 106° 54′ W. In 1823, Capt. Weddell penetrated to lat. 74° 15′ S. in lon. 34° 16′ 15″ W., and found there an open sea. In 1839, Capt. Wilkes, of the U. S. navy, conducted an exploring expedition towards the South Pole. He discovered in Jan., 1840, a portion of a large continent in lat. 61° 30′ S. and lon. 161° E. He traced the coast westward to lon. 101° E., but was prevented from landing by an impassable barrier of ice. Capt. James Ross, who commanded a British expedition in 1841, penetrated as far as 78° or 79° S. He computed the position of the southern magnetic pole to be in Victoria Land, lat. 75° 5′ S., lon. 154° 8′ E. (See POLAR RESEARCH.)

Anta'res [from the Gr. ἀντί, in a sense implying "comparison," and 'Αρης, "Mars," because this star was thought to resemble Mars], a ruddy double star, the most conspicuous in the constellation Scorpio. It is important in navigation in computing longitude.

Ant-Catcher and **Ant-Thrush,** names given to birds of tropical and sub-tropical countries that feed upon ants, and are nearly allied to the thrushes. They have very powerful voices, a straight, sub-cylindrical bill, hooked at the tip, slender legs, and short tail. Some of them belong to the genera *Pitta* and *Grallaria*. The giant ant-catcher of Sumatra (*Pitta gigas*) is of a fine green color.

Giant Ant-Catcher.

Ant-Eater, a South American family of mammals, animals of the order Edentata. Ant-eaters have no teeth, and feed on ants and other insects, which they catch by thrusting among them the long tongue covered with a viscid saliva. The head is much elongated, and the tail is about as long as the body, which is covered with long hair. The toes are united as far as the base of the claws, which are very large and strong, adapted for the purpose of tearing open ant-hills. The great ant-eater (*Myrmecophaga jubata*), sometimes called the ant-bear, is about four and a half feet long, exclusive of the tail, which is about two and



Manis laticaudata, the Asiatic Ant-Eater.

a half feet. It has four toes on the fore feet, and five on the hind feet. It is a sluggish animal, whose movements are not much more rapid than those of a sloth. The little ant-eater (*Cyclothu'rus didac'tylus*) is not more than twenty or twenty-one inches in entire length. It is remarkable for a peculiar structure of the skeleton. On a side view the cavity of the chest is completely hidden by the ribs, which are greatly flattened and overlap each other, so that on a hasty glance the ribs appear to be formed of one solid piece of bone. It has two claws on the fore feet and four on the hind feet; these claws are compressed, curved, and very sharp. The name ant-eater is sometimes given to the aardvark (*Orycteropus Capensis*) of South Africa, to the pangolins, the *Echidna,* and other mammals which subsist on ants and other insects. One of the best known of these is the *Manis laticaudata,* or pangolin of Hindostan. (See PANGOLIN.)

Antece'dent [Lat. *antece'dens,* from *an'te,* "before," and *ce'do,* to "go"], that which goes before or precedes in time or in place. In grammar, the noun to which a relative pronoun refers; in logic, the first of two propositions in an enthymeme, and the first member of a hypothetical proposition; opposed to the consequent; in mathematics, the first of two terms composing a ratio. Thus, in the ratio A : B, A is the antecedent, and B is the consequent.

The word in the plural is used in a different sense, as in speaking of a person's *antecedents—i. e.* his previous conduct and character, his early history or primordial relations.

Antedilu'vian [from the Lat. *an'te,* "before," and *dilu'vium,* the "deluge"], a term applied to any person or thing that existed before the Flood—*i. e.* the Noachian Deluge. According to the chronology of the Hebrew text of the Bible, this flood occurred 1656 years after the creation of man. The date of this event, according to the Septuagint version, is several centuries later. Chevalier Bunsen adopted the theory that the Flood occurred about ten thousand years ago. Geologists do not recognize that the earth was ever inundated by a simultaneous universal deluge since it was inhabited by man.

An'telope [Lat. *antil'ope* and *antel'aphus;* Fr. *antilope*], a family of Mammalia, of the order Ruminantia, characterized by hollow horns, which are annulated and permanent, not annually renewed (except the *Antilocapra*), and not longitudinally rigid. The family comprises numerous genera and species, the genus *Antilope* being the typical one, natives of Europe, Asia, Africa, and America, remarkable for their elegant figure and extreme agility. They are mostly gregarious, inoffensive, and timid animals, and vary greatly in size as well as form. The greater numbers of them are found in Southern and Central Africa. Asia produces numerous species. Among the various species are the gazelle (*Gazella dorcas*), the beauty of whose eye is proverbial; the addax or Nubian antelope; the stein-boc, eland, and spring-boc of South Africa; and the chamois of Europe. The antelopes are probably the fleetest of all quadrupeds. Their flesh is a favorite article of food. Great numbers of the prong-buck (*Antilocapra America'na*) roam over the plains between the Mississippi River and the Rocky Mountains. The Rocky Mountain goat is another antelope (*Aploceras montanus*). "Born in the scorching sun," says Sir S. W. Baker, "nursed on the burning sand of the treeless and shadowless wilderness, the gazelle is among the antelope tribe as the Arab horse is among its brethren —the high-bred and superlative beauty of the race. Entirely free from fat, and nevertheless a mass of muscle and sinew, the gazelle is the fastest of the antelope tribe."

Antilope bezoartica, the Common Antelope.

The "common" or bezoar antelope (*Antilope bezoartica*) is found in India and throughout Southern Asia. It is a very beautiful animal, and is distinguished for its timidity and swiftness. Its flesh, like that of most antelopes, is dry and rather unpalatable. The Oriental bezoar, a phosphatic concretion prized in the East for its supposed medicinal virtues, is derived from the intestines of this animal. The horns of the antelope differ in structure from those of the deer; in the latter the horns (which are more properly called antlers) are deciduous, but in the antelopes they consist of a horny sheath surrounding a conical support of bone. Their growth is gradual, and they are not yearly shed and renewed, but are retained during the life of the animal. Some antelopes have four horns. In some groups of antelopes both sexes have horns; in others, only the male. (See ANTILOCAPRA.)

An'te Na'ti [a Latin term signifying "born before"] was a term applied to such of the Scotch as were born before the accession of James I. to the throne of England, and who were considered as aliens by the English.

An'tennæ, singular **Anten'na** [a Latin word meaning the "yard of a ship"], jointed filaments or tubular sensiferous organs attached to the heads of insects and crustaceans. They are sometimes called feelers, and are supposed to be organs of touch (or, according to some naturalists, organs of hearing). An insect has two antennæ, which are very flexible, and are composed in some species of a great number of joints. A crustacean has four antennæ.

Anteque'ra, a city of Spain, in the province of Malaga, 22 miles N. N. W. of Malaga, on the left bank of the Guadalhoree. It has many monasteries and convents, and large factories of flannel, paper, silk, and soap. The population of Antequera consists largely of hidalgos, with whom the vendetta was a common practice as late as 1845. Pop. in 1877, 25,549.

Ant'eros ['Αντέρως], in the Greek mythology, a being opposed to Eros or Cupid, the god of Love, and fighting against him; also the deity who punishes those who do not return the love of others.

Anthe'lia [from the Gr. ἀντήλιος or ἀνθήλιος, "opposite the sun"], luminous colored rings observed under certain conditions around the shadow of the spectator's own head. The conditions of the phenomenon are two: first, that the sun be near the horizon, and secondly, that the shadow be projected on a surface covered with dew-drops, as a field of grass, or on a dense fog-bank distant about fifty yards. They occur chiefly in the polar regions.

Anthelmin'tics [Gr. ἀντί, "against," and ἕλμινς, a "worm"] are medicines which either destroy or drive out intestinal parasites; the former are called vermicides, the latter vermifuges. The last named are most commonly employed. Against the ordinary lumbricoid worm (*As'caris lumbricoi'des*) an infusion or fluid extract of senna and spigelia (pink-root) is safe and efficacious. To drive out the worrying seat-worms or thread-worms (*Oxyu'rus* or *As'caris vermicula'ris*) nothing is better than santonin, introduced into the bowels in the form of a suppository. For the more formidable tape-worm (*Tæ'nia*) oil of turpentine, oil of fern, kousso, pumpkin seeds, and pomegranate seeds are used. It is important that the *head* of the tape-worm shall pass away, as, till that happens, the joints continue to be reproduced. In all cases of worms attention is needed to the general condition of the digestive organs.

An'them [Gr. ἀντίφωνος, "returning a responsive sound"], a mixture of motett and cantata, with instrumental accompaniment, adapted to scriptural words. It was carried to great perfection by Handel.

Anthe'mion, the ornament or ornamental series used in Greek and Roman decoration which is derived from floral forms, more especially the honeysuckle, very common in the early period of Greek art.

Anthe'mius ['Ανθέμιος], an eminent Greek architect and mathematician, surnamed TRALLIANUS, from his native place, Tralles, in Lydia, was a brother of Alexander Trallianus. He was patronized by Justinian at Constantinople, and designed the celebrated church of St. Sophia, which was finished about 537 A. D., and is surmounted by a dome in the Byzantine style, of which it is probably the original type. It is now a Turkish mosque. Anthemius died about 534 A. D.

Anthe′mius, or **Anthe′mius Proco′pius,** a Roman emperor, who began to reign at Rome in 467 A. D., before which he was a favorite general of Leo, the emperor of the East. He was the father-in-law of Ricimer, who became his enemy. Anthemius was defeated in battle by Ricimer, and put to death in 472 A. D.

An′ther [Lat. *anthe′ra*, from the Gr. ἄνθος, a "flower"], the essential part of the stamen, is the case which contains the pollen, and is the male organ of a plant. Theoretically considered, the anther is the lamina of a transformed leaf divided into two lobes or cells by the connective, which corresponds to the midrib of the leaf. When the anther is attached by its base to the apex of the filament, it is called *innate*, as in the carex; when it grows to the face or side of the filament, it is *adnate*, as in the magnolia; and when the apex of the filament is attached to the middle of the anther, the latter is *versatile*, as in the grasses. The anther generally opens, for discharging pollen, a longitudinal slit from top to bottom of each cell, but sometimes only at the apex or some other definite point.

Antherid′ium, plural **Antherid′ia** [from Lat. *anthera*, an "anther," and the Gr. εἶδος, "likeness"], a name applied to organs of cryptogamous plants supposed to be analogous in functions to the anthers of the phanerogamous flowers. They are variously situated on the surface of plants or within their tissue, and are in some cases collections of cells containing small bodies called *phytozoa*, which at certain periods exhibit rapid movements.

Antho′dium [from the Gr. ἄνθος, "flower," and εἶδος, "likeness"], a head of flowers, the same as a capitule, applied to the flower of the thistle and other Compositæ, in which a number of florets are combined in a head and surrounded by a common involucre.

Anthol′ogy [from the Gr. ἀνθολογία, a "collection of flowers"], a term applied metaphorically in ancient literature to a collection of short pieces of poetry on amatory, convivial, or moral subjects, or a selection of beautiful thoughts and sentences in prose or verse, mostly epigrams. The first collection in Greek entitled an Anthology was made by Meleager, a Syrian poet who lived about 80–60 B. C. Another collection, compiled by Constantine Cephalas in the tenth century, was discovered by Salmasius, and is now extant. This anthology, augmented by epigrams found on ancient monuments, was edited by Brunck, under the title of "Analecta Veterum Poëtarum Græcorum" (1776). A revised edition of the same was published by Jacobs, entitled "Anthologia Græca sive Poëtarum Græcorum Lusus ex Recensione Brunckii" (Leipsic, 1794–1814). Scaliger published a Latin anthology in 1573, "Catalecta Veterum Poëtarum" greatly enlarged in Burrman's "Anthologia Latina," 2 vols. 4to, 1759. Collections of poetry which may not inappropriately be termed anthologies are also found in the literatures of Arabia, Turkey, Persia, and China.

An′thon (Charles), LL.D., an American classical scholar, born in the city of New York Nov. 19, 1797, graduated at Columbia College in 1815. He studied law, and was admitted to the bar in 1819, but he never practised that profession. In 1820 he became adjunct professor of ancient languages in Columbia College, and in 1835 principal professor of the classics in that institution. He published an edition of Horace with notes (1830), and of the classical works usually read in schools, also a "Classical Dictionary" (1841). Died July 29, 1867.

Anthon (John), LL.D., a brother of the preceding, born in Detroit in 1784, graduated at Columbia College in 1801. He was a very eminent lawyer, and was president of the Law Institute of New York. He published several legal works of importance. Died Mar. 5, 1863.

Anthony, city, on R. R., capital of Harper co., Kan. (see map of Kansas, ref. 8–F, for location of county). Pop. in 1880, 345; in 1885, 2132.

Anthony (Henry B.), a statesman, was born at Coventry, R. I., April 1, 1815, graduated at Brown University in 1833, was editor of the "Providence Journal" (1838–59), governor of Rhode Island (1849–51), and U. S. Senator from 1859 until his death, having been U. S. Senator longer than any one then holding that position; was a delegate to the Philadelphia "Loyalists'" Convention in 1866. Elected president *pro tem.* of U. S. Senate 1883, but declined the office on account of ill health. D. Sept. 2, 1884.

Anthony (Joseph B.), born in Pennsylvania, was a member of Congress from that State 1833–38, and served as a member of the committees on territories and military affairs. Died Jan. 17, 1851.

Anthony (Susan Brownell), born at South Adams, Mass., Feb. 15, 1820, was the daughter of a Quaker. She was fifteen years a teacher in New York. Since 1852 she has been an active leader of the woman's right movement; she has also been long distinguished for her zeal and eloquence in the temperance and anti-slavery causes. Since the civil war she has given most of her labors to the cause of woman's suffrage.

Anthony, Saint. See Antony, Saint.

Anthony's Nose, a mountain in the Highlands, E. of the Hudson River, is partly in Philipstown township, Putnam co., and partly in Cortlandt township, Westchester co., N. Y. It rises 1228 feet above the river. In making the railroad-cutting through its base many beautiful minerals were found.

Anthoph′yllite, a silicate of magnesia and iron from Norway. A fibrous mineral of similar composition, called *hydrous anthophyllite*, is found on New York Island, near the corner of Fifty-ninth street and Tenth avenue, which is supposed to be an altered hornblende.

Anthosid′erite [from the Gr. ἄνθος, a "flower," and σίδηρος, "iron"], a hydrated silicate of iron occurring in fine fibrous tufts, with a radiated structure. It is found at Antonia Pereira, in Minas Geraes, in Brazil.

Anthoxan′thum [from the Gr. ἄνθος, a "flower," and ξανθός, "yellow"], a genus of plants of the natural order Graminaceæ, natives of Europe. The flowers are a dull yellow when ripe. It includes the sweet vernal grass (*Anthoxanthum odoratum*), which grows in meadows and perfumes the air with an exquisite fragrance. It is naturalized in the U. S.

An′thracene, or **Paranaph′thaline** ($C_{14}H_{10}$), a hydro-carbon existing in coal-tar, and extracted from the last portions of the distillate from this substance. The products of the distillation of coal-tar as ordinarily conducted are: (1) Crude coal-tar naphtha, containing benzol, toluol, etc., lighter than water. (2) Heavy oil of coal-tar, or "dead oil," heavier than water, and containing about 10 per cent. of Phenol (which see) and cresol, and much naphthaline. (3) Green oil, which becomes semi-solid on cooling, owing to the crystallization of anthracene. (4) Pitch, which remains in the still. Versemann and Fenner have patented the further distillation of pitch till only coke remains in the still. They thus obtain a much larger yield of green oil, and increase the product of anthracene from one-half of 1 per cent. to 2 per cent. of the original tar. The semi-solid green oil has been used in England to some extent as a cheap lubricator or wheel-grease, under the name of "green grease." The anthracene is separated from the green oil by chilling and pressing. In its crude state it contains considerable oil, naphthaline, pyrene, chrysene, chrysogen, retene, anthraflavic acid, etc. To purify the crude anthracene cake, it may be subjected to distillation, the first and last portions being rejected, the intermediate portion being recrystallized from benzol or coal-tar naphtha; or the crude cake may be washed with petroleum naphtha to remove oils, etc., and then recrystallized from benzol. Thus obtained, anthracene is always colored yellow by chrysogen, which may be destroyed by exposing its solution to the direct rays of the sun. Graebe and Liebermann prepared anthracene by the action of zinc-dust on alizarine, the coloring-matter of madder, and were from this led to devise a method for preparing alizarine from anthracene—an operation which is now the basis of a very important industry. (See Alizarine.)

Anthracene may also be formed artificially by benzyl chloride (C_7H_7Cl) with water, and by exposing to a red or white heat mixtures of ethylene with benzol, cinnamene, diphenyl, chrysene, or naphthaline. Anthracene is obtained in beautiful white crystalline laminæ, melting at 213° C., and distilling at 360° C. Anthracene is insoluble in water, soluble in alcohol, benzol, and bisulphide of carbon to the extent of 0.6, 0.9, and 1.7 per cent. respectively. Heat greatly increases its solubility in these liquids. It is also soluble in ether and the essential oils, especially oil of turpentine. Light petroleum naphtha, which dissolves naphthaline readily, has little effect on anthracene. Oxidizing agents, such as potassic dichromate and sulphuric or acetic acid, change anthracene into oxanthracene or anthraquinone ($C_{14}H_8O_2$), which, by the addition of O_2, becomes anthraquinonic acid or alizarine, $C_{14}H_8O_4$. Oil of vitriol dissolves anthracene, forming a conjugated acid. With bromine and chlorine, anthracene forms several substitution products. On mixing alcoholic solutions of picric acid and anthracene, beautiful ruby-red needles of picrate are obtained. (See "Anthracene und seine Derivate," by G. Auerbach, Berlin, 1873; Kopp's articles in "Le Moniteur Scientifique du Quesneville," Aug. 15, 1870, Aug. 1 and 15, 1871; also "Jahresbericht über die Fortschritte der Chemie," 1868 *et seq.*, and Wagner's "Jahresbericht der Chemischen Technologie," 1868 *et seq.*) C. F. Chandler.

An′thracite [Lat. *anthraci′tes*, from the Gr. *ἄνθραξ*, a "coal"], an important fossil fuel, the hardest variety of stone coal, consisting, when pure, almost exclusively of carbon. It has a conchoidal fracture, a black color, and an imperfectly metallic lustre, from which it is sometimes called *glance coal*. It burns slowly, with intense heat, without smoke, and with little flame. Anthracite, like all other varieties of coal, is of vegetable origin, and is, in fact, formed from softer and more bituminous coals by the action of subterranean heat, which has driven off most of their volatile matter. The composition of anthracite is the same as that of coke formed artificially from bituminous coal, and it is more dense than coke only because it has been heated under great pressure. Anthracite has no definite composition, but shades imperceptibly into graphite on one hand, and into bituminous coal on the other. The anthracite beds of Pennsylvania are all of carboniferous age, and were once connected with the bituminous coals of the Alleghany coal-field, having been separated and changed in character by the upheaval of the Alleghany Mountains. The coals of that State show a regular gradation of composition in going from the east to the west, and receding from the focus of metamorphic action in the Alleghanies. For example, the coal of the Lehigh basin is most baked, and contains the least amount of volatile matter—3 to 7 per cent.; the Scranton coal, from 9 to 12 per cent.; the semi-bituminous coal of Blossburg and Broad Top, from 17 to 25 per cent.; the bituminous coal of Western Pennsylvania, from 30 to 50 per cent. In Rhode Island a small basin of carboniferous rocks has been still more thoroughly calcined, and the coal is partially converted into graphite (graphitic anthracite). Anthracite may be of any geological age. In China the coals are mostly, if not altogether, of mesozoic age, and over large areas they are anthracitic. Near Richmond, Va., trap dikes bursting through the triassic coal-beds have changed some of them locally into a spongy anthracite, a "natural coke." Near Sante Fé, N. M., and Crested Buttes, Col., outbursts of volcanic rock have, over many square miles, converted cretaceous lignite into anthracite. The triassic coal of Los Bronces, Sonora, has been extensively metamorphosed by the action of igneous rocks, and on Queen Charlotte Island, N. of Vancouver's Island, a local eruption of trap has converted a cretaceous lignite into one of the most compact and brilliant anthracites known.

The density and great heating power of anthracite make it an excellent fuel for metallurgic purposes, while its freedom from smoke specially commends it for combustion in cities. For the generation of steam, anthracite has no superiority over the best bituminous and semi-bituminous coals; and as a household fuel, cannel is preferred for open fires from its cheerful flame and the facility with which it is kindled; but the steadiness, cleanliness, and economy of an anthracite fire will always make it the staple fuel of the communities which can obtain it.

Anthracite occurs and is largely mined in Wales, Ireland, and other parts of Europe, but the most extensive and productive beds of anthracite are those of Pennsylvania. These form several detached basins between the folds of the Alleghany Mountains. Their total area is only about 500 sq. m., but from their proximity to the chief centres of population and manufacture they have had a most important effect on the development of the industry and wealth of America. (See COAL.) (See TAYLOR'S "Statistics of Coal;" DADOW'S "Coal, Iron, and Oil;" and MCFARLANE'S "Coal Formations of America.") J. S. NEWBERRY.

Anthrapurpurine. See ALIZARINE.

Anthraquinone. See ANTHRACENE and ALIZARINE.

Anthrenus Scrophulariæ. See APPENDIX.

Anthropol′atry [from the Gr. *ἄνθρωπος*, "man," and *λατρεία*, "service," "worship"] signifies the worship of man.

Anthropol′ogy [from the Gr. *ἄνθρωπος*, "man," and *λόγος*, a "treatise"] is a term used in several senses: (1) It signifies the science of man as an object of natural history, and as compared with other animals; (2) the science which treats of man's whole nature, as distinguished from psychology, which treats of the mind or spirit of man; (3) in a theological sense it denotes the study of man in his relations to God. (For a notice of anthropology in the former senses see the article MAN, by PRES. M. B. ANDERSON, LL.D.)

ANTHROPOLOGY [*ἀνθροπολογία*, "doctrine respecting man"], in the theological as distinguished from the physiological sense, is that part of the Christian system which treats of man in distinction from God. In its entire extent it includes the description of man both as created and as fallen, and therefore properly includes both the holiness and the sin of the human race. It begins with the creation of man as composed of body and soul, and thus supposes a basis in physical anthropology. It then considers the soul as created in the image of God, and thus discusses the nature of holiness and the happiness of an unfallen creature in the paradisaical state. But inasmuch as man continued in his primitive holy condition but a brief time, his history is made up mainly of his apostasy and its consequences, so that practically the subject of anthropology relates to such topics as original and actual sin, the free and the enslaved will, the relation of the human to the divine efficiency in regeneration, and the related doctrines. The great controversies which have resulted in the several anthropologies that have a place in the history of religious opinions were concerned almost exclusively with sin, and it is in this reference that we shall examine the subject.

In the primitive Church of the first three centuries the fact of apostasy was universally acknowledged, but only in a general form. The doctrines of sin and grace in their more difficult and scientific aspects did not seriously engage the attention of the Church. The theological mind was occupied with the doctrine of the Trinity and the great controversy concerning the deity of Christ. The statements of Scripture concerning the fall of Adam and its consequences were taken without much discussion, and no acute and powerful exegesis was expended upon them for the purpose of answering the more difficult questions respecting the nature and depth of human depravity. When, however, these latter points were presented, and any direct response was given, sin in its nature was referred, to a considerable degree, to a sensuous ground, and its intensity was not regarded as so great as to deprive the human will of all power to good. The origin and development of human corruption was traced to the body full as much as to the activity of the spirit itself, and hence a remainder of energy was assumed to exist in the fallen will, by which it could co-operate with the Holy Ghost in regeneration. This view appears particularly in the writings of Clement of Alexandria and Origen, and colors the anthropology of that Alexandrine School which acknowledged those theologians as its great leaders.

It would be a mistake, however, to regard Clement and Origen as the only representatives of the anthropology of the primitive Church. In Tertullian and Cyprian a tendency appears towards that theory which was afterwards elaborated by Augustine. While the part which the sensuous nature has in determining the origin and nature of sin is still asserted, yet more weight is attached to the self-determination of the human will itself—to the purely mental and spiritual energy that originates and perpetuates it. This naturally leads to more assertion of the bondage of the will, and a more profound conception of sin as enfeebling and ruining the moral power of the soul. This tendency was strengthened by the adoption by Tertullian of the traducian view of the origin of the individual. This North African Father, in a somewhat crude and materializing manner, held that both the body and soul are propagated. Both the immaterial essence of the soul and the material substance of the body are individualized portions of human nature as created in Adam. There is no creation from nothing after the creative act on the sixth day, when "God created man male and female, and blessed them, and called their name Adam." (Gen. v. 1, 2.) There is only procreation, or the deduction of individual after individual from this original unity. Such a theory of the propagation of the soul, however difficult in itself, yet made the propagation of sin more intelligible, and prepared the way for the subsequent doctrine of the propagation of sin itself, and not of mere physical evil.

The anthropology indicated in this brief statement of the views of the early Church received a subsequent modification in the later Alexandrine and Antiochian Schools. The best representatives of the first were Athanasius, the two Gregories, and the two Cyrils; of the second, Theodore of Mopsuestia, Theodoret, and Chrysostom. The influence of Origen upon these Greek theologians is apparent, but they receded from his extreme positions and modified his anthropology, (1) by the adoption of creationism instead of pre-existence; (2) by recognizing more distinctly the effects of the Adamic transgression upon the soul itself, including the will; and (3) by making a more guarded assertion of power to good in the fallen man. They agreed, however, with the earlier anthropology in affirming that original sin, or inherited corruption, is not culpable. It is only a propagated disorder of the sensuous nature seen in exorbitant physical appetites, from which temptation issues, and to which every human individual yields without exception. But until this act of the individual will there is no sin, properly so called, no sin in the sense of guilt, in any man. The mortal Adam could beget mortal descendants, but the sinful Adam could not beget strictly sinful and guilty descendants. "What, then," says Chrysostom, "is the meaning of the phrase 'were made sinners?'

(Rom. v. 19.) It seems to me to denote liability to suffering and death." In this exegesis, Chrysostom put a secondary meaning upon the verb "to sin," which has come down to the present time, and which has unquestionably exerted an influence upon many theologians who would agree with the Golden-mouthed in most of his positions, and also upon many who would be unwilling to adopt his anthropology.

The question as to the guilt of original sin, and the justice of imputing that "disobedience of one man whereby many were made sinners" (Rom. v. 19), is, in truth, the hinge upon which the whole subject of anthropology must turn. And the way in which it is answered constitutes the dividing line between the two great dogmatic divisions which from Augustine down to the present day appear in the history of the Church. Augustine, in his controversy with Pelagianism, but still more with Semi-Pelagianism, maintained that the first sin of Adam is imputable to the posterity as guilt, and is a just ground of condemnation, because the posterity existed in the progenitor, and in some real but inexplicable manner acted in him in the first transgression. "We were all," he says, "*in* that one man, since we all *were* that one man. The particular form in which we were to live as individuals had not been created and assigned to us, man by man, but that *seminal nature* was in existence from which we were to be propagated." (*De Civitate Dei*, xiii. 14.) If the mystery of such a generic existence and such a natural union between the progenitor and the posterity could be believed and the fact conceded, then the imputation of Adam's sin to his descendants would be made upon the same principle that it is imputed to Adam himself—upon the principle, namely, of attributing to every real and veritable agent every real and veritable act of the agent. The consequence of this primal act of apostasy was the total depravation of the entire human species, then existing in the progenitors, and consequently every individual produced out of this species is born entirely depraved. Beginning in the higher parts of the soul, the reason and will, sin penetrates and poisons the lower powers, and vitiates the bodily appetites and propensities. Sin is spiritual evil in its very outset, and becomes sensuous corruption in its final issue. The soul itself falls from God, and carries the body with its sensuous nature along with it. Unlike the anthropology of Origen, that of Augustine explains the disordered appetites of the flesh by the rebellion in the spirit, and not the rebellion in the spirit by the disorder of the flesh.

Another point of difference between Augustine and his Semi-Pelagian opponents relates to the question as to the amount of power to holiness in man after apostasy. Pelagianism, as defined and defended by its ablest advocate, Julian of Eclanum, contended for plenary power in every man to keep the moral law. The apostasy still left the will free, and freedom means the liberty of indifference, or the power of choosing either good or evil at any instant. This view was deemed to be extreme by those who would find a middle view between Pelagius and Augustine. Cassian and Faustus of Rhegium, the best representatives of the so-called Semi-Pelagianism, maintained that by the fall of Adam his posterity were greatly weakened, but not made absolutely impotent to good. There still remained a minimum of goodness, which is capable of co-operating with God, and therefore regeneration is a joint product of grace and free-will. Neither can do without the other. In opposition to this, Augustine contended that there is no power to good, not even a minimum, left in the human soul since apostasy. The heart and will are wholly determined to evil, and there is no remainder, however small, of either inclination or affection that is friendly to God and holiness. The carnal mind is enmity towards God, and nothing but enmity. Hence, man cannot co-operate with God in regeneration. Not until the sinner is made willing (Ps. cx. 3; Phil. ii. 12, 13) can he will the right.

The Pelagian anthropology, which was the occasion of forcing out the systematic statements of Augustine, denied that any physical or moral corruption of human nature resulted from the Adamic transgression, interpreted the statements of the fifth chapter of Romans as teaching the influence of bad example, and asserted that sin is not strictly universal, but that some have lived without transgression. Pelagianism itself never exerted much influence within the Church. It contained too few elements of truth, and was too utterly at variance with the Scripture representations of sin and grace, to get the advocacy of any who possessed an evangelical experience. It was rejected as heresy. But the middle view of Semi-Pelagianism held its ground by reason of its recognition of the injurious effects of Adam's apostasy upon his posterity, and its acknowledgment of the need of grace in order to recovery therefrom. Moreover, the *degree* of power to good which many of the Semi-Pelagians asserted was much less than that asserted in the Alexandrine anthropology, and in some instances it was reduced to so low a minimum as to border closely upon the Augustinian impotence. Wiggers compares the three systems with each other as follows: Augustinianism asserts that man is morally *dead;* Semi-Pelagianism maintains that he is morally *sick;* Pelagianism holds that he is morally *well.*

The Augustinian and Semi-Pelagian anthropologies (that of Pelagius being rejected by all parties within the Church) continued to hold their ground with varying success. The Augustinian theory of sin and grace was adopted by the Western Church at the Councils of Orange and Valence, in 529, as the catholic orthodoxy, not merely in opposition to Pelagianism, but also to Semi-Pelagianism and all grades of the synergistic theory of regeneration. But it would be an error to suppose that the Western Church as a body continued to adhere to the views of the venerated North African Father. Theologians like Leo and Gregory in the fifth and sixth centuries, and like Bede, Gottschalk, and Alcuin in the eighth and ninth centuries, propagated the teachings of Augustine respecting the corruption of human nature and the agency of the Holy Spirit in regeneration, but the middle theory found increasing currency in the mediæval Church. Its less rigorous character, together with its comparative silence upon the more difficult parts of the doctrines of original sin, predestination, and the enslaved will, recommended it to a large class of minds; while the element of human efficiency which it introduced into the doctrine of regeneration was thought to render it a more intelligible and practical doctrine. It was not strange, consequently, that in course of time the Latin Church, though holding the name of Augustine in the highest veneration, and claiming not to depart from his teachings, should have lapsed very generally into Semi-Pelagianism. It came thus upon the same doctrinal position with the Greek Church, which, during all the controversy at the West respecting sin and grace, continued to adopt the views of Chrysostom and the Greek Fathers generally. In the eleventh century the wonderful intellect and saintly piety of Anselm maintained the Augustinian view with great power and depth of reasoning, but was not able to turn the current which was sweeping with an increasing flood in the other direction. Schoolmen like Bernard and Aquinas were nearer to Augustine than to any other great authority of the past, but the main influence of Scholasticism as a whole tended to undermine his positions. The dawn of a new era at the Reformation opened the old questions. Luther, Calvin, and the Protestant theologians generally not only adopted the Augustinian anthropology, but stated the doctrines involved in it with still greater clearness, and defended them with still closer reasoning. The papal Church took the opposite view. The Council of Trent enunciated Semi-Pelagianism, and endeavored to give it currency under the great authority of Augustine, whose opinions were in some instances honestly misconceived, and in others knowingly misrepresented.

Wherever Protestantism prevailed, Augustinianism prevailed also. Augustine's theory of sin and grace pervaded and moulded the symbols of the Reformation almost without an exception, and from them passed into the heart and life of the Protestant Church. But in process of time the same transition occurs in Protestantism which we have seen taking place in the Latin Church. The more rigorous type gives way to the milder in some quarters. The Arminian controversy in reality turned upon the same points that were discussed between Augustine and the monks of Adrumetum, between Prosper and Cassian. Calvinism is the revived Augustinianism, and Arminianism is the revived Semi-Pelagianism. These two types of doctrine in reality exhaust and include all the varieties of doctrinal opinion that prevail in modern evangelical Christendom. There are minor differences, but churches and individuals are either Calvinistic or Arminian, as in the Patristic period they were either Augustinian or Semi-Pelagian. There is no real mid-point between these two, although schools and theologians have frequently attempted to find one.

The difference between these anthropologies is due to logic rather than to practical experience. The follower of Arminius agrees with the adherent of Calvin in holding the fundamental doctrines of the Trinity and the incarnation, of apostasy and redemption, and the religious experience of both alike is evangelical; that is, it springs out of faith in the atonement of the Son of God. The difference between them relates not to the general facts and truths of the New Testament, but to the more specific and exact definitions of them. The modern Arminian, like the ancient Semi-Pelagian, while confessing sin and trusting in the blood of Christ, urges what he believes to be a valid argument against the doctrines of predestination and irresistible grace, and that particular form of the doctrine of original sin out of which the doctrines of predestination and irresistible grace issue as necessary corollaries. And his opponent shows his respect for this belief by entering into the debate, and defending what he thinks to be the more exact and self-consistent and all-comprehending statement of that same evangelical system. The issue of a controversy that originates in logic must therefore be left to logic. The closest reasoner from the scriptural premises and the evangelical experience must be adjudged to be the victor. If the Arminian anthropology shall in the course of time prove itself to be the more scientific and self-consistent system of the two, it will be recognized and accepted as such. But if in the same calm and cool atmosphere the Augustinian statements shall evince their superiority, they must pass for Christian science.

(For the sources of information see, among others, Augustine's Pelagian and Semi-Pelagian treatises; Vossius, "Historia de Controversiis quæ Pelagius ejusque reliquæ moverunt;" Calvin's "Institutes," book ii.; Ussher's "Works," vol. iii.; Chemnitzius, "Examen Concilii Tridentini;" Wigger's "Darstullung;" Gangauf, "Metaphysische Psychologie des Augustines;" Neander's "Church History," ii., 557–627; Guericke's "Church History," § 91–93; Müller, "Christian Doctrine of Sin;" Baur's "Gegensatz;" Möhler, "Symbolik;" Redepenning's "Origenes;" Hasse, "Anselm;" Arminius's "Works;" Episcopius, "Opera;" Limborch's "Theologia Christiana;" Bellarmine, "Disputationes;" Jeremy Taylor, "On Original Sin;" Whitby, "On Original Sin;" Edwards, "On Original Sin;" Hagenbach's "History of Doctrine;" Shedd's "History of Doctrine;" Cunningham's "Historical Theology;" Neander's "History of Christian Dogmas.")

W. G. T. Shedd.

Anthropomor'phism [from the Gr. *ἄνθρωπος*, a "man," and *μορφή*, a "form"], the representation of the Deity under a human form or with human affections; the figurative application to God of terms which properly relate to human beings. Also the heresy of the Anthropomorphites (which see).

Anthropomor'phites, or **Anthropomor'phists,** persons who believe or imagine that the Deity has naturally a human form, as the ancient Greeks and other pagans. This error has been also entertained by some Christians, especially the Audæans or Audians, a Syrian sect formed about 350 A. D. The tendency to anthropomorphism arises from the inability of man to form any conception of a divine Person except by imagining that there is some similarity between the human and the divine nature.

Anti [*ἀντί*, "against"], a Greek preposition which occurs as a prefix to many English words, denoting opposition, as *antidote*, "given against" [poison]; *antipodes*, "opposite [our] feet," etc.

Antibes, ŏɴ'teeb' (anc. *Antip'olis*), a fortified seaport-town in the S. E. of France, in the department of Alpes Maritimes, is on the Mediterranean, 17 miles by rail S. W. of Nice. Its port is small but deep, and is furnished with a lighthouse. Lat. 43° 35' N., and lon. 7° 81' E. It has a college, and a considerable trade in olives, fruits, oil, salt fish, etc. Here are some remains of great antiquity. It was founded by a Greek colony about 340 B. C. Its Provençal name *Antiboul* readily recalls the ancient Greek appellation. Its coins, the remains of its theatre and of certain Roman constructions, have excited the interest of antiquaries, but its ancient history is obscure. Pop. 6064.

An'tichlore, a name given by papermakers to substances which are employed to remove from the pulp the chlorine which, in the form of chloride of lime, had been used to bleach it, and which, if allowed to remain in the pulp, would not only damage the machinery, but injure the strength of the paper. Sulphite and bisulphite of soda were first employed, but at present hyposulphite of soda is almost invariably used. Sulphide of calcium, proto-chloride of tin, and coal-gas have been used. (See Bleaching.)

An'tichrist [Gr. *'Αντίχριστος*, from *ἀντί*, "against," and *Χριστός*, "Christ"], a name which has been variously applied by Christian writers to a supposed powerful individual or institution destined to arise in opposition to Christianity, and to obtain a partial or temporary triumph over it. This idea has been traced back beyond the Christian era by some writers, who cite in favor of this view the prophecy of Ezekiel concerning Gog and Magog. The word Antichrist occurs in the Scriptures only in the First and Second Epistles of John. He says "that every spirit that confesseth not that Jesus Christ is come in the flesh" is Antichrist. The "Man of Sin" and "Adversary" of Paul's Second Epistle to the Thessalonians are commonly identified with the Antichrist of John. Many writers, both before and since the Protestant Reformation, have made the pope, or the papacy, Antichrist. Many writers, both Roman Catholics and Protestants, have suggested one or another of the persecuting emperors, such as Nero or Diocletian. Others say a succession of Roman emperors.

Anticleia [*'Αντίκλεια*], a daughter of Autolycus, was married to Laertes and became the mother of Odysseus. According to Homer, she died of grief at the long absence of her son, but on his visit to Hades he met her and spoke with her. According to other traditions, she put an end to her own life on account of a false report of the death of her son. Euripides calls Odysseus a son of Sisyphus (*Iphig. Aul.*, 524), referring to a tradition, communicated by Hyginus, that Anticleia lived on intimate terms with Sisyphus before she married Laertes.

Anticleides [*'Αντικλείδης*], a Greek historian, lived shortly after the time of Alexander the Great, and is often referred to by later writers, but of his works only fragments have come down to us. He wrote a history of Alexander the Great, which contained an elaborate sketch of the previous history of Egypt, but his principal work was his Περὶ Νόστων, containing, according to Strabo, an account of the return of the Greeks from their ancient expeditions.

Anticli'max [for etymology, see Climax], in rhetoric, a sentence which descends from great to little, and is the reverse of a climax, as in this verse of Pope: "Die and endow a college or a cat;" and this line from Horace: "Parturiunt montes, nascetur ridiculus mus."

Anticli'nal Ax'is, in geology, a term used to denote an imaginary line dividing the portions of a stratum which dip in opposite directions. It may be compared to the ridge of a house which has a steep roof sloping in opposite directions.

Anti-Corn Law League. See League, Anti-Corn Law.

Anticos'ti, a large island of the province of Quebec, Dominion of Canada, in the Gulf of St. Lawrence, between lat. 49° 04' and 49° 58' N., and lon. 61° 45' and 64° 35' W. Area, more than 3750 square miles, over one-half of which is arable land of excellent quality. Its length is 140 miles, and its greatest breadth is 35 miles. The climate is healthful, and remarkably fine for the latitude. The island was long regarded as worthless, but it has been surveyed and pronounced to abound in valuable forests of pine, spruce, tamarac, ash, and other valuable timber; also in coal, peat, plumbago, salt-springs, marl, marble, building-stone, grindstones, and valuable minerals. The island abounds in fur-bearing animals, and its waters already afford valuable fisheries. In 1873 the island was divided by the "Anticosti Company" into twenty counties of five townships each. Ellis Bay (the chief settlement) and Fox Bay are the only tolerable harbors.

Antic'ўra [Gr. *'Αντίκυρα*], an ancient city of Thessaly, on the river Sperchius. Another Anticyra was a city of Phocis, with a harbor on the Corinthian Gulf. Still another was in Locris, on left side of entrance to Corinthian Gulf. All were noted for the production of hellebore.

An'tidote [from the Gr. *ἀντί*, "against," and *δίδωμι*, to "give"], a medicine given to overcome or prevent the injurious effects of poisons. Antidotes are chemical or physiological. The first act by neutralizing the poison, converting it into an insoluble or harmless substance. Physiological antidotes produce action within the body which enables it to resist the effect of the poison. Thus, belladonna and opium, both poisonous, are physiological antidotes or counter-poisons to each other. Alcohol or ammonia is the physiological antidote of certain snake-poisons. The more important antidotes are mentioned in this work under the name of the poison for which they are administered.

Antietam Creek is the name of a small but deep river in Maryland, which empties into the Potomac about 6 miles above Harper's Ferry, and which gives name to the battle fought near Sharpsburg on Sept. 17, 1862, between the Federal troops, under Gen. McClellan, and the Confederates, under Gen. Lee. The Confederate army had crossed the Potomac near Leesburg on the 4th, 5th, and 6th of September, and had occupied Frederick and the surrounding country along the Monocacy. McClellan threw a part of his army between the enemy and the fords of the Potomac, and thus forced Lee to leave Frederick on the 12th, who then marched towards Hagerstown. Two days previously, Jackson had separated himself from the main army, and hurried by forced marches towards Harper's Ferry, which was occupied by Col. D. S. Miles. On Sept. 15 this important position was surrendered to the Confederates, and Jackson made over 12,000 prisoners. In the mean while, the Federal army had followed Lee towards the N., and on the 14th had taken Crampton's Gap and the heights of South Mountain, which commanded the road to Hagerstown, thus forcing Lee to retreat over the Antietam to Sharpsburg. On the afternoon of the 16th he was followed by Hooker, who, after a sharp engagement, secured a favorable position. On the following morning the real battle was begun by Hooker, who rapidly drove back the left wing of the Confederates under Jackson, while at the same time Burnside engaged the right wing. The battle at first raged around a corn-field surrounded by woods, to which Hooker had in the beginning driven the enemy. Twice the Federal troops had been repulsed, before a party detached from Franklin's division succeeded in holding it. But Hooker had already been wounded and carried from the field, and the command had devolved upon Gen. Sumner. In the mean while, Burnside on the extreme left had made two unsuccessful attempts to cross the Antietam, when at three o'clock in the afternoon he placed himself at the head of the troops and drove back the enemy, until a row of hills occupied by batteries checked his farther advance. At four o'clock Burnside received orders to gain this position at any price. The first battery was then taken. But by this time Lee had succeeded in strengthening the second hill by A. P. Hill's division, so that Burnside declared himself not able to hold the ground gained, if not assisted by McClellan with the reserve. McClellan did not accede to this demand, and the Federal troops were driven back to the bridge, which the Confederates did not venture to attack. In the centre, French's division steadily advanced, without being able, however, to occupy the hills. Richardson, who commanded another division of Sumner's corps, drove the Confederates from the river halfway back to Sharpsburg. Thus, the Federal army, when darkness put an end to the battle, had gained a few advantages at all points, but had not been able to gain a decisive success. The following morning the Confederates asked for an armistice to bury their dead, which was granted, and under cover of these operations Lee retreated in the night of Sept. 18–19 to the right bank of the Potomac, without encountering much resistance. With regard to the forces at the disposition of the two commanders-in-chief, the statements vary considerably. McClellan states that his army numbered 87,164, and estimates that of the Confederates at 97,445 men, while Lee himself states it to have been only 40,000. According to the Richmond "Enquirer," Lee had 60,000 under his personal command, while Pollard ("Southern History of the War") estimates Lee's forces in the morning at 45,000 and in the afternoon at 70,000 men. The losses seem to have been pretty nearly equal. McClellan gives his at 12,469, inclusive of 2010 dead, while official accounts for Lee's losses are wanting. According to the reports of the commanders of the several corps, they amounted during the fortnight's campaign in Maryland to 13,533. According to McClellan's report, they were several thousand more.

Antigo, city, on R. R., capital of Langlade co., Wis. (see map of Wisconsin, ref. 3–E, for location of county). Pop. in 1885, 1979.

Antig'one [Gr. 'Αντιγόνη], a daughter of Œdipus, king of Thebes, and his own mother, Jocasta. She attended her father in his exile into Colonus in Attica, remaining with him till he died, when she returned to Thebes, and afterward buried her brother Polynices in defiance of the edict of the tyrant Creon, who, for her disobedience, immured her alive. Her tragic story was a subject of the Greek poets, particularly Sophocles, whose plays of "Antigone" and "Œdipus at Colonus" are still extant, and Euripides, whose "Antigone," though not extant, is known from extracts by later writers and in his play of the "Phœnissœ."

Antig'onus [Gr. 'Αντίγονος], king of Asia, surnamed Cyclops (*i. e.* "one-eyed"), a Macedonian general, was born about 382 B. C. He took part in Alexander's campaign against Persia, and became satrap of Phrygia in 333. In the division of the empire which followed the death of Alexander, Antigonus received the provinces of Lycia, Pamphylia, and the Greater Phrygia. Having become an enemy of Perdiccas, he formed an alliance with Antipater and Ptolemy in 321 B. C. After the death of Perdiccas (321 B. C.), Antigonus waged war in Asia Minor against Eumenes, whom he defeated and put to death in 316. He obtained by conquest several provinces in Asia, and indulged an immoderate ambition, to restrain which Ptolemy, Cassander, Seleucus, and Lysimachus formed a league against him in 315 B. C. In the long war that ensued, Demetrius Poliorcetes, the son of Antigonus, defeated Ptolemy in a naval battle in 306, soon after which Antigonus took the title of king. He encountered the united armies of the allies at Ipsus in Phrygia, where he was defeated and killed in battle in 301 B. C.

Antigonus, king of the Jews, a son of Aristobulus II., was born about 80 B. C. After the death of his father he was expelled from Judea by Antipater and Herod. He was restored to the throne by the Parthians about 39 B. C., but the Roman senate refused to recognize him as king. Mark Antony took Jerusalem and put Antigonus to death about 36 B. C.

Antig'onus Do'son [Gr. 'Αντίγονος Δώσων], king of Macedon, was a descendant of Antigonus surnamed Cyclops, and a nephew of Antigonus Gonatas. He became regent or king in 229 B. C., during the minority of Philip V., who was heir to the throne. He was an ally of the Achæan League in a war against Sparta, and he defeated the Spartan Cleomenes in 221 B. C. He died in the same year, and left the throne to Philip V.

Antig'onus Gona'tas [Gr. 'Αντίγονος Γονατᾶς], a son of Demetrius Poliorcetes, was born about 320 B. C. at Gona, or Gonni, in Thessaly, whence his surname. Having defeated an army of Gauls who under Brennus had invaded Macedonia, he became king of that country in 277 B. C. He was expelled from his kingdom by the famous Pyrrhus, king of Epirus, in 273, but he recovered the throne after the death of Pyrrhus in 271. He died about 240 B. C., and was succeeded by his son, Demetrius II.

Antig'orite, a species of serpentine in which a portion of the silica is replaced by alumina. It has a weak lustre, and feels smooth but not greasy. It is found in the Antigorio valley in Piedmont.

Anti'gua, a British West India island, the most important of the Leeward Group, was first settled in 1632; the area is 89 square miles. It is 22 miles S. of Barbuda. The capital, St. John's, is in lat. 17° 8′ N., lon. 61° 52′ W. The surface is diversified, the climate dry and healthy, and the soil of the interior is fertile. Sugar, molasses, and rum are the chief articles of export. English Harbor can receive very large vessels. Pop. in 1881, 34,964, including the little island of Barbuda, which has about 800.

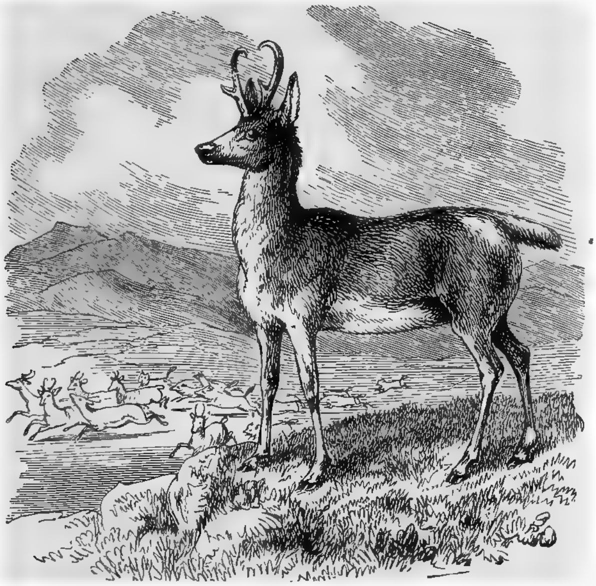
Antilegom'ena [from the Gr. ἀντί, "against," and λέγω, to "speak"], literally, "spoken against," a theological term applied in ancient times to certain books of the New Testament, the authority of which was questioned by some biblical critics—namely, the Second Epistle of Peter, those of James and Jude, the Epistle to the Hebrews, the Second and Third of St. John, and the Apocalypse. They were, however, ultimately admitted into the canon.

An'ti-Lib'anus, or **An'ti-Leb'anon,** a mountain-range of Palestine and Syria, extending about 90 miles in a N. E. and S. W. direction nearly parallel with Lebanon, from which it is separated by the valley of Cœle-Syria. It is of Jura limestone formation. The highest summit of this range is Mount Hermon, which has an altitude of about 10,000 feet. The valley of Cœle-Syria, between the two ranges, now called *Bŭkâ'a*, is from 4 to 6 miles wide. (See Robinson's "Physical Geography of the Holy Land," 1865.)

Antilles, The [some have supposed the name to be corrupted from the Latin words *ante*, "before," and *insulæ*, "islands," because they seemed placed before the continent, which was only reached after the islands had been passed], a term applied generally to all the West India Islands except the Bahamas. They lie between the Atlantic Ocean and the Caribbean Sea, and extend from the Gulf of Mexico nearly to the Gulf of Paria. They are divided into two groups—the Greater Antilles, and the Lesser Antilles, or Caribbean Islands, which are the most eastern of the two groups. The Greater Antilles comprise the four largest islands of the archipelago—namely, Cuba, Hayti (or St. Domingo), Jamaica, and Porto Rico, with the small islands along their coasts. They are situated in the torrid zone, and are subject to frequent hurricanes and earthquakes. In the central parts of these islands rise high mountains of granitic formation. The staple products are sugar, rum, tobacco, cotton, and coffee.

The Lesser Antilles are small in size, but very numerous, and are arranged in a long curved line or row like a crescent, the convex side of which is towards the east. They are divided into two groups—viz. the Windward, or South Caribbee Islands, and the Leeward, or North Caribbee Islands. The Windward Islands are Barbadoes, Grenada, the Grenadines, Martinique, St. Lucia, St. Vincent, Trinidad, and Tobago. All these belong to England except Martinique, which is a French colony. The Leeward Islands are Anguilla, Antigua, Barbuda, Deseada (French), Dominica, Guadeloupe (French), Marie Galante (French), Montserrat, Nevis, Saba, St. Bartholomew (Swedish), St. Christopher, St. Eustatius, St. Martin (French and Dutch), Santa Cruz, and a group of several small isles called the Virgin Islands, British, Danish, and Spanish. The Leeward Islands are British, except those otherwise designated, and three of the Virgin Islands. Many of the Lesser Antilles are of volcanic origin, and some are of coral formation. The staple productions are similar to those of the Greater Antilles. A large portion of the population of the Antilles are negroes and mulattoes, who are free, except in the Spanish islands of Cuba and Porto Rico. Pop. about 4,000,000.

Antiloca'pra ("antelope-goat"), the generic name of the prong-horned antelope (*Antilocapra Americana*), which inhabits the drier portions of the North American continent W. of the Mississippi. With the possible exception of the so-called Rocky Mountain goat, this is the only antelope found in America, and it differs widely from all the Old World antelopes in this, that the sheaths of its horns are shed annually, like the deciduous horns of the Cervidæ. In this respect the prong-horned antelope stands quite alone, and forms a kind of connecting link between the hollow-horned and solid-horned ruminants.



Prong-Horned Antelope.

Antim'achus ['Αντίμαχος], a distinguished Greek epic poet, a native of Colophon or Claros, lived about 400–360 B. C. He was a friend of Plato, and author of an epic poem entitled "Thebais," which was highly commended by some ancient critics, but is not extant. He wrote an admired elegy called "Lyde," and other works, which are all lost except small fragments.

Anti-Masonry is a term which indicates repugnance to secret societies (that is, societies which conserve secrets) in general; but it more directly implies opposition to the order known as Masons or Free Masons, for which a high antiquity and wide influence are claimed. This order early excited the suspicions of European governments, some of which regarded it as a mask for conspiracies against throne and altar. Some of them protected themselves, so far as they might, by procuring the election of princes or other eminent personages to the chief offices of the order.

In the summer of 1826 a thriftless tailor, named William Morgan, living in the village of Batavia, in Western New York, it was whispered, was engaged in preparing a revelation of the secrets of the Masonic order, whereof he was a member. Other Masons, including the editor of the village gazette, were understood to be engaged with him in the enterprise. Suddenly, Morgan disappeared one evening, and it was soon proved that he had been forcibly abducted. Excitement naturally arose, committees of vigilance and safety were organized, and he was traced westward to Fort Niagara, near Lewiston, N. Y., where he was temporarily imprisoned, and whence, it was ultimately testified, he was taken out into deep water in Lake Ontario and there sunk, though this was strenuously denied, and various stories from time to time affirmed that he was subsequently seen alive at Smyrna in Asia and other places. Such reports did not allay the excitement, which deepened and diffused itself, finding vent in a political party, which cast 33,000 votes in the State of New York in 1828, about 70,000 in 1829, and 128,000 in 1830; but of this last a fraction were not Anti-Masons, but only Anti-Jackson. The party spread into other States, and nominated William Wirt for President and Amos Ellmaker for Vice-President in 1832, when they were heartily supported in several States, but carried Vermont only. They probably diverted votes enough from Clay to give the States of Ohio and New Jersey to Jackson. They nearly elected Joseph Ritner governor of Pennsylvania in 1832, and did elect him in 1835, through a split in the Democratic ranks. The excitement gradually died out, and absorbing questions of finance and political economy soon dissolved the Anti-Masonic party.

HORACE GREELEY.

Anti-Me'los, or **Antimi'lo** (*i. e.* "over against Melos"), a small island of the Grecian Archipelago, is 5 miles N. W. of Melos or Milo.

Anti-mission Baptists, called by themselves **Old-School Baptists,** a denomination of Baptists of the U. S. who have no Sunday schools, missions, colleges, or theological schools, holding that these things make the salvation of men to depend on human effort, and not upon divine grace.

Antimo'nial Wine, a solution of tartar emetic in sherry or other wine.

Antimon'ic Acid, the acid of antimony. It exists in two modifications—antimonic acid, $HSbO_3$, and metantimonic acid, $H_4Sb_2O_7$.

An'timony [etymology uncertain; Lat. *stib'ium*, from which is derived the chemical symbol, Sb], a brittle metal of a silver-white color and of a peculiar taste. It occurs in nature native, combined with other metals, as nickel, silver, etc., with oxygen and with sulphur. The sulphide, "stibnite" or "gray antimony," is the source of all the antimony of commerce. The most abundant supplies of this ore are obtained from Borneo. It also occurs in considerable quantities in Hungary, Cornwall, New Brunswick, California, and Nevada. The sulphide, being very fusible, is often separated from the accompanying gangue-rock by heat, and cast in blocks or loaves. The metal, or "regulus of antimony" as it is called in commerce, is separated from the sulphide in various ways, such as heating with metallic iron, sodic carbonate, and charcoal, or cream of tartar and nitre. The extraction of antimony from its ores is mainly carried on at Linz, in Germany, where the sulphide of antimony is found extensively, and in Great Britain, which receives its supply of ore from Singapore and Borneo, commonly as ballast. The process consists in heating the crude ore, covered with charcoal, on the bed of a furnace, when the sulphide of antimony fuses, leaving unmelted the earthy impurities; and thereafter the liquid is drawn off into iron moulds, where it solidifies into cakes or loaves. The latter are reduced to coarse powder, placed on the bed of a reverberatory furnace, and heated with access of ordinary air containing oxygen, when the sulphur passes away as gaseous sulphurous acid, SO_2, leaving behind the antimony as the teroxide, Sb_2O_3. The roasted mass is now mixed with one-sixth of its weight of powdered charcoal, the whole moistened with a solution of carbonate of soda, and raised to bright redness in crucibles, when the metal antimony trickles to the bottom, and the impurities are left above in the spent flux or scoria, which is known in the arts by the name of *crocus* of antimony. The antimony thus prepared is more or less contaminated by sulphur, copper, arsenic, iron, lead, etc. It may be freed from all these metals except lead by reducing it to a coarse powder and fusing with one-sixteenth of gray sulphide and one-eighth of dry sodic carbonate. The resulting metal must then be pulverized and fused with one-tenth of dry sodic carbonate, and the process repeated.

Owing to the extensive use of antimony preparations in medicine, the removal of arsenic is of special importance. This can be effected by mixing 4 parts of powdered antimony with 5 parts nitre and 2 parts dry sodic carbonate, projecting the mixture into a red-hot crucible. The semi-fused mass is boiled with water, and the insoluble potassic antimoniate is reduced to metal by fusion with cream of tartar. Several successive fusions of pulverized antimony with one-eighth of nitre are said to completely remove the arsenic.

Antimony is a brilliant metal of a bluish-white color and highly crystalline or laminated structure. Its density is 6.7 to 6.86. It is extremely brittle, and may be easily pulverized in a mortar. Its melting-point is 450° C. (842° F.). It may be distilled in an atmosphere of hydrogen at a white heat. Heated in the open air, it burns with a bluish-white flame, and forms copious fumes of antimonious oxide (Sb_2O_3), or "flowers of antimony." A peculiar *amorphous* antimony was prepared by G. Gore (*Proc. Roy. Soc.*, ix., 70 and 304) by electrolyzing certain solutions of the metal. A mass having the appearance of polished steel, with a bright, metallic, amorphous fracture, was obtained of a density of 5.78, which, on being broken or heated, suddenly passed into the crystalline form, with the evolution of sufficient heat to make it take fire (*Feuererscheinung*). Antimony is oxidized by nitric acid, with the formation of antimonous oxide (Sb_2O_3), antimonic oxide (Sb_2O_5), or antimonoso-antimonic oxide ($Sb_2O_3.Sb_2O_5$). Antimony forms with acids or chlorous radicals two classes of compounds: 1, antimonous or tri-compounds, as the trichloride, $SbCl_3$; trioxide or antimonous oxide, Sb_2O_3; trisulphide, Sb_2S_3. 2, Antimonic or penta-compounds, as pentachloride, $SbCl_5$; pentoxide or antimonic oxide, Sb_2O_5; pentasulphide, Sb_2S_5.

Antimonous chloride, or *trichloride* ($SbCl_3$), called *butter of antimony*, is obtained by dissolving antimonic sulphide in hydrochloric acid. In its concentrated form it appears as a yellow oily liquid of the consistence of melted butter. Poured into water, it produces a buttery white precipitate of oxychloride (*powder of algaroth*), $SbCl_3$, Sb_2O_3, or $SbO.Cl$. Mixed with olive oil, butter of antimony is used for bronzing gun-barrels. Powdered antimony poured into a jar of chlorine takes fire, forming $SbCl_3$ or $SbCl_5$.

Antimonic chloride, or *pentachloride* ($SbCl_5$), is a colorless volatile liquid, prepared by heating antimony in an excess of chlorine. By the action of water it is changed to antimonic acid and hydrochloric acid.

Antimonous hydride, or *antimonetted hydrogen* (SbH_3), a colorless gas produced by the action of zinc and sulphuric acid on a solution of antimony. It burns with a greenish flame, evolving fumes of Sb_2O_3. Passed through a red-hot tube, it is decomposed, with the formation of a black deposit of Sb. A similar deposit is formed on cold porcelain held in the flame. When the gas is passed into a solution of argentic nitrate, a black precipitate of antimonide of silver ($SbAg_3$) is formed. This gas (SbH_3) is the analogue of ammonia, NH_3, phosphine, PH_3, and arsine, AsH_3; as is also the silver compound, $SbAg_3$. A class of organic bases, represented by triethyl stibine, $Sb(C_2H_5)_3$, belongs to the same group. (See AMINES.)

Antimonous, or *trioxide* (Sb_2O_3), found native in beautiful crystals, as *valentinite* and *senarmontite*. Boiled with cream of tartar ($K.H.C_4H_4O_6$), antimonous oxide dissolves, with the formation of *potassio-antimonous tartrate*, or *tarter emetic* ($K.SbO.C_4H_4O_6$). An impure oxide is manufactured for the preparation of this salt, by roasting the powdered sulphide, and fusing the product at the end of the process. It is known as *glass of antimony*.

Antimonic, or *pentoxide* (Sb_2O_5), is formed by heating powdered antimony with excess of strong nitric acid, by decomposing $SbCl_5$ with water, or by fusing powdered antimony with nitre. Potassic antimoniate is the only reagent for the precipitation of soda. There are two modifications of this acid, known as antimonic acid, $HSbO_3$, and metantimonic acid, $H_4Sb_2O_7$.

Tetroxide, or *antimonoso-antimonic acid* (Sb_2O_4 or $Sb_2O_3.Sb_2O_5$), occurs native as *cervantite*. It is the ultimate product of the action of heat and air on the metal.

Trisulphide, or *antimonous sulphide* (Sb_2S_3), the ore *stibnite*, or *gray antimony*, prepared artificially by fusing antimony with sulphur, or as an orange precipitate by passing sulphuretted hydrogen through a solution of tartar emetic. This sulphide is a sulphur-acid, which unites with basic sulphides, forming salts in every way analogous to the oxygen salts. Such are $3K_2S.Sb_2S_3$; zinkenite, $PbS.Sb_2S_3$; miargyrite, $AgS.Sb_2S_3$; pyrargyrite, $3AgS.Sb_2S_3$.

Pentasulphide, or *antimonic sulphide* (Sb_2S_5), is also a sulphur-acid, forming sulpho-antimoniates, analogous to the ortho-phosphates. The sodic sulpho-antimoniate is Na_3SbS_4. Precipitated from a mixture of antimonic pentachloride and tartaric acid, it appears as a yellowish-red powder, the golden sulphuret.

Kermes is an oxysulphide ($Sb_2O_3.2SbS_3$) which occurs native as the beautiful cherry-red kermesite.

ALLOYS OF ANTIMONY.—*Type-metal* is composed of antimony 1, lead 4 parts, and when used for stereotype plates receives an addition of one-eightieth to one-fiftieth of tin. This alloy is not only hard, but, owing to the fact that it expands at the moment of solidification, it takes a very sharp impression of the mould. *Britannia* is composed of antimony 1, tin 9 parts. *Pewter* is another alloy of antimony and tin. Antimony also enters into the composition of some of the *anti-friction* alloys. Tartar emetic is the most important preparation of antimony used in medicine; in large doses it is very poisonous. The old-fashioned "family pill" was a small bullet of metallic antimony, which was swallowed for certain difficulties, and carefully preserved for future occasions. C. F. CHANDLER.

Antino'mians [from the Gr. ἀντί, "against," and νόμος, "law"], a name applied to those who maintained that the law is of no use or obligation under the gospel dispensation. They took their rise from JOHN AGRICOLA (which see), who was originally a disciple and friend of Luther, and who contended that his views were the legitimate deductions from the principles taught by Luther himself. He taught, among other things, that good works do not promote our salvation, nor evil ones hinder it. Luther attacked the Antinomian heresy with great zeal, and at length, in 1540, Agricola recanted his more obnoxious tenets, and pledged himself to teach in conformity to the Church of Wittenberg. Antinomianism afterwards appeared in a more extravagant form in England, where, during the protectorate of Cromwell, some zealots maintained that if they should commit any kind of sin, it would do them no harm, nor affect in the slightest degree their condition in a future state, and that it is one of the distinguishing characteristics of the elect that they cannot do anything displeasing to God. English Antinomianism survived till the present century. Crisp was one of its warmest advocates—Wesley and Fletcher its sharpest assailants.

Antinoöp'olis, an ancient city built by the emperor Hadrian in Egypt, on the site of a more ancient city named Besa, and named in honor of his favorite Antinous. It was on the E. bank of the Nile, near the modern village of Ababde. Here the ruins of its theatre and hippodrome are still visible.

Antin'ous, a beautiful youth, a native of Bithynia, became a favorite and attendant of the emperor Hadrian. Having accompanied that emperor to Egypt, he was drowned in the Nile in 122 A. D. As a monument to him, Hadrian built the city of Antinoöpolis, in Upper Egypt. Statues almost innumerable were also erected to perpetuate his memory and his form, by artists whose emulation gave a new impulse to the fine arts. Some of these statues are still extant.

An'tioch [Lat. *Antiochi'a*; Gr. 'Αντιόχεια; Turk. *Antakia*], an ancient city and the former capital of Syria, situated on a fertile and beautiful plain, on the left bank of the river Orontes, 57 miles W. of Aleppo; lat. 36° 11′ N., lon. 36° 9′ 30″ E. It was founded in 301 B. C., by Seleucus Nicator, and named in honor of his father Antiochus. It was the favorite residence of the Seleucid kings of Syria, was called "Antioch the Beautiful," and was widely celebrated for the splendor of its luxury and the magnificence of its palaces and temples. The population in the time of its greatest prosperity is supposed to have been 400,000 or more. Antioch has been nearly ruined by earthquakes, one of which occurred in 115 A. D., and one in 1822. The most destructive of them occurred in 526 A. D., and is said to have caused the death of 250,000 people, there being at that time an assembly of Christians there. On April 3 and 10, 1872, the city was again visited by severe earthquakes, which destroyed many houses and caused the death of a considerable portion of the population. The disciples of Christ were first called Christians in Antioch, which occupies a prominent position in the history of the primitive Church as the scene of the labors of the apostle Paul. In the fifth century the bishops of Antioch received the title of patriarchs and ranked equal to the patriarchs of Rome, Constantinople, and Alexandria. In the Greek Church the patriarchs still retain this rank. In the Roman Catholic Church four prelates (of the Greek, Syrian, Maronite, and Latin rites) have the title of patriarch of Antioch, but none of them at present reside in Antioch. The Jacobite patriarch of Antioch is the head of that Church. Many councils of the Church were also held here. The crusaders took Antioch from the Saracens in 1098, after which it was the capital of a Christian principality until 1269. Among the remains of its former grandeur are the ruined walls and aqueduct. On the S. bank of the Orontes, about 5 miles S. W. of Antioch, is the site of the famous ancient grove of Daphne and temple of Apollo. The modern town, Antakia, is meanly built, but has some manufactures of pottery and cotton stuffs. The culture of silk is the chief branch of industry. It has become a centre of Protestant missionary labors. Pop. estimated at 12,000.

ANTIOCH was also the name of an ancient city of Asia Minor, in Pisidia, visited by the apostle Paul (see Acts xiii. 14, and xiv. 21), who planted a church there. Of this city extensive ruins exist. Besides the above, there were at least six other Oriental towns of this name.

Antioch, on R. R., Contra Costa co., Cal. (see map of California, ref. 4–B, for location of county), 55 miles N. E. of San Francisco, is on the Sacramento River, and is the trading-point of an extensive grain-growing district. Large quantities of wheat, barley, and coal are shipped from this place, which has 30 feet of water at low tide. It has potteries and copper-smelting works. Pop. in 1880, 626.

Antioch, Bay of, is a part of the Mediterranean, at the mouth of the Orontes River, between lat. 35° 50′ and 36° 20′ N., and in lon. about 36° E., and lies between high mountains on the N. and S., by which it is mostly well sheltered. The waters are deep, and free from rocks. Some ruins are situated at the N. side, which are described as those of Seleucia Peiria, the ancient port of Antioch.

Antioch College, at Yellow Springs, Green co., O., was founded in 1852, and opened the next year. This college is designed to be free from sectarian influences, and to develop good character as well as mental excellence in its pupils. The sexes are educated together with the best results. The college was established with a view of diffusing education at the lowest possible cost. It has a music school and a preparatory department. Its first president was Hon. Horace Mann, LL.D. (1852–59). Rev. D. A. Long, A. M., is the present incumbent. Its principal patrons are members of the Christian Church, represented by the "Herald of Gospel Liberty," Dayton, O., "Christian Sun," Raleigh, N. C., and "Indicator," Kokomo, Ind.

Anti'ochus I. [Gr. 'Αντίοχος], surnamed Soter (*i. e.* "saviour"), a king of Syria, of the dynasty of Seleucidæ, was a son of Seleucus I. Nicator, and was born about 324 B. C. He commanded the cavalry which fought against Antigonus at Ipsus, in 301. Having succeeded his father in 280 B. C., he gained a victory over the Gauls, who had invaded his dominions, from which victory he derived the surname *Soter*. He was killed in battle by the Gauls in 261 B. C.

Anti'ochus II. Theos, king of Syria, was a son of the preceding, and began to reign in 261 B. C. The people of Miletus, who had received a favor from him, gave him the title of *Theos*, "God." In his reign the Parthians revolted with success, and Arsaces became king of Parthia, which was previously subject to the king of Syria. A war which he waged against Ptolemy of Egypt was ended in 252 B. C. by a treaty, in accordance with which he married Berenice, a daughter of Ptolemy, and repudiated his first wife, Laodice. After the death of Ptolemy he reinstated Laodice, who poisoned him in 246 B. C.

Antiochus III., surnamed the Great, a grandson of the preceding, and a son of Seleucus Callinicus, was born about 238 B. C. He succeeded his brother, Seleucus Ceraunus, in 223 B. C. His capital was Antioch, and his kingdom comprised Syria Proper, Babylonia, Media, and a part of Asia Minor. For the possession of Palestine he waged war against Ptolemy of Egypt, by whom he was defeated at Raphia, near Gaza, in 217 B. C. While he was suppressing a revolt of Achæus in Asia Minor, in 214, the Parthians occupied Media, but, after a successful campaign against Arsaces of Parthia, Antiochus reconquered Media in 212. He afterwards conducted a victorious expedition across the mountains of Hindu-Kush into India, and, having formed an alliance with several Indian princes, returned to Antioch, from which he had been absent seven years. He took Palestine from the king of Egypt in 198 B. C., and invaded Thrace in 196. By this movement he provoked the hostility of the Roman senate. He led an army into Greece, was defeated at Thermopylæ in 191 by Acilius Glabrio, and retreated into Asia Minor. The Roman army, commanded by L. Cornelius Scipio, passed over into Asia in 190 B. C., and gained a decisive victory over Antiochus at Magnesia. The war was then ended by a treaty dictated by the Romans, who required him to cede all the provinces west of Mount Taurus, and to pay about 15,000 talents. In order to raise this sum, he plundered a temple in Elymais, for which act the populace killed him in 187 B. C. He left the throne to his son, Seleucus Philopator. (See Polybius, "History.")

Antiochus IV., surnamed Epiphanes ("the illustrious"), was a son of the preceding. He passed about twelve years in captivity in Rome, whither he was sent as a hostage in 188 B. C. He became king on the death of his brother, Seleucus Philopatór, in 175 B. C. He invaded Egypt in 170, and captured the king, Ptolemy Philometor, but was constrained by the Roman senate to retire from that country in 168 B. C. About this date he plundered the temple of Jerusalem and persecuted the Jews, who rose in arms and were led by Judas Maccabæus, who defeated the Syrian armies in several battles. (See 1 Maccabees ii.) Died in 164 B. C.

Antiochus VII., surnamed Sidetes, a son of Demetrius Soter, was born about 164 B. C. He became king of Syria in 137, and defeated the Parthians in several battles, but was killed in battle by them in 129 B. C.

Antiochus VIII., second son of Cleopatra (the wife, first of Alexander Balas, then of Demetrius II., and then of Antiochus VII.), who reigned over Syria with his mother from 126 to 122 B. C., and then alone till 114 B. C., when his authority was disputed by his half-brother, Antiochus Cyzicenus (Antiochus IX.). He was assassinated by an officer of his court 96 B. C.

Antiochus IX., surnamed Cyzicenus, son of Cleopatra by Antiochus VII., survived Antiochus VIII., and committed suicide 95 B. C.

Antiochus X., surnamed Eusebes, son of the preceding, succeeded his father in 95 B. C., but was soon after expelled, and died in obscurity.

Antiochus XI., surnamed Asiaticus, was the twentieth and last king of the dynasty of the Seleucidæ. He began to reign about 69 B. C., and was deposed by Pompey in 65 B. C., when Syria became a Roman province.

Anti'oco, an island in the Mediterranean, near the S. W. coast of Sardinia, is 8 miles long and 3 miles wide. The soil is fertile. Pop. about 2200.

Antioqui'a, one of the states of the United States of Colombia, is bounded on the N. by Bolivar, on the E. by Bolivar, Santander, and Cundinamarca, on the S. by Cundinamarca and Cauca, and on the W. by Cauca. Area, 22,790 square miles. The state is chiefly covered by large forests, and is rich in precious metals. The chief occupation of the inhabitants is mining. Capital, Medellin. Pop. 365,974.

Antip'aros, Oli'aros, or **Ole'aros,** a Grecian island in the Ægean Sea, about 1 mile W. of Paros, is one of the Cyclades. It is 8 miles long and 2 or 3 miles wide, and consists of a mass of marble, covered with soil which produces some grain, wine, etc. Here is a celebrated stalactitic cavern called the Grotto of Antiparos, which is about 300 feet long and 80 feet high. The roof and sides are adorned with white incrustations of great splendor and beauty. This grotto was discovered by M. de Nointel in 1673. It was probably not known to the ancients. Pop. about 1200.

Antip'ater [Gr. 'Αντίπατρος], a Macedonian general, who was a pupil of Aristotle, and held a responsible position under Philip of Macedon. He was appointed regent of that kingdom by Alexander the Great in 334 B. C., when he departed to invade Persia. He defeated Agis, king of Sparta, in a battle near Megalopolis in 330. After the death of Alexander, his generals or successors agreed that Antipater should govern Macedonia and Greece. The Athenians, in alliance with other Greek states, made an effort to regain their independence in 322, and defeated Antipater near Lamia, but, having been reinforced by Craterus, he gained a decisive victory in the same year. The Lamian war was then ended by a treaty dictated by Antipater, who required the Athenians to deliver Demosthenes to him. He joined Antigonus in a league against Perdiccas, and on the death of the latter, in 321, succeeded him as regent of the empire. He died in 319 or 318 B. C., and left a son, Cassander. (See Thirlwall, "History of Greece;" Diodorus Siculus, "History.")

Antipater, a son of Herod the Great and Doris, was notorious for his wickedness. Having procured the death of his half-brothers Aristobulus and Alexander, and conspired against his father, he was put to death in 1 B. C.

Antipater the Idumean, a son of Antipas, and the father of Herod the Great, became governor of Idumea. Having assisted Julius Cæsar in his war against the Egyptians, he was rewarded with the office of procurator or governor of Judea, about 46 B. C. Died in 43 B. C.

Antipater of Tarsus, a Stoic philosopher who lived about 140 B. C., wrote several works on philosophy and morality. He opposed the skepticism of Carneades. Cicero represents him as a man of remarkable subtlety.

Antip'athy [Lat. *antipathi'a;* Gr. ἀντιπάθεια, from ἀντί, "against," and πάθος, "feeling"] is a term applied to a peculiarity of the physical or mental constitution in which certain persons feel a strong aversion to particular objects not offensive to others. Some have from childhood an antipathy to animal food, while others dislike one particular kind. That this is not always the effect of caprice is shown by the fact that contact with the object of aversion produces very disagreeable, and in some cases injurious, effects on the system. Certain medicines affect particular persons dangerously; a single grain of mercury has been known to cause profuse salivation. The most remarkable antipathies are those affecting the special senses. Persons have been known to faint at the sight of reptiles and other animals. The smell of musk or ambergris has been known to throw some people into convulsions, and Zimmermann mentions the case of a lady who was similarly affected by touching silk, satin, etc.

Antiph'ilus ['Αντίφιλος], an eminent Greek painter, born in Egypt, is supposed to have flourished about 330 B. C., but according to Lucian he lived about 220. He was distinguished for facility of execution. Among his works were "Cadmus and Europa," and a portrait of Alexander the Great.

Antiphlogis'tic [from the Gr. ἀντί, "against," and φλέγω, to "burn"], a term applied to remedies and treatment adapted to subdue inflammation or excitement of the system in inflammatory diseases. Among these remedies are purgatives and blood-letting.

An'tiphon, or **An'tipho** [Gr. 'Αντιφῶν], one of the ten

Attic orators, born at Rhamnus in Attica about 480 B. C., was a son of Sophilus the Sophist. He opened a school of rhetoric at Athens, and made reforms in the art of oratory. Among his pupils was Thucydides, who expressed a high opinion of him. Declining to plead in court or appear as a public speaker, he gained much influence and distinction by composing orations for politicians and arguments for persons who were accused. He was an adversary of Alcibiades in politics, and was the chief promoter of the revolution which in 411 B. C. abolished democracy and converted Athens into an oligarchy ruled by a council of 400. A sudden reaction restored Alcibiades to power, and Antiphon was tried for treason. He made an able speech in his own defence, but was convicted and executed in 411 B. C. Fifteen of his orations are still extant. (See D. Ruhnken and P. van Spaan, "Dissertatio de Antiphonte Oratore Attico," 1765; A. Dryander, "Commentatio de Antiphontis Vita," 1838.)

An'tiphon [Gr. ἀντίφωνος, from ἀντί, "against," "in reply to," and φωνή, a "voice"], a piece of music performed in cathedral service by choristers, who sing alternately; a short verse which was sung in the ancient Church before the psalms and other portions of the service.

Antiph'ony [Gr. ἀντίφωνον], a term applied by the ancient Greeks to a species of musical accompaniment in the octave by instruments or voices.

Antiphony is also a sacred song sung by two parties, each responding to the other; the answer of one choir to the other when an anthem is sung alternately. This practice prevailed amongst the ancient Hebrews and in the early Christian Church. Ignatius, bishop of Antioch, is said to have introduced it into the Eastern Church in the second century.

Antip'odes [from the Gr. ἀντί, "against," and πούς, ποδός, "the foot"], in geography, signifies people who live on opposite sides of the globe, and whose feet point against each other. The antipodes of any place are those who live at the other end of a straight line drawn from that place through the centre of the earth to its opposite surface. Thus, the antipodes of London, which is in lat 51° 30′ N. and lon. 0°, must be in lat. 51° 30′ S. and lon. 180° E. or W. The noon of any point corresponds with the midnight of its antipodes, and the summer of one coincides with the winter of the other.

Antipodes, a small island in the South Pacific Ocean, S. E. of New Zealand; lat. 49° 32′ S., lon. 178° 42′ E. It is so called because it is the nearest land to the antipodes of London.

An'tipope, one who assumes or usurps the office of pope, but is not regularly elected or generally recognized as such. The emperors of Germany in several instances, having quarrelled with the pope, appointed another person to the office. The emperor Henry IV. in 1080 appointed the antipope Clement III. in opposition to Pope Gregory VII. In some cases two rival popes have been elected by different parties of cardinals. The great Western schism began in 1378, when the Italian party chose Urban VI., and the French cardinals voted for Clement VII., who held his court at Avignon, and was recognized by France and Spain. This schism was continued after their death by another double election, but in 1415 the Council of Constance deposed both of the popes, and elected Martin V. The last antipope was Felix V. (originally Amadeus VIII. of Savoy), who was elected in 1439, and abdicated in 1449.

An'tiquaries, Society of, the title of several associations of learned men, formed to promote the study of antiquities. The London Society of Antiquaries was founded in 1572, and reorganized in 1707, but received its charter in 1751. The Scottish Society of Antiquaries was founded in 1780. The American Antiquarian Society was organized in Massachusetts in 1812.

An'tiquary [Lat. *antiqua'rius*, from *anti'quus*, "ancient"]. The term (in Latin) was originally applied to persons who copied old books in convents before the invention of printing. In modern language an antiquary is one who studies and collects ancient monuments and remains, such as medals, coins, statues, manuscripts, and inscriptions; or who makes researches into the history, manners, and customs of former generations. The antiquary renders an important service to society by collecting materials for history and rescuing many documents from the ravages of time. The word is nearly synonymous with archæologist. Pausanias is said by some to have been the first antiquary.

Antique, an-teek', a French word derived from the Latin *anti'quus*, "ancient," signifies old, ancient, old-fashioned, antiquated. In the language of art, the epithet antique is applied to the style of the ancient Greek artists, especially the sculptors, in contradistinction to the mediæval and the modern styles. The word *antique*, variously defined, is generally understood to refer to a period antecedent to the revival of classical studies in the West and the *renaissance* of art. The Greek sculptors excelled in ideal beauty of form, and the antique style is by most critics considered more perfect than the mediæval or the modern.

Antiq'uities [Lat. *antiquita'tes*, from *anti'quus*, "ancient"], an important department of learning, comprises all memorable facts, ideas, and things which relate to or illustrate the origin, early institutions, and development of nations. Thus, the study of antiquities, in the largest application of the term, includes a knowledge of the religion, laws, language, arts, traditions, manners, and customs of ancient peoples, as well as a cognizance of ancient monuments of architecture, sculpture, and other arts. In a more restricted and perhaps more popular sense, the study of antiquities is limited to the discovery, collection, verification, description, and explanation of the relics of antiquity, such as medals, statues, inscriptions, manuscripts, ruined buildings, bas-reliefs, and hieroglyphics. About the time of the revival of learning after the Dark Ages the study of classical antiquities became a distinct branch of research, which was pursued by many eminent scholars. Grævius published a valuable work on Greek antiquities, entitled "Thesaurus Antiquitatum Græcarum" (12 vols. fol., 1697 et seq.); and Roman antiquities were amply illustrated by Gronovius in his "Thesaurus Antiquitatum Romanarum" (13 vols. fol., 1697). Champollion, Young, Bunsen, Lepsius, and Brugsch are the highest authorities in Egyptian antiquities. Among the best antiquarian works may be mentioned Montfaucon, "Antiquité Expliquée" (15 vols., 1719–24); Heeren, "History of Ancient Commerce;" Dr. W. Smith's "Dictionary of Greek and Roman Antiquities;" Montfaucon, "Monuments de la Monarchie Française" (5 vols., 1725). (For the difference between archæology and antiquities, see Archæology.)

Antiquity of the Human Race. See Man, by Pres. M. B. Anderson, LL.D.

Anti'quus (Jan), a skilful Dutch painter, born at Groningen Oct. 11, 1702. He passed many years in Rome, Florence, and Venice, and after his return to Holland was patronized by the prince of Orange. Among his works are a "Fall of the Giants," a "Parnassus," and many portraits. Died in 1750.

Anti-rent'ers, a name given to the inhabitants of several counties in Eastern New York, who refused to pay the rents and feudal services required of them by the so-called lord-patroons, the owners of the land. This disturbance, which at one time nearly amounted to insurrection, was at length ended by the triumph of the Anti-rent party in the constitutional convention of 1846, in which a clause was inserted abolishing thenceforth all feudal tenures and incidents.

Anti-Sabbata'rians, a sect of Christians who recognize no obligation to observe the Sabbath, and who affirm that the New Testament does not call for the observance of the Sabbath or any other day.

Antisa'na, a volcanic peak of the Andes, in Ecuador, 35 miles S. E. of Quito, and 20 miles N. E. of Cotopaxi, has an altitude of 19,140 feet.

Antis'cii (the plu. of **Antis'cius**), or **Antiscians** [from the Gr. ἀντί, "against," and σκιά, a "shade" or "shadow"], literally, having "opposing shadows" or having their shadows in opposite directions at noon; a term applied to the people N. and S. of the equator, considered in relation to each other.

Antiscorbu'tic [Lat. *antiscorbu'ticus*, from the Gr. ἀντί, "against," and the Lat. *scorbu'tus*, the "scurvy"], corrective of *scorbutus*, or scurvy. (See Scurvy.) Onions, lime-juice, potatoes, lemons, horse-radish, scurvy-grass, etc. are the best antiscorbutics. Diet, and not medicine, is needed to effect the cure.

Antisep'tic [from the Gr. ἀντί, "against," and σήπω, to "putrefy"], opposed to or preventing putrefaction. Antiseptics are substances which prevent or check the decay and putrefaction of organic matters. As air, moisture, and heat are necessary conditions of putrefaction, the exclusion of one of these from the animal or vegetable matter is an antiseptic process. The common practice of preserving fruit in air-tight cans of tin or glass is an illustration of this principle. Generally speaking, so long as the air is excluded no decomposition or decay can take place. Cold is a powerful antiseptic; intense cold will prevent change even in those substances which putrefy most readily. To render timber more durable and less liable to decay, corrosive sublimate, chloride of zinc, and heavy oil of tar are sometimes used. For this purpose the wood is placed in a steam-box, its pores are filled with steam, and a vacuum is formed in the pores by the condensation of the steam. The pores are then filled with the antiseptic substance.

The more important chemical antiseptics are—alcohol, wood-spirit (or pyroxylic acid), creasote, carbolic acid, heavy oil of tar, sugar, glycerine, sulphurous acid, common salt, charcoal, nitre, alum, chloride of zinc, sulphate of copper (blue vitriol), cresylic acid, sulphate of iron, aluminum chloride and acetate, and other aluminum compounds, corrosive sublimate, and arsenic. Sulphurous acid acts by deoxidizing the substance; sugar acts by combining with the water of the substance to be preserved; creasote, tannic acid, alum, chloride of zinc, sulphate of copper, corrosive sublimate, and arsenic form compounds with the organic matter which are not liable to become putrescent; alcohol, salt, and nitre act both by combining with the water of the putrescible substance, and by combining with the substance itself. (See Preservation of Food, Preservation of Timber, Disinfection, and Fermentation.)

Anti-Slavery, a term which originated during the long agitation that resulted in the overthrow of slavery in the U. S. It was used nearly synonymously with "abolition," but was preferred by many as being more definite, since the latter term might as well be applied to the "abolition of royalty" (a phrase much in vogue during the first French Revolution) as to the doing away with slavery. The anti-slavery sentiment in the U. S. became more and more widely diffused and more intense as the evils of slavery became more apparent, but it found its most decided and forcible expression through the organization known as the American Anti-Slavery Society. (See next article.)

Anti-Slavery Society, American. This society was organized in Dec., 1833, in the city of Philadelphia, by a convention of delegates from a few anti-slavery societies already in existence in the U. S., and of other persons who were friends of emancipation. The preamble and second and third articles of its constitution express the character and purposes of the society. The preamble asserts that, "Whereas, slavery is contrary to the principles of natural justice, of our republican form of government, and of the Christian religion, and is destructive of the prosperity of the country, while it is endangering the peace, union, and liberties of the States; and whereas, we believe it the duty and interest of the masters immediately to emancipate their slaves, and that no scheme of expatriation, either voluntary or by compulsion, can remove this great and increasing evil; . . . we do hereby agree to form ourselves into a society," etc. The second and third articles declare that "the object of this society is the entire abolition of slavery in the United States;" that the society "shall aim to elevate the character and condition of the people of color, by encouraging their intellectual, moral, and religious improvement, and by removing public prejudice, that thus they may, according to their intellectual and moral worth, share an equality with the whites of civil and religious privileges; but this society will never, in any way, countenance the oppressed in vindicating their rights by resorting to physical force."

The society, thus organized, immediately adopted and published a "Declaration of Sentiments," in which they declared: "The right to enjoy liberty is inalienable. To invade it is to usurp the prerogative of Jehovah. Every man has a right to his own body, to the products of his own labor, to the protection of law, and to the common advantages of society. It is piracy to buy or steal a native African, and subject him to servitude. Surely the sin is as great to enslave an American as an African. Therefore we believe and affirm that there is no difference in principle between the African slave-trade and American slavery; that every American citizen who retains a human being in involuntary bondage as his property is, according to Scripture, a man-stealer; that the slaves ought instantly to be set free, and brought under the protection of law; that if they lived from the time of Pharaoh down to the present period, and had been entailed through successive generations, their right to be free could never have been alienated, but their claims would have constantly risen in solemnity; that all those laws which are now in force, admitting the right of slavery, are therefore, before God, utterly null and void, being an audacious usurpation of the Divine prerogative, a daring infringement on the law of nature, a base overthrow of the very foundations of the social compact, a complete extinction of all the relations, endearments, and obligations of mankind, and a presumptuous transgression of all the holy commandments; and that therefore they ought instantly to be abrogated. We further believe and affirm that all persons of color who possess the qualifications which are demanded of others, ought to be admitted forthwith to the enjoyment of the same privileges, and the exercise of the same prerogatives, as others; and that the paths of preferment, of wealth, and of intelligence should be opened as widely to them as to persons of a white complexion."

Respecting the measures by which the society would seek the accomplishment of its purpose, the Declaration asserts: "Our principles forbid the doing of evil that good may come, and lead us to reject, and to entreat the oppressed to reject, the use of all carnal weapons for deliverance from bondage; relying solely upon those which are spiritual, and mighty through God to the pulling down of strongholds." "Our measures shall be such, only, as the opposition of moral purity to moral corruption; the destruction of error by the potency of truth; the overthrow of prejudice by the power of love; and the abolition of slavery by the spirit of repentance." "We shall send forth agents to lift up the voice of remonstrance, of warning, of entreaty and rebuke. We shall circulate, unsparingly and extensively, anti-slavery tracts and periodicals. We shall enlist the pulpit and the press in the cause of the suffering and the dumb. We shall aim at a purification of the churches from all participation in the guilt of slavery. We shall encourage the labor of freemen rather than that of slaves, by giving a preference to their productions. We shall spare no means to bring the whole nation to speedy repentance."

Arthur Tappan, Lindley Coates, William Lloyd Garrison, and Wendell Phillips successively presided over this society from the time of its organization to that of its disbandment. Among the persons who have held offices in it are—Benjamin Lundy, Lucretia Mott, William Jay, John G. Whittier, Abby Kelly Foster, Gerrit Smith, Samuel J. May, Owen Lovejoy, and Edward Beecher. Its organization was the signal for the concentration of the resistance of slaveholders and their allies, North and South, against the anti-slavery sentiment which had always existed, and which had, from time to time, found expression in the community. Numerous anti-slavery societies, of States, counties, and cities, were soon organized throughout the North; and these, with those which had been founded prior to the American Society, became its auxiliaries. Besides this organized aid, it received cordial sympathy and substantial help from men and women not enrolled as its members, who welcomed it as a mighty instrumentality for the overthrow of slavery. It represented the moral sentiment of the country, which was actively warring against American slavery. During its existence it adhered to its original constitution, and carried on its work in accordance with its Declaration of Sentiments. At its tenth annual meeting, held in New York in May, 1844, it adopted a resolution declaring that, whereas the Constitution of the U. S. contained provisions requiring the rendition of the fugitive slave to his master, therefore fidelity to the cause of freedom required the dissolution of the national compact, and forbade abolitionists to hold office or vote under that Constitution. During a long period of years this society and its adherents were opposed by a large portion of the press and of the pulpits of the nation, and were frequently the victims of the violence of mobs, who disturbed their meetings, assaulted their persons, destroyed their property, and imperilled their lives. In May, 1838, Pennsylvania Hall, a large building erected in Philadelphia for the use of public meetings, and especially for anti-slavery meetings (against which nearly all the churches and halls of the country were then closed), was burned to the ground by a furious mob on the fourth day after its opening and dedication. The purpose of this society—namely, the creation of a public sentiment which should overthrow American slavery—was at last accomplished. This moral force, which had been steadily increasing for more than a quarter of a century, and which had called into existence a small and earnest political party, at length pervaded the Republican party to the extent necessary for a successful resistance, first, to the *extension* of slavery, and then to its *existence*. When the thirteenth amendment of the U. S. Constitution was ratified, abolishing slavery within the jurisdiction of the U. S., and the fourteenth and fifteenth amendments had secured to the emancipated slave his personal freedom, by endowing him with the ballot of a citizen, the American Anti-Slavery Society (the work for which it was organized being finished) disbanded its members and ceased to exist, on the ninth day of April, 1870. Horace Greeley.

Antispasmod′ics, a name applied to medicines which cure or alleviate spasm. The name is frequently limited to a small class of drugs which have usually a strong and often an unpleasant odor, and which in some cases act as diffusive stimulants. Such are valerian, assafœtida, myrrh, musk, ammonia, ether, etc. Others are sedatives, as hydrocyanic acid. The term might well include the other nerve-sedatives or depressors of reflex action, like bromide of potassium, belladonna, Calabar bean, curari poison, etc. The best treatment for spasmodic symptoms aims, however, at the restoration of health by proper food, good air, and correct habits of life, and by such special treatment as the case may require.

Antis′thenes [Ἀντισθένης], an eminent Greek Cynic philosopher, called the founder of the Cynic sect or school, was born at Athens, and flourished about 400 B. C. He was a young man when he served at the battle of Tanagra, 426 B. C. He was a pupil and friend of Socrates, whose death he witnessed. After this event he opened a school at Athens in the gymnasium of Cynosarges, where the famous and witty Diogenes became one of his pupils. He was a man of temperate habits and simple mode of life, inculcating a contempt of riches and sensual pleasure. He maintained that virtue is all-sufficient for happiness, and directed his attention chiefly to practical morality. His works on various subjects are lost, but several of his sententious and pithy sayings have been preserved. Socrates reproved the poverty of his dress and his neglect of the conventional by saying, "I can see thy pride through the holes in thy robe." Antisthenes was living in 371 B. C.

Antis′trophe [Gr. ἀντιστροφή, from ἀντί, "against," and στρέφω, to "turn"], a term applied by the ancient Greeks to that part of a song or dance before the altar which was performed by turning from the left to the right. Hence a stanza or portion of poetry following the strophe, and responding to it, was called antistrophe.

An′ti-Tau′rus, a range of mountains in the N. part of Asia Minor, extends from the Bosphorus eastward, and is nearly parallel to the Black Sea. According to some authorities, it extends from Arjish-Dagh (Mount Argæus) north-eastward into Armenia, forming the watershed between the Euphrates and the Kizil-Irmak, which enters the Black Sea. The name Anti-Taurus was given to the range because it is "opposite to or over against the Taurus." As the latter extends along the coast of the Mediterranean, so the former runs along the coast of the Black Sea.

Antith′esis [from the Gr. ἀντί, "against," and θέσις, a "position"], in rhetoric, a figure of speech in which an idea is rendered more emphatic and impressive by juxtaposition and contrast with an opposite or converse idea. Thus a critic said of a certain book, "It contains many good things, and many new; but the good are not new, and the new are not good."

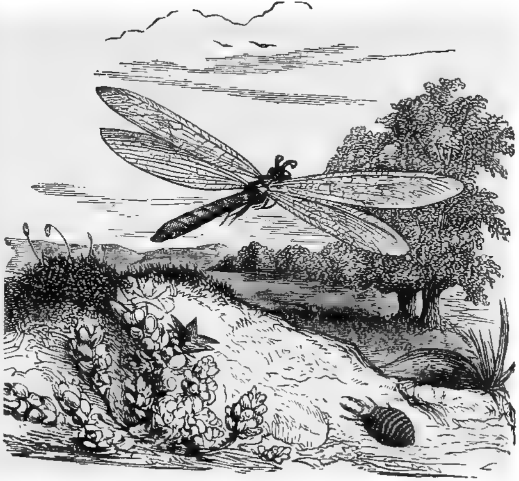
Anti-Trinitarians. See Unitarianism, by Orville Dewey, S. T. D., LL.D.

An′titype [Gr. ἀντίτυπος, from ἀντί, "against," and hence "corresponding to," and τύπος, a "type"]. a type or figure which corresponds to some other type. In theology, it denotes that of which the type was a prefiguration; the person in whom any prophetic type is fulfilled. "The holy places made by hands are figures of the true," which are the antitypes of the former. (See Type.)

An′tium [It. *An′zo*], an ancient city of Latium, on the sea-coast, 34 miles S. S. E. of Rome, was a favorite resort of opulent citizens of Rome, in whose villas famous works of art have been discovered. Among these was the Apollo Belvedere. The emperors Caligula and Nero were natives of Antium, the site of which is now occupied by a village called Porto d'Anzo (*i. e.* the "port of Antium").

Anti′vari, a town and seaport of Albania, on the Adriatic, 14 miles N. W. of Scutari. The harbor is shallow, and admits only small vessels. It exports oil, etc., and has, with its suburbs, about 1000 houses. Pop. about 5000.

Ant-Lion, the larva of several species of *Myrmeleon*, and other cognate genera, insects of the order Neuroptera, found in sandy tracts in different parts of the world. The perfect insect is similar in appearance to the dragon-fly. The larva is remarkable for the curious and insidious mode in which it catches the ants and other insects on which it feeds. It excavates a funnel-shaped cavity in the sandy soil, and lies in wait at the bottom until an insect comes so near to the edge of the pit that the loose sand gives way and the insect falls down the slope. If, before reaching the bottom, its victim begins to climb upward, the ant-lion throws sand upon it and brings it down. Several species of ant-lion are found in the U. S.



Ant-Lion.

Antœci, an-tee′sī [from the Gr. ἀντί, "against," and οἶκος, a "house" or "dwelling-place"], in geography, is applied to people who live under the same meridian and at the same distance from the equator, but the one in north and the other in south latitude. The summer of one coincides in time with the winter of the other.

Antommar′chi (Francesco), an Italian anatomist, born in 1780, a native of Corsica, became in 1812 anatomical dissector to a hospital of Florence, attached to the University of Pisa. In 1819 he was sent for to attend Napoleon at St. Helena. The ex-emperor was so well pleased with him that he left him a legacy of 100,000 francs. He published "The Last Moments of Napoleon" (2 vols., 1823). (See "Mémoirs du Docteur F. Antommarchi.") In 1836 he settled in New Orleans as a homœopathist. He died in Cuba April 3, 1838.

Anton Ulrich, a son of the duke of Brunswick-Wolfenbüttel, was born in 1714. He married in 1739 Anna Carlovna, who was a niece of the Russian empress, Anna Ivanovna, and who became regent in 1740. In Dec., 1741, Anna was deposed, and banished with her husband to the government of Archangel. He is supposed to have died about 1780.

Antonel′li (Giacomo), an Italian cardinal and astute politician, born at Sonnino April 2, 1806. He became grand treasurer of the two apostolic chambers in 1845, and was appointed minister of finance by Pius IX., soon after his election. In 1847 he was made cardinal-deacon. He acquired much influence with the pope, and opposed the liberal movement of 1848. In 1849 he was appointed papal secretary of foreign affairs (*i. e.* prime minister), which place he occupied when Rome, in 1870, was incorporated with the kingdom of Italy. He strenuously opposed the cause of Italian unity. D. Nov. 6, 1876.

Antonel′lo, or **Antonelli** (Antonio), surnamed Da Messina, from the place of his birth, an eminent painter, born at Messina in 1414. He is reputed to be the first Italian who painted in oil, having visited Bruges and obtained from J. van Eyck the secret of oil-painting. He returned to Italy about 1445, after which he worked at Milan, and removed to Venice about 1470. He gained distinction by the brilliance of his coloring. Died in 1475.

Anto′nia (Major, or the Elder), a Roman lady, a daughter of Mark Antony the Triumvir, was born in 39 B. C. Her mother was Octavia, a sister of Augustus Cæsar. She was married to L. Domitius Ahenobarbus, and was the grandmother of Nero.—Her sister, Antonia Minor (the Younger), was born 36 B. C. She was the wife of Claudius Drusus Nero, and mother of the famous Germanicus and of the emperor Claudius. She is said to have been virtuous and fair. Died in 37 or 38 A. D.

Anto′nides van der Goes (Johannes), a Dutch poet, born at Goes in 1647. He held an office in the admiralty. His principal work is a national epic poem on the river Y, which is entitled "Ijstroom," or "Y-Stroom" (1671), and was very popular. Died Sept. 18, 1684.

Antoni′nus (Marcus Aurelius), usually called **Marcus Aurelius,** sometimes surnamed the Philosopher, a Roman emperor highly distinguished for his wisdom and virtue, was born in Rome in April, 121 A. D. He was a son of Annius Verus and Domitia Calvilla, and his original name was Marcus Annius Verus. His education was directed by Fronto and Herodes Atticus. He became a disciple of the Stoic philosophy, with the principles of which his habitual conduct was consistent. Having been adopted as a son by the emperor Antoninus Pius in 138 A. D., he assumed the name of M. Ælius Aurelius Verus Cæsar. He was chosen consul in 140, and married Faustina, a daughter of Antoninus Pius, whom he succeeded in 161 A. D. He then admitted Lucius Commodus (or Lucius Verus) to a share of the imperial power, but the latter died in the year 169. Before this date the Roman army gained several victories over the Parthians. Although the temper of Marcus Aurelius was pacific, he was involved in frequent wars by the aggressions of northern barbarians and the revolts of his subjects. He conducted in person an expedition against the Marcomanni, which was successful, in 168 A. D., and he afterwards drove them out of Pannonia. In 174 A. D. he gained over the Quadi a famous victory, which was reputed miraculous. According to Dion Cassius and other writers, the Romans, who were suffering with thirst, were refreshed by a shower of rain, while their enemies were demoralized by a violent storm of hail. One of his generals, named Avidius Cassius, then commanding in Syria, revolted in 175 A. D. and obtained possession of Egypt and part of Asia, but he was killed by his own officers in the same year. In 176 the emperor visited Syria and Egypt, and displayed great clemency towards persons who had been implicated in the recent rebellion. On his homeward journey he passed through Athens, where he founded a chair of philosophy for each of the four sects, Platonic, Stoic, Peripatetic, and Epicurean. His ardent love of learning continued unabated in advanced age, and he cherished constantly, amidst the turmoil of war and the distractions of public life, his philosophic and philanthropic aspirations. No monarch was ever more warmly and generally beloved by his subjects. It is a strange anomaly in his character and conduct that he persecuted the Christians. During a campaign against his inveterate enemies, the Marcomanni, he died at Sirmium or at Vindebona (Vienna) in Mar., 180 A. D., and was succeeded by his son Commodus. He was author of an excellent ethical work in Greek, called "Meditations," a good English version of which, by George Long, appeared in 1862, under the title of "Thoughts of M. Aurelius Antoninus." "His writings," says the eminent philosopher, J. Stuart Mill, "the highest ethical product of the ancient mind, differ scarcely perceptibly, if they differ at all, from the most characteristic teachings of Christ. This man, a better Christian in all but the dogmatic sense of the word than almost any of the ostensibly Christian sovereigns who have since reigned, persecuted Christianity. To my mind this is one of the most tragical facts in all history." (See J. Capitolinus, "Marcus Aurelius Philosophus;" Ripault, "Histoire de l'Empereur Marc-Antonin," 5 vols., 1820; Tillemont, "Histoire des Empereurs;" De Suckau, "Étude sur Marc-Aurèle," 1857; Dion Cassius, "History;" Aurelius Victor, "De Cæsaribus Historia.")

William Jacobs.

Antoni′nus, Column of, a pillar which Marcus Aurelius erected in Rome to the memory of Antoninus Pius, or perhaps in his own honor. It is a combination of the Corinthian and Doric orders, and is adorned with bas-reliefs of the victories which Marcus Aurelius gained over the Marcomanni. It stands in the Piazza Colonna.

Antoninus, Itinerary of [Lat. *Antoni′ni Itinera′rium*], a valuable geographical work, the date and author of which are unknown. It contained the names of all places and stations on the roads of the Roman empire, with their distances in Roman miles.

Antoni′nus Pi′us (or, more fully, **Titus Aure′lius Ful′vus Boio′nius Ar′rius Antoni′nus**), a Roman emperor, born at Lanuvium Sept. 19, 86 A. D., was a son of Aurelius Fulvus. He was chosen consul in 120 A. D., and married Anna Galeria Faustina. Having, as proconsul in Asia, distinguished himself by his wisdom and equity, he was adopted by Hadrian in 138 A. D., and he ascended the throne on the death of Hadrian, in July of that year. He adopted as his successor Marcus Aurelius. His reign was so peaceful and prosperous that it furnishes but scanty materials for history. Antoninus promoted literature, and treated the Christians with mildness. As a man he was temperate, humane, learned, and eloquent. The name of "Pater Patriæ" ("Father of his Country") was given to him by the vote of the Roman senate. He had two sons, whom he survived. He died Mar. 7, 161 A. D., and was succeeded by Marcus Aurelius. His memory was greatly venerated by the Romans of his own and later ages. (See J. Capitolinus, "Vita Antonini.")

Antoninus, Wall of (anc. *Antoni′ni Val′lum*), a rampart or intrenchment raised in Scotland by the Romans under Lollius Urbicus, in the reign of Antoninus Pius, in 139 A. D. It extended from the Clyde to the Frith of Forth, was 36 miles long and 20 feet high, and was built of earth and stone. Its remains are called "Græm's dyke."

Anto′nio (Nicolas), [Lat. *Nicola′us Anto′nius*], an eminent Spanish critic and bibliographer, born at Seville in 1617. He published "Bibliotheca Hispana Nova" (2 vols., 1672), and "Bibliotheca Hispana Vetus" (2 vols., 1696), which contain catalogues of all the Spanish books, with biographical notices, and are highly esteemed. He was Spanish agent at Rome 1659–81. Died April 13, 1684.

Anto′nius (Caius Hybrida), a Roman consul, was a son of M. Antonius the Orator, and an uncle of Mark Antony the Triumvir. He was chosen consul as the colleague of Cicero in 63 B. C. He was a profligate politician, and did not earnestly co-operate with Cicero in opposing the conspiracy of Catiline. Died in 44 B. C.

Antonius (Marcus), called the Orator, an eminent Roman orator and lawyer, born in 143 B. C., was grandfather of the famous Mark Antony. He became prætor in 104, and consul in 99 B. C., and was attached to the aristocratic party. Having become an adherent of Sulla in the civil war, he was assassinated by the order of Marius in 87 B. C. He was perhaps the most eloquent Roman orator of his time. His eloquence is highly eulogized by Cicero in his treatise "De Oratore," and in his "Brutus." The orations of Antonius are not extant.

Antonius (Marcus), surnamed the Triumvir, commonly called in English **Mark Antony,** a celebrated Roman general and politician, born in 83 B. C., was a son of M. Antonius Creticus. His mother Julia was a daughter of L. Julius Cæsar, who was consul about 90 B. C. Though in his youth he was addicted to licentious vice and debauchery, he distinguished himself at an early age by his talents and riotous audacity. He obtained about 57 B. C. command of the cavalry of Gabinius in Syria and Egypt. Having been elected quæstor in 53 or 52, he served in Gaul as legate of Cæsar, and displayed superior talents in several campaigns. Through the influence of Cæsar he was elected augur and tribune of the people in 50 B. C. As tribune he promoted the interest of Cæsar, and vetoed a decree of the senate which ordered Cæsar to disband his army. Early in 49 B. C. he fled from Rome to the camp of the general last named. After the civil war began, and Cæsar passed into Spain, he appointed Antony commander-in-chief of his forces in Italy. The latter commanded the left wing at the battle of Pharsalia, 48 B. C. In the year 47 he became master of the horse to Cæsar, who was now invested with the office of dictator. He married Fulvia, the widow of the demagogue P. Clodius, about 45 B. C., and was chosen consul with Cæsar as his colleague in 44. Although he indulged freely in licentious orgies, and disgraced himself by the effrontery with which he violated the proprieties of life, he displayed great political ability, especially in the crisis which followed the death of Cæsar. He negotiated with Brutus and Cassius, and temporized with the senate, whom he induced to ratify the acts of the late dictator. His eloquent funeral oration over the body of Cæsar excited such popular indignation against the conspirators that they were compelled to retreat from Rome. In 43 B. C. Antony was defeated in battle by the consuls Hirtius and Pansa at Mutina (now Módena). About this time he was denounced by Cicero in a series of famous orations called "Philippics." Before the end of the year 43, Antony, Octavius, and Lepidus united to form a league (triumvirate) against the senate and the republicans, many of whom were put to death by the myrmidons of the triumvirs. At the instigation of Antony, Cicero was proscribed and killed. It was the military skill of Antony which defeated Brutus and Cassius at the decisive battle of Philippi (42 B. C.), which rendered the triumvirs masters of the Roman world. This victory was followed by another bloody proscription. Antony, who received for his share of the empire the Asiatic provinces and Egypt, now gave himself up to pleasure and luxury. He was so captivated by Cleopatra, queen of Egypt, that he neglected public affairs while Octavius was marching with stealthy steps towards supreme and undivided power. Antony and Octavius were involved in a quarrel in the year 41, but they were formally reconciled in 40 B. C., and Antony then married Octavia, the sister of his rival or colleague. About the end of the year 38 the triumvirate was renewed for a period of five years. Arousing once from his indolent and luxurious mode of life, he marched with an army into Armenia and invaded Parthia, in which he fought many battles. He soon divorced Octavia, and returned to his dalliance with Cleopatra. The conflict which had been postponed now became inevitable, and Antony was defeated at the naval battle of Actium in Sept., 31 B. C. He then retreated to Alexandria in Egypt, and was deserted by his fleet. Reduced to a desperate extremity, he killed himself in 30 B. C. He left two sons, Iulus and Antyllus. (See Plutarch, "Life of Antony;" Drumann, "Geschichte Roms;" Appian, "Bellum Civile.") William Jacobs.

Antony, or **Anthony** [Lat. *Anto′nius*], Saint, surnamed Abbas, an eminent anchorite, called the founder of monachism, was born in Upper Egypt in 250 A. D. He reduced himself to voluntary poverty, and retired to a desert, where he passed many years in ascetic devotion and solitude. About 305 he founded a monastery near Faioom (or Phaiûm). He was an opponent of Arianism, and was venerated as a saint and oracle by his contemporaries. During the persecution of the Christians in 311 he went to Alexandria in the hope of obtaining the crown of martyrdom, but he was disappointed, and returned to the desert. He had an interview many years later with Athanasius, who wrote an account of his life. Some of the letters of Saint Antony are extant. Died Jan. 17, 356 A. D.

Antony, or **Anthony** (Saint), **of Padua** [It. *Anto′nio*], was born at Lisbon Aug. 15, 1195. He became a Franciscan monk, and preached at Toulouse, Bologna, and Padua, where he died June 13, 1231. According to a legend, he once preached to the fish in the sea an eloquent sermon, which attracted the devoted attention of his finny auditors. This sermon is extant. An abstract of it may be seen in Addison's "Remarks on Italy." He was canonized in 1232.

Antony (Milton), M. D. See Appendix.

An′tony of Bourbon [Fr. *Antoine de Bourbon*], duke of Vendôme and king of Navarre, was born in Picardy April 22, 1518. He was a brother of the prince of Condé. He married, in 1548, Jeanne d'Albret, the only child of the king of Navarre. In 1560 he was appointed lieutenant-general of France. Soon after that date he formed a coalition with the duke of Guise and Constable Montmorency, and became a Roman Catholic. He commanded the royal army for a short time in the civil war, and was mortally wounded at Rouen, and died Nov. 17, 1562. He was the father of Henry IV. of France.

An′trim, the extreme N. E. county of Ireland, in Ulster, bounded on the N. by the Atlantic, on the E. by the Irish Channel, on the S. by the Lagan River, and on the W. by the river Bann. Area, 1164 square miles. The surface near the sea-coast is hilly, and the soil is mostly light. The rock which underlies it is basaltic trap, with some new red sandstone. Lignite of good quality is mined. On the N. coast is the famous Giants' Causeway, one of the most perfect examples of columnar basalt in the world. Oats and flax are the staple products of the soil. The county has extensive manufactures of linen and cotton. The earliest known inhabitants of this county were of Celtic origin. It was exposed to the inroads of the Danes and the Northern Scots, who finally made permanent settlements here. It has numerous ancient cairns, mounts or forts, cromlechs, round-towers, castles, etc. The noble castle of Carrickfergus is the only one perfectly preserved. Antrim is one of the most decidedly Protestant counties in Ireland. Chief town, Belfast. Pop. in 1871, 419,782; in 1881, 423,171. A battle was fought near the town of Antrim in this county between the English and Irish in the reign of Edward III., and on June 7, 1798, a severe conflict took place there between the English army and a large body of rebels (United Irishmen), in which the latter were defeated.

Ant′werp, a province of Belgium, is bounded on the N. by Holland, on the E. by Limbourg, on the S. by South Brabant, on the W. by the river Scheldt. Area, 1093 square miles. The river Dyle forms part of its southern boundary. The soil is generally fertile, and produces grain, hemp, madder, hops, and pine timber. Capital, Antwerp. Pop. in 1880, 577,232.

Ant′werp [Dutch *Ant′werpen*; Lat. *Antuer′pia*; Fr. *Anvers*, ôɴ′vaiʀ′; Sp. *Ambéres*], the chief commercial city of Belgium, and capital of a province of its own name, is on the right bank of the Scheldt, 26½ miles by rail N. of Brussels; lat. 51° 13′ N., lon. 4° 24′ E. It is strongly fortified, and has among its defences a citadel built by the duke of Alva in 1567. The magnificent public buildings, the numerous churches, the stately and antique houses, and the profusion of ornamental trees, render the general appearance of the city very picturesque. The streets are tortuous and irregular, but one of them, called the Place de Meir, is scarcely surpassed in beauty by any street in Europe. Foremost among the public buildings is the cathedral, one of the largest and most beautiful specimens of Gothic architecture in Europe. It is 500 feet long and 240 feet wide, and contains the principal masterpieces of Rubens. Among the other public edifices are the exchange and the marble hôtel de ville. The principal institutions are—the Academy of Sciences, the Academy of Painting and Sculpture, a rich gallery of pictures, a public library, and a botanic garden. Antwerp has an excellent harbor, which will admit the largest vessels. Railways extend from this place to Holland, Prussia, Brussels, and Ghent. It has an extensive trade, and is an important market for hides. Here are manufactures of black silk stuffs, cotton, linen, lace, carpets, sewing-silk, and printers' ink. Antwerp was a city as early as the eighth century, and was formerly more populous than it is now. In the fifteenth and sixteenth centuries it was the great centre of European commerce, and had 200,000 inhabitants or more. It is stated that 500 vessels daily entered its port. It was besieged and taken by the prince of Parma in 1585, soon after which much of its commerce was transferred to Amsterdam. By the treaty of Paris, Antwerp, with the rest of Belgium, was annexed to the kingdom of Holland in 1814. In the popular rising of 1830 against that government the citadel was held by Dutch troops under command of General Chassé. The resulting siege of Antwerp by the French was a fine practical example of the science of sieges, which excited the interest of military amateurs of all nations. The defence exhibited a conspicuous example of fortitude and endurance. The capitulation took place Dec. 24, 1832, the trenches having been opened Nov. 30. During recent years, Antwerp, the true military capital of Belgium, has been fortified under a very distinguished engineer, Colonel Brialmont, as the central point of a great intrenched camp on the Scheldt, by a system of works "unrivalled in Europe in the intelligent application of the true principles of art to a great practical example." The most remarkable feature, however, in the recent history of the city is the marvellous development of its commerce during the last few years; 4379 vessels, of 3,734,428 tons burden, entered its harbor in 1883, which places it at the head of all continental ports of Europe, far exceeding Bilbao, Genoa, Havre, Hamburg, etc., and ranking immediately after London, Liverpool and Newcastle. The causes of this unexpected development were the abolition in 1863 of the entrance-toll on the Scheldt and the construction in 1877 of magnificent quays and docks, at a cost of more than £4,000,000. Pop. in 1885, 180,447.

Antwerp, on R. R., Jefferson co., N. Y. (see map of New York, ref. 2–G, for location of county), is the seat of the Northern New York Conference Seminary. Two hundred thousand tons of iron ore are raised from beds in this vicinity per year. Pop. in 1870, 773; in 1880, 731.

Anu′bis, or **Anepu,** an idol of the Egyptians, was represented as a son of Osiris, and as having the form of a dog, or a man with a dog's head. His worship commenced in the earliest times of Egyptian history, and was continued in some form till superseded by Christianity. He presided over the funeral rites and embalming of the dead, and was also called *Ap-heru*, signifying "the opener of the paths supposed to lead to heaven."

Anvari′, or **Anwari,** a Persian poet, born in Khorassân. He rose to celebrity about 1150, and enjoyed the favor of the Seljukide sultan Sanjar, at whose court he passed many years. He wrote numerous lyrical poems, which are much admired. His elegy on the capture of Sanjar by the Ghaurians has been translated into English. Having turned his attention to astrology, and predicted that a great hurricane would occur in 1185 or 1186, he fell into disgrace when his prediction was not fulfilled. Died about 1200.

An′vil, an iron block with a smooth surface on which blacksmiths hammer and shape their work. It varies in form and in size. The common or middle-sized anvil, on which iron is forged with a sledge-hammer, is in the form of an oblong table, which has a conical horn at one end, and sometimes a pyramidal horn at the other end. The upper surface of the anvil is sometimes made of steel. *Figuratively*, anything on which blows are laid.

Anville, d' (Jean Baptiste Bourguignon), a celebrated French geographer, born in Paris July 11, 1697. He devoted his whole life to the study and improvement of geography, and is recognized as the first who raised geography to the rank of an exact science. He was appointed geographer to the king, and became a member of the Academy of Sciences. Among his works are "Orbis Romanus" ("Roman World"), "Orbis Veteribus Notus" ("The World known to the Ancients"), and a "Compendium of Ancient Geography" (in French, 3 vols., 1768). He published 211 maps and plans, which embrace nearly every country in the world. Although he never travelled, he delineated various foreign countries with remarkable accuracy. The correctness of his map of Egypt was confirmed by the French survey of 1798–99. Died Jan. 28, 1782. (See Condorcet, "Éloge de M. d'Anville," 1762.)

Anzas′ca, Val d', a picturesque valley of Piedmont, in the province of Novara. It has beautiful cascades, and affords fine views of Monte Rosa. Gold is found here.

Anzin, a town of France, in the department of Nord, 1 mile N. W. of Valenciennes. It has iron-foundries and glass-works, and is the centre of the greatest collieries of France. Pop. in 1881, 7613.

Ao′nia, a district of ancient Greece, in Bœotia, contained Mount Helicon (the Aonian Mount) and the fountain Aganippe. These were celebrated as the favorite resorts of the Muses, who were called *Aon′ides*.

A′orist [from the Gr. α, priv., and ὅρος, a "limit"], a form of the Greek verb which represents an action as taking place in an indefinite time. The Greek language has, in addition to the imperfect, perfect, and pluperfect, the aorist, which is peculiarly adapted to the narrative style. The aorist has two forms, called first and second aorist, but very few verbs have both in use.

Aor′ta [Gr. ἀορτή, from ἀείρω, to "raise up," to "support," to "suspend," because it is supported or suspended from the heart], the large arterial trunk arising from the left ventricle of the heart, and giving origin directly or indirectly to all arteries except the pulmonary and its ramifications. The curve that it makes in the upper part of its course, during which it sends off the innominata and the left carotid and subclavian arteries, is called the arch of the aorta. The *thoracic* aorta extends from the third dorsal vertebra to the diaphragm, where it takes the name of *abdominal* aorta, which in the lower part of the abdomen, about opposite the fourth lumbar vertebra, divides into the two iliac arteries, going to supply the lower extremities. The thoracic aorta gives off two or three bronchial arteries to supply the tissue of the lungs. The abdominal aorta gives off two phrenic arteries to the diaphragm, and the cœliac axis, which divides into three branches to supply the stomach, liver, and spleen, besides several smaller arteries. (See Circulation of the Blood.)

Aos′ta (anc. *Augus′ta Præto′ria*), a town of Italy, in the province of Turin, is on the river Dora, in a valley 50 miles N. N. W. of Turin. It has a Gothic cathedral, the remains of a Roman amphitheatre, and a fine triumphal arch. The valley of Aosta produces large forests of pine, and has mines of copper, silver, iron, and lead. Cheese, leather, wine, and hemp are exported. Pop. in 1881, 7437.

Apa′ches, a warlike tribe of savages who infest New Mexico and Arizona, and hitherto have persisted in hostility against the Mexicans and the white people of the U. S. They make frequent incursions into the states of Chihuahua and Sonora. They fight on horseback, and gain a subsistence by robbery. The rifle and bow and arrow are their principal weapons. They are divided into several bands or tribes.

Ap′afi (Michael or Mihaly), prince of Transylvania, was born in 1632. He began to reign in 1661, and was for many years an ally of the Turkish sultan. In 1687 he became tributary to the emperor of Germany. Died April 15, 1690. He was succeeded by his son Mihaly, under whom Transylvania was invaded by the Turks, who took several towns. He sold his principality to Austria for a pension. Died in 1713.

Apalachicola, Fla. See Appalachicola.

Apame′a, an ancient city of Syria, on the river Orontes, which here expands into a lake named Apamea, about 75 miles S. of Antioch. It was probably named in honor of Apame, the wife of Seleucus Nicator. The place was called *Famieh* in the time of the Crusades. Its extensive ruins still exist. There were several other ancient cities of this name in Asia.

Ap′anage, or **Ap′panage** [from Lat. *ad*, "for," and *panis*, "bread," "living"], in feudal law, an allowance to the younger sons of a sovereign or prince out of the revenues of the country, generally joined with a grant of the public domain. In England the duchy of Cornwall is an apanage of the prince of Wales, but the younger sons of the sovereign depend on the liberality of Parliament.

Apartment Houses. See Appendix.

Apatin′, a town of Hungary, in the county of Bacs, on the left bank of the Danube, 60 miles S. of Baja. It has a trade in silk, madder, and hemp. Pop. in 1880, 11,973.

Ap′atite [from the Gr. ἀπάτη, "deceit," so called because it deceives the observer by its resemblance to other minerals], the native phosphate of lime, which is extensively used as a manure in England and the U. S. It usually occurs in crystalline rocks, such as granite and greenstone, but is also found in granular limestone and serpentine. The most abundant supplies, however, are derived from beds of animal remains, bones, etc. When crystallized it appears in six-sided prisms, sometimes of a greenish color, and containing calcic phosphate, with a certain proportion of calcic chloride and fluoride, $Ca_3(PO_4)_2 + Ca(Cl_4F)_2$. The amorphous apatite which is used in the preparation of artificial manure is imported from Spain and Norway, and from Sombrero, Navassa, Swan, and some other small islands in the West Indies. Before it is applied to the soil it is ground to powder and subjected to the action of sulphuric acid, which renders the phosphoric acid of the apatite soluble in water. The efficacy of apatite as a fertilizer of the soil depends on the presence of phosphoric acid, which is essential to the growth of such plants as wheat, barley, and oats. It is often mixed with guano, bones, and other manures to make a complex fertilizer, which is better than the simple mineral phosphate. A rich deposit of apatite in the form of nodules has been found in the postpliocene marls of South Carolina, near the Ashley, Stono, and Edisto rivers. Large quantities of these nodules, which contain 25 or 30 per cent. of phosphoric acid, are converted into "superphosphate of lime" at Charleston, S. C., and at Camden, N. J. It is stated that about 13,000 tons of apatite (otherwise called phosphatic guano) were imported into the U. S. in 1868. Apatite occurs in large crystals, associated with white limestone, in St. Lawrence co., N. Y. Massive apatite is found in England, Ireland, Spain, and other countries. (See Guano, Bone, Fertilizers, Agricultural Chemistry.)

Apcheron. See Apsheron.

Ape [Gr. πίθηκος; Lat. *pithe′cus* or *sim′ia*], a name of a division of animals closely allied to monkeys, but having no tail. It comprises the chimpanzee, orang-outang, gorilla, gibbon, etc. The ape belongs to the order Quadrumana and class Mammalia, having four extremities, which are all adapted to grasping, like the human hand. Their structure is better adapted for climbing trees than for walking on the ground, and accordingly in the forest they swing from tree to tree with great agility and ease, but on the ground they are slow and almost helpless. A remarkable peculiarity in the habits of these animals is that they use clubs and stones as weapons for defence or offence. Apes are natives of Africa, India, Borneo, etc. (See Chimpanzee, Gorilla, Orang-Outang.)

Ap′eldorn, or **Apeldoorn,** a beautiful village of Holland, in Gelderland, on the river Grift, 16 miles N. N. E. of Arnhem. Here are an agricultural school and manufactures of paper, blankets, and coarse woollen fabrics. Pop., with adjacent hamlets, in 1879, 15,053.

Apel′les [Gr. 'Απελλῆς], a Greek painter, lived between 352 and 308 B. C. We do not know when or where he was born, nor when nor where he died, and not one of his pictures remains; yet his name stands for supreme excellence in the art of painting. Suidas says he was born at Colophon; Strabo and Lucian make him an Ephesian; and a doubtful reading in the case of each makes both Pliny and Ovid seem to call him a Coan. He studied first with Ephorus of Ephesus; afterwards with Pamphilus of Amphipolis. Plutarch (Aratus) says he joined the school of Melanthius at Sicyon, not to learn, but to gain credit. He painted many portraits of Philip, and also of Alexander, who would sit to no other painter. He probably accompanied Alexander to Asia, and after his death went to Egypt, from which time we hear no more of him. Apelles was generous to other painters and devoted to his art. He admitted that in some things he was excelled by other artists, but he claimed to surpass all others in grace. His industry gave rise to the proverb, "No day without a line." He knew when to stop correcting, declaring that "Too much labor is sometimes hurtful to a piece." To a cobbler, who, having rightly criticised the painting of a shoe in one of his pictures, went on to blame the leg, he said, "Let the cobbler stick to his last." He is thought to have invented the process known as glazing or toning, and he painted on movable panels—never, says Pliny, on walls. His most famous picture was that of "Venus Rising from the Sea" (*Venus Anadyomene*), painted for the temple of Æsculapius in Cos. (See Pliny, "Natural History xxxv. 10;" Suidas, "Apelles;" Carlo Dati, "Vite dei Pittori Antichi," 1667; Della Valle, "Vite Pittori Antichi," 1795; Wustmann, "Apelles' Leben und Werke," 1870.)

Clarence Cook.

Ap′ennines [It. *Apenni′no*], (anc. *Mons Apenni′nus*), a long chain of mountains extending through the whole length of the Italian peninsula, and forming the watershed between the Adriatic Sea and the Mediterranean. This chain belongs to the system of the Alps, from which it branches off near the Col de Tenda. The northern portion, called the Ligurian Alps, is nearly parallel to the Gulf of Genoa, and is in close proximity to the coast. The entire length of the chain is about 800 miles, and its general direction nearly south-eastward. None of its summits rise to the limit of perpetual snow. The highest summit in the peninsula is Monte Corno, which has an altitude of 9546 feet, but Mount Etna, regarded by some as a part of the Apennine system, is 10,935 feet high. The average height of the chain is about 4000 feet. The geological formations of the Apennines are either metamorphic or secondary, and limestone is the predominant rock. They are remarkable for their rich quarries of marble of various colors, but are poor in metals. Rocks of volcanic origin abound in the former kingdom of Naples. The mineral riches of these mountains consist chiefly in the celebrated marbles of Carrara, Seravezza, and Sienna. The Apennines are somewhat deficient in sublime and magnificent scenery, and their general aspect is that of a wall, with few projecting peaks to break the monotony of the scene. The higher parts of these mountains are mostly dry, rocky, and destitute of trees, but below the altitude of 3000 feet they are covered with forests of the evergreen oak, chestnut, beech, and other trees. The olive, orange, and palm also flourish near their base, especially where they are in close proximity to the sea, as near the Gulf of Naples and at the

Riviera of Genoa. Some geographers divide this chain into four parts: 1. The Northern Apennines, extending from the Col de Tenda to the Pass of Borgo San Sepolcro, near Arezzo; 2. The Central Apennines, from Arezzo to the valley of the Pescara, which separates the provinces of Teramo and Chieti; 3. The Southern Apennines, from the Pescara to Cape Spartivento; 4. The Insular Apennines, in the island of Sicily. In Central Italy the western or southwestern side presents a very gradual descent, but in the northern part of the range, which approaches the coast, there is a very steep declivity next to the sea.

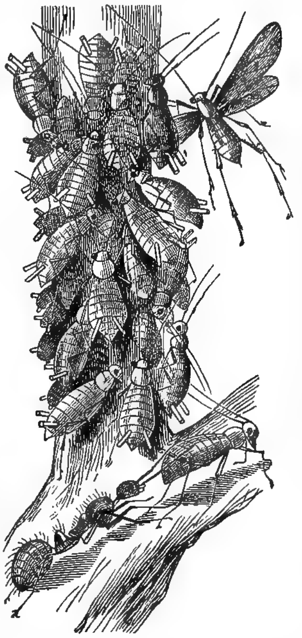
Apenra'de, a seaport-town in Sleswick, on a fiord of the same name in the Little Belt, 35 miles north of Sleswick. It has a good harbor and beautiful environs. Shipbuilding is carried on here. Near this town is the castle of Brundlund, built by Queen Margaret about 1410. Pop. in 1880, 6215.

Aphanip'tera, or **Aphanop'tera** [from the Gr. ἀφανής, "invisible," and πτερόν, a "wing"], *i. e.* with wings not apparent, although they have rudimental elytra (hence termed in English *aphanipterous*), the term applied to an order, sub-order, or family of wingless haustellate insects, composed of the different species of fleas, and forming the family Pulicidæ, and closely allied to the flies. There are many species, of which the common flea (*Pulex irritans*) may be regarded as the type. The female deposits her eggs, generally about a dozen in number, of a white color, in any favorable situation; and in about six days the larvæ are hatched, attaining their full size in ten or twelve days more. At the end of this time the larva spins itself a little silken cocoon, in which it passes into the pupa state, and in about twelve days afterwards emerges a perfect flea. This metamorphosis distinguishes the flea and chigoe from other blood-sucking parasitic insects; and they are further distinguished by the number of segments into which their bodies are divided, and by their five-jointed tarsi. The chigoe (*Sarcopsylla penetrans*) is a native of South America and the West Indies, and is an exceedingly annoying, and sometimes even a dangerous, insect. It penetrates the skin entirely out of sight, and in this way often forms troublesome ulcers, which, if neglected at first, are very difficult to heal.

Apha'sia [from the Gr. α, priv., and φημί, to "speak"], a loss of speech which is a symptom of brain disease, as distinguished from *aphonia*, loss of speech from disease of the larynx or direct paralysis of that organ. Aphasia may coexist with the most perfect ability to utter words, or even to think, the patient sometimes persisting in giving things names which do not belong to them. At other times the patient, though he can utter words, cannot clothe his thought in articulate language, but manifests by signs, etc. a normal condition as regards intelligence. Aphasia is not necessarily a precursor of insanity, though sometimes observed in its early stages. One of the most remarkable facts in this connection is that apoplectic effusion, traumatic injury, or disease of the left frontal lobe, and especially of the third convolution, is notably liable to be followed by this symptom, which is not very frequent, and which sometimes ends in perfect recovery. (See APHONIA.)

Aphe'lion [from the Gr. ἀπό, "from," and ἥλιος, the "sun"], that part of a planet's orbit which is the most distant from the sun, and is opposite to the perihelion, or the point nearest the sun. In consequence of the mutual attractions of the planets, the figures and positions of their orbits are continually but slowly changing.

Aph'ides (sing. *a'phis*, gen. *aph'idis*, a "plant-louse"), the name applied to numerous homopterous insects of the family Aphidæ, and commonly known as plant-lice. They inhabit trees and plants, on the juices of which they feed. The aphides are remarkable for their saccharine secretion, but more especially for a peculiarity in their generative economy which consists in the first fecundation of the female influencing not only the ova developed immediately afterwards, but those of the females resulting from that development, even to the ninth generation, which are successively impregnated, and continue to produce without any intercourse with the male. In autumn the males are produced, when the last set of females are impregnated, and the fecundated eggs brought forth for the ensuing year. The body of these insects is generally flask-like, being furnished with six legs, a pair of antennæ, and two small tubes not far from the extremity of the abdomen through which the saccharine fluid is exuded. In some of the aphides wings are present, but in others they are not. The sweet fluid which they throw out is known as *honey-dew*, and is sometimes produced in such quantities as to fall in drops from the leaves of the trees to the earth. Ants have a special fondness for this substance, and often frequent plants on which it is deposited. They may sometimes be seen milking the aphides, as it is termed—that is, stroking these sugar-tubes with their antennæ, to induce them to furnish them the saccharine fluid more abundantly. Hence the aphides have been termed the milch-cows of the ants. Some species of this genus are very destructive to vegetation, as the hop-fly (*A'phis hu'muli*), and the aphis of the turnip cabbage (*A'phis bras'sicæ*), which have sometimes destroyed whole crops. The aphides are often infested by certain minute parasites, which, by laying their eggs in the bodies of those insects, cause the death of great numbers. It is remarkable that one of these parasites (*Aphid'ius*) has itself still more minute ichneumon parasites, whose eggs are deposited in its body.


Aphides.

Aphis. See APHIDES.

Apho'nia [from the Gr. α, priv., and φωνέω, to "make a sound"], a loss of speech in which the patient more or less completely loses power to utter sounds. This may arise from disease of the larynx, from direct paralysis of that organ, or from some functional disease, as hysteria or chorea. The treatment varies with the disease of which the aphonia is a symptom. As a general rule, these cases are temporary, unless there is a destruction or serious organic change in the tissues of the larynx.

Aph'rodite, a name of a hydrated silicate of magnesia found in Sweden. It is a soft, earthy mineral, with a waxy lustre, and resembles meerschaum.

Aphrodite. See VENUS.

Aph'tha, plu. **Aph'thæ** [from the Gr. ἅπτω, to "set on fire"], ulcers of the mouth, beginning with numerous minute vesicles and terminating in white sloughs. Aphthæ are usually the seat of microscopic vegetation, but whether the growth is an essential or only an accidental element is a disputed point. Aphthæ resemble "thrush" in appearance, but in the latter disease no vesicles are formed.

Aphthar'to-Doce'tæ [from the Gr. α, neg., and φθαρτός, "corruptible," and δοκέω, to "think," to "believe"], literally, "believers in [that which is] incorruptible," the name of the followers of Julian of Halicarnassus, who lived about 520 A. D., and taught that the body of Christ was divine and incorruptible.

A'pian [Lat. *Apia'nus*], or **Appian** (PETER), a German astronomer and mathematician, born in Misnia in 1495. His proper name was BIENEWITZ. He became professor of mathematics at Ingolstadt about 1524, and gained distinction by his writings, among which is a work on cosmography (1524). He first proposed the method of ascertaining the longitude by lunar observations. He was ennobled by the emperor Charles V. Died April 21, 1552.

Apiç'ius (MARCUS GABIUS), a celebrated epicure who lived at Rome in the reigns of Augustus and Tiberius. His name became proverbial for gluttony and luxury in eating. According to Seneca, he expended more than $3,500,000 in the indulgence of his taste for rare dishes, and then discovering that his fortune was reduced to ten million sesterces (about $360,000), he poisoned himself, because he could not continue his expensive style of living.

A'pion ['Απίων], surnamed PLISTONIÇES, a Greek grammarian and historian, born in the Great Oasis, Egypt, lived about 20–50 A. D. He opened a school of rhetoric in Rome about 45 A. D., and wrote several works, among which were a "History of Egypt" and a lexicon to Homer's poems. Josephus's work, usually called "Against Apion," was written in answer to a book which Apion wrote against the Jews. On account of his egotism and loquacity, Tiberius used to call him *Cymbalum Mundi* (the "Cymbal of the World"). His works are lost, except small fragments.

A'pios Tubero'sa, a papilionaceous plant of the natural order Leguminosæ, was formerly included in the genus *Glycine*. It is a native of Virginia, Ohio, New York, etc., has a twining stem, pinnate leaves, and tuberous roots, which are used as food, and resemble the potato. The roots are commonly called ground-nuts.

A'pis [Gr. Ἆπις], the name of the bull of Memphis, the favorite idol and object of worship of the ancient Egyptians. According to some authorities, he was sacred to Osiris, or was a symbol of Osiris, and was not permitted to live more than twenty-five years, at the end of which time he was secretly put to death by the priests. During his life he was kept in the temple of Ptah in Memphis, and served by a retinue of priests. His death was followed by a general mourning until a calf with the requisite color and marks was found to supply his place. The principal of these required marks were—black color with a white square on the brow, the figure of an eagle on the back, and a peculiar knot under the tongue.

Aplanat'ic Lens [from the Gr. *α*, priv., and πλάνη, "deviation"], in optics, a lens which causes all the rays of light that fall on it to converge to a single point or true focus. In order to be aplanatic, the lens must not only have the true geometrical figure necessary to destroy aberration, but must be formed of different media, so as to be achromatic. These conditions cannot be accurately fulfilled in practice.

Apoc'alypse [Gr. ἀποκάλυψις, from ἀποκαλύπτω, to "reveal"], a word signifying "revelation," and usually applied to the last book of the New Testament, which contains discoveries or predictions respecting the future of Christianity. (See Revelation.)

Apocalyp'tic Knights, a secret society of which scarcely anything is known, founded at Rome in 1692 by Agostino Gabrino, a citizen of Brescia. To defend the Roman Catholic Church against Antichrist is said to have been the avowed object of this society, but many suspected that the real design was hostile to the established social order, and that by Antichrist was meant the pope.

Apocalyptic Number, the mystical number 666 spoken of in the book of Revelation (xiii. 18). Some critics interpret this to be an enigmatical expression of the word *Latinus*, the Greek characters of which, taken as numerals, amount to 666. The connection between *Latinus* and the Roman power has given Protestants a reason, or pretext, to apply this passage to the Roman Church, and the Roman Catholics retort by making the same number stand for Luther, Calvin, and other Protestants.

Apocren'ic Ac'id [from the Gr. ἀπό, "from," and κρήνη, a "fountain," so called because derived from some fountains or springs], an extractive or brown matter found in some spring water and in ordinary vegetable mould. It is a product of the natural decay of wood and other vegetable tissue.

Apoc'rypha [from the Gr. ἀπόκρυφος, "hidden"], a term applied by Protestant theologians to a collection of writings which have been regarded as an appendage to the Old Testament, and sometimes as a part of it. They are valuable chiefly as historical records, and for the light they throw on the religious condition of the Jews from the period of the Old Testament to the Christian era. They are divided into three classes: 1st, those which originated in Palestine, such as the book of Jesus son of Sirach, first book of Maccabees, and book of Judith; 2d, those of Egypto-Alexandrian origin—the book of Wisdom, second of Maccabees, and the addition to Esther; 3d, those which show traces of Chaldaic or Persian influence, as Esdras, Tobias, Baruch, and the additions to Daniel. The Council of Laodicea in Phrygia, between 343 and 381 (commonly referred to cir. 360), condemned the use of "uncanonical books;" but the list of canonical books which follows is now generally thought to be an interpolation. The third Council of Carthage (Aug., 397), in the forty-seventh of its fifty canons, gives a list which includes Ecclesiasticus, Wisdom, Tobit, Judith, First and Second Maccabees. There are in all fourteen apocryphal books, or portions of books, all but three of which were pronounced canonical by the Council of Trent in 1546. The Roman Catholic Church calls these books deutero-canonical or antilegomena, and applies the name "apocryphal" to those books to which a reception into their canon of the books of the Old Testament has been refused. By Protestants these books are generally called Pseudepigrapha (which see). The Church of England in her Articles mentions the Apocrypha as books which "the Church doth read for example of life and instruction of manners, but yet doth it not apply them to establish any doctrine." They are entirely rejected from public worship by Protestants in America, and by the dissenting churches in Great Britain. Revised by R. D. Hitchcock.

Apocyna'ceæ, or **Apocyn'eæ** [so called from *Apoc'ynum*, the name of one of its genera], an order of exogenous herbs, trees, and shrubs. The calyx is usually 5-partite, persistent; the corolla monopetalous and hypogynous; the stamens are five, inserted on the corolla. Many of the species have a poisonous milky juice, and others are used in medicine. The whole number of the species is said to be more than 550. This order comprises the oleander; the hya-hya, or cow tree, the milk of which is wholesome; the *Cerbera*, which produces the Tanghin poison of Madagascar; the *Carissa edulis* of Arabia; and the *Apocynum cannabinum*, or Indian hemp, which grows in North America.

Ap'odal Fishes, or **Ap'odes** [from the Gr. *α*, priv., and πούς, ποδός, a "foot"], a term applied to fishes destitute of ventral fins or homologues of the posterior extremities. In the Linnæan system, Apodes was the name of an order of such fishes, but in the system of Cuvier less importance is attached to this distinctive character. Eels are apodal fishes.

Ap'ogee [from the Gr. ἀπό, "from," and γῆ, the "earth"] signifies the point of the moon's orbit most remote from the earth; the point which is opposite to the perigee. The apogee of the lunar orbit advances eastward among the stars, and completes a revolution in nine years.

Apol'da, a town of Central Germany, situated near the river Ilm, in the grand duchy of Saxe-Weimar, on the railway from Berlin to Weimar, 11 miles by rail N. E. of Weimar. It has manufactures of hosiery, cloths, etc. Here are mineral springs. Pop. in 1880, 15,630.

Apollina'ris (or **Apollina'rius**) the Younger, a learned bishop and philosopher, was a son of a grammarian of the same name. He became bishop of Laodicea in 362 A. D., and gained distinction as an orator and writer. Among his works were "Thirty Books against Porphyry" and commentaries on the Bible. He was an opponent of Arianism, and in 375 founded the sect of Apollinarians, who were regarded as heretics. The heresy of which he was accused was the denial of the human soul in Christ, the place of which, he taught, was supplied by the *Logos*. His heresy was condemned at Alexandria in 362, and at Rome in 374. At the Council of Constantinople, in 381, he was condemned by name. He died in 390, and by the middle of the subsequent century the sect he founded was extinct. (See Wernsdorff, "Dissertatio de Apollinare Laodiceno," 1694.)

Apollina'ris Sido'nius (Caius Sollius), Saint, a Latin poet and ecclesiastic, born at Lugdunum (Lyons), in Gaul, in 430 A. D. He was a son-in-law of Avitus, who was emperor of Rome for a few months in 455–456 A. D. Anthemius, who became emperor in 467, appointed him chief of the senate. In 471 he was elected bishop of Clermont (Augustonemetum). He wrote "Carmina" and "Epistolæ," which are extant, and have some historical value. Died in 482 A. D. (See Germain, "Essai sur Apollinaris Sidonius," 1840.)

Apol'lo [Gr. Ἀπόλλων], in Greek mythology, the god of light or day, of poetry, music, archery, etc., was a son of Jupiter and Latona. He was often called Delius, because he was born on the island of Delos; and Phœbus, which signifies "shining." As the god of light (the presence of which is necessary to the existence of beauty) he presides over poetry, the arts, etc. According to the later poets, he was the god of the sun, and was identified with Helios, but Homer represents them as distinct deities. Apollo may be considered the ideal representative of the Hellenic people, and the impersonation of Hellenic life in its most noble and beautiful forms. He was recognized as the author of the healing art, and as the god of prophetic inspiration as especially manifested in the oracle of Delphi. Under the name of Pæan he was invoked as a healer of disease and as a destroyer, for his arrows were believed to deal out pestilence. Apollo was also worshipped by the ancient Romans, who derived their idea of him from the Greeks. He was represented by artists as a beautiful young man, crowned with laurel, and holding in his hand a harp or a bow and arrow.

Apollo, Armstrong co., Pa. (see map of Pennsylvania, ref. 4–B, for location of county), on R. R. and Kiskiminetas River. Pop. in 1870, 764; in 1880, 1156.

Apol'lo Belvede're, a beautiful antique marble statue of Apollo which was discovered at Antium about 1503, and was placed in the Belvedere of the Vatican. The name and date of the artist are unknown. This statue, which is about seven feet high, is considered the most perfect model of manly beauty. The attitude of the statue is generally supposed to represent Apollo as he appeared after he had discharged the arrow that killed the Python. (See Byron's "Childe Harold," canto iv., stanzas clxi., clxii., and clxiii.) But another opinion is gaining ground that it represents the god with the ægis in his hand, as he appeared to the Goths who were invading his sanctuary at Delphi. (See "Apollon Boëdromios; bronze Statue im Besitz des

Grafen Sergei Stroganoff; erläutert von LUDOLF STEPHANI, mit vier Kupfertafeln," St. Petersburg, 1860.) CLARENCE COOK.

Apollodo'rus [Gr. 'Απολλόδωρος], a celebrated Greek painter, surnamed THE SHADOWER, was born at Athens about 440 B. C. He was a rival of Zeuxis, the founder of a new school, and the reputed inventor of chiaroscuro. His works are highly praised by Pliny, who says he was the first who painted objects as they really appear.

Apollodorus of Athens, a celebrated grammarian and historian who lived about 140 B. C., was a pupil of Aristarchus. He wrote numerous works, which are lost, and a manual of Greek mythology entitled "Bibliotheca," a large part of which is extant. It is considered very valuable by classical scholars as the best work on the subject. It was published by Heyne in two volumes; 2d ed. 1803.

Apollodorus of Damascus, a distinguished architect, born at Damascus, lived about 100 A. D. He was patronized by Trajan, and erected in Rome numerous works, among which were the Basilica Ulpia, the Forum of Trajan, and the Column of Trajan, which is still extant. His capital work was a noble bridge over the Danube, near the mouth of the Aluta, built in 105 A. D. He was put to death about 128 A. D. by Hadrian, whom he had offended by criticising a temple which that emperor had designed.

Apollo'nia [Gr. 'Απολλωνία], an ancient city of Illyricum, on the Adriatic Sea, about 40 miles S. of Dyrrhachium. It was founded by colonists from Corinth and Corcyra, and became an important city. The site is now occupied by a village called Polina or Pollina, and some ruins of temples.

Apollo'nius [Gr. Απολλώνιος] **of Tralles,** an eminent Greek sculptor, lived probably about 200 B. C. Aided by his brother Tauriscus, he executed a group of Zethus and Amphion tying Dirce to the horns of a bull. Some persons identify this with the group called "Toro Farnese" which is now at Naples.

Apollonius, a skilful Athenian sculptor, a son of Nestor. His date is unknown, and nothing is known about him but that he executed the marble statue of Hercules, of which a large fragment, called the Torso of the Belvedere, is now in Rome.

Apollonius, a grammarian and Sophist of Alexandria, lived in the time of Augustus. His lexicon to Homer's "Iliad" and "Odyssey" is extant, and is highly prized.

Apollonius, surnamed DYSCOLUS (the "Morose"), an eminent Greek grammarian of Alexandria, was the father of Ælius Herodian. He lived about 120–160 A. D., and wrote many works which are lost, but a "Treatise on the Syntax of the Parts of Speech" and three others are extant. He was styled by Priscian *grammaticorum princeps* —"prince of grammarians."

Apollonius, surnamed PERGÆUS, a celebrated and profound Greek geometer, born at Perga, in Pamphylia, about 250 B. C. Little is known of his life, except that he resided in Alexandria in the reign of Ptolemy Philopator (222–205 B. C.). His most important work is a Greek "Treatise on Conic Sections," in eight books, which is extant except one book. He wrote other works, which are lost. He was also distinguished as an astronomer.

Apollo'nius Mo'lon, a Greek rhetorician, born at Alabanda, in Caria. He taught rhetoric at Rhodes and Rome, which he visited in 81 B. C. Cicero and Julius Cæsar were his pupils soon after that date.

Apollo'nius Rho'dius ['Απολλώνιος ὁ 'Ρόδιος], a Greek poet, born at Alexandria (or at Naucratis) about 235 B. C., was a pupil of the poet Callimachus, and at an early age removed to Rhodes, of which he became a citizen. He taught rhetoric at Rhodes for many years, and afterwards returned to Alexandria. About 194 B. C. he was appointed keeper of the great Alexandrian library. His chief work is an epic poem entitled "Argonautica," on the expedition of the Argonauts, which displays great erudition, and was much admired by the ancient Romans. Critics generally agree that it contains beautiful passages. (See WEICHERT, "Ueber das Leben und Gedicht des Apollonius," 1821.)

Apollo'nius Tyanæ'us (or **Apollo'nius of Tyana**), [Gr. 'Απολλώνιος Τυανεύς], a Pythagorean philosopher, born at Tyana, in Cappadocia, lived about 30–70 A. D. He performed a journey to India in order to learn the doctrines of the Brahmans, and after his return gained a high reputation as a sage, an oracle, and a worker of miracles. He is considered by some authors as an impostor, and by others as a prophet or magician of extraordinary powers. He travelled extensively in Europe and Africa, and is said to have passed his latter years at Ephesus. Many marvellous and absurd stories are related of him by Flavius Philostratus, who wrote his life. Apollonius wrote in reply to Euphrates an Apology, which is extant. (See JOHN H. NEWMAN'S "Life of Apollonius Tyanæus," 1853; PHILOSTRATOS, "Life of Apollonius," in English, 1809; F. C. BAUR, "Apollonius von Tyana und Christus," 1832.)

Apol'los, an eloquent preacher among the early Christians, was originally a Jew and a native of Alexandria. He is said to have been ordained bishop of Corinth. (See Acts xviii. 24; 1 Corinthians i. 12; iii. 4.)

Apol'lyon [Gr. 'Απολλύων, from ἀπολλύω, to "destroy"] signifies the "destroyer," and answers to the Hebrew *Abaddon*, and to the *Asmodeus* of Tobit.

Apologet'ic Fa'thers, a name given to those early Christians who addressed to pagans and Jews apologies for the Christian religion. Some of these were remonstrances against the judicial punishment of Christians as such, addressed to the Roman emperor or senate. Others were defences of Christianity against the charges of the Jews and pagans. Among the former were the apologies of Justin Martyr, Melito, bishop of Sardis, and the Liber Apologeticus of Tertullian. Origen, Tertullian, Clement of Alexandria, and Justin were among the principal writers of the latter class.

Apol'ogy [Gr. ἀπολογία], a term originally used to denote a written defence or answer to an accusation; a work written in defence of certain doctrines, as Plato's and Xenophon's "Apology for Socrates." Tertullian, Justin Martyr, and other early Christians wrote treatises in defence of the Christian religion, which they called Apologies. Among the modern works of this class are Bishop Watson's "Apology for Christianity," and Robert Barclay's "Apology for the True Christian Divinity." In its modern or recent acceptation apology signifies the acknowledgment of a fault, usually accompanied by some explanation which may palliate or excuse it.

Apoph'yllite [from the Gr. ἀποφυλλίζω, to "exfoliate"], a zeolitic mineral with a lamellar structure, is so called because it exfoliates before the blowpipe. It is a hydrated silicate of lime and potash occurring in square prisms, the solid angles of which are sometimes replaced by triangular or rhombic planes. It is brittle, and has a white or grayish color, often tinged with green, yellow, blue, or red. It is found in beautiful crystals in the Hartz Mountains, in Poonah, and in the Bergen Tunnel at Jersey City.

Ap'oplexy [Lat. *apoplexia*, from the Gr. ἀπό, "away," and πλήσσω, to "strike;" as we speak of a *stroke* of apoplexy or of paralysis], a disease marked by the sudden failure of volition, sensation, motion, and mental action, the symptoms being caused by a pressure upon the brain originating within the cranium. Apoplexy is of various kinds, differing not so much in symptoms as in pathology. The typical form is characterized by an escape of blood into the substance of the brain from a ruptured vessel. The rupture itself may be caused (1) by a non-inflammatory, fatty degeneration of the blood-vessel, caused by bad nutrition, etc.; (2) by a brittle condition of the vessel, resulting from an inflammatory process. These causes may be supplemented by a full habit of body or by a hypertrophied heart, or both; and it is easy to see how such secondary causes might assist in the rupture of a weakened blood-vessel. Apoplexy may, however, be produced by an extravasation of blood between the meninges, by a sudden and large serous effusion into the ventricles of the brain, or even by a congestion (hyperæmia) of the brain. The apoplectic stroke may end in partial recovery or in speedy death. Cases not fatal generally result in permanent or temporary paralysis of one side of the body (hemiplegia), often on the side opposite that in which the mischief has occurred.

The symptoms of apoplexy are often unexpected. The patient falls suddenly (with or without an outcry), his respirations are long, slow, and stertorous, the pulse is slow, one or both the pupils usually small. If the patient does not die during the attack, a secondary inflammation follows which may destroy life. Bleeding may be resorted to if the pulse be strong and the heart and lungs in good condition, but it is often injurious. Mustard to the extremities and frictions of the skin should be resorted to, and the bowels should be moved by enema. Persons having reason to fear apoplexy should avoid excesses of all kinds, yet live upon nutritious food, paying special attention to hygienic conditions.

REVISED BY WILLARD PARKER.

A posterio'ri and **A prio'ri.** Before the time of Kant the former of these terms denoted a reasoning from effect to cause, and the latter a reasoning from cause to effect. Since Kant's time, and owing to his influence and that of his school, these terms are generally used more in relation to the doctrine of knowledge; *a posteriori* knowledge being empirical knowledge, or knowledge through experience, and *a priori* knowledge being rational knowledge, or a knowledge through the reason of that which is prior to experience.

Apos'tle [Gr. Ἀπόστολος, *i. e.* "one sent forth," from ἀπό, "away" or "forth," and στέλλω, to "send"], the name given originally to the twelve disciples of Jesus, whom he had chosen to make known his doctrines to the world. The greater part were Galileans, laboring people, and destitute of high culture. Their names were Simon Peter (called also Cephas and Bar-Jona), Andrew, James the Elder (son of Zebedee), John his brother, Philip, Bartholomew (Nathanael), Thomas (Didymus), Matthew (Levi), James the Younger (son of Alpheus), Thaddeus, Simon, and Judas Iscariot. Matthias was chosen in the place of Judas, and subsequently Paul and Barnabas were called to the apostleship. It is a disputed point between the advocates and the opponents of episcopacy, whether or not the term apostle is applicable to any except the original twelve, and to Barnabas, Matthias, and Paul; some maintaining that the office is perpetuated in bishops, while others hold that it was temporary, and belonged only to those who were witnesses of the resurrection of Christ, and were employed by him to found the Christian Church. In the third year of the Saviour's ministry the apostles were commissioned by him to preach the gospel to the Jews only, but a short time before his ascension he commanded them to "Go and teach all nations, baptizing them in the name of the Father, and of the Son, and of the Holy Ghost." On the day of Pentecost the apostles received miraculous gifts, and began their work with the public announcement of Christ as the Messiah. They travelled over Greece, Syria, and Asia Minor, but there appears to be no foundation for the tradition that they divided the known world into twelve parts, each taking one for his special sphere. We have little information concerning the time or the place of the death of most of the apostles. The Epistles and the Acts of the Apostles are the only genuine records concerning them now extant.

Apostles, Acts of [Gr. Πράξεις τῶν Ἀποστόλων], the fifth book of the New Testament, written by Luke, containing the history of the period from the ascension of our Lord to Paul's arrival at Rome; that is, in all probability, from 30 to 61 A. D. It is proper to observe that though this portion of the Scriptures is styled the Acts of the Apostles, it treats only of the acts of Peter, Paul, and James; and of these, only Paul's career is narrated fully and connectedly. The book is avowedly a continuation of the third Gospel, and, though restricted within such narrow limits, may be said to give those great events in the history of the apostles in which the Christian Church would naturally feel the greatest interest. Among these events the pouring out of the Holy Spirit at Pentecost, the martyrdom of Stephen, and the conversion of Saint Paul, as well as most of his subsequent journeys and labors, are fully related.

Apostles' Creed [Lat. *Sym'bolum Apostol'icum*], called also the Creed or Confession of Faith, is the most universal creed of the Christian Church. It is as follows: "I believe in God the Father Almighty, maker of heaven and earth; and in Jesus Christ his only Son our Lord; who was conceived by the Holy Ghost, born of the Virgin Mary; suffered under Pontius Pilate, was crucified, dead, and buried. He descended into hell [or hades]; the third day he rose again from the dead; he ascended into heaven, and sitteth on the right hand of God the Father Almighty; from whence he shall come to judge the quick and the dead. I believe in the Holy Ghost; the Holy Catholic Church; the communion of Saints; the forgiveness of sins; the resurrection of the body; and the life everlasting. Amen." According to a tradition prevailing in the fourth century, but now generally discredited, this creed was composed by the apostles themselves, each contributing one of the articles. Some churches omit the clause, "He descended into hell," asserting that it was not a part of the original creed. (This subject is more fully discussed under CREED (which see).)

Apostles' Islands, or the **Twelve Apostles,** a group of twenty-seven islands in Lake Superior, 70 miles W. of Ontonagon. The principal islands are Ile au Chêne, Madeline, Bear, Stockton, and Outer Island. The islands belong to Wisconsin. They are covered with fine timber, and their cliffs have been worn into strange forms by the action of the waves. The land area is estimated at 200 square miles. Brown sandstone is quarried and exported from the islands. La Pointe, on Madeline Island, was formerly the capital of Ashland co., Wis. This place was settled by the French in 1680. The Jesuits established very early several missions on these beautiful islands.

Apostol'ic, or **Apostol'ical,** a general term given to everything directly derived from, or bearing the character of, the apostles. The Roman Catholic Church styles itself the Apostolic Church, and the papal chair is called the Apostolic chair, because the pope is supposed to be the legitimate and lineal successor of Peter, the chief apostle. The Church of England claims to be apostolic in virtue of regular episcopal ordination from the Church before the Reformation; so also do the Protestant Episcopal churches in Scotland and the U. S. Several churches of Jerusalem, Antioch, Ephesus, Corinth, and Rome, which were the special scenes of the labors of the apostles, were called apostolic churches. With the increasing power of the Roman Catholic Church, the word apostolic was more exclusively applied to whatever belonged to that Church, as Apostolic See, Apostolic Canons, etc.

Apostol'ic Can'ons and Constitu'tions are notes of ecclesiastical customs regarded as apostolical. The Apostolic Constitutions (*Constitutiones Apostolicæ*) consist of eight books, the first six of which contain a comprehensive rule for a Christian life. These are supposed to have been written about the end of the third and beginning of the fourth century. The Apostolic Canons (*Canones Apostolici*) were composed at a later period. The first fifty, translated from Greek into Latin by Dionysius Exiguus, were acknowledged by the Latin Church alone. The Greek Church accepted the thirty-five canons put forth early in the sixth century; and this became a point of dissension between the Eastern and Western churches. The Apostolic Constitutions have been ascribed by some writers to Clement of Rome.

Apostol'ic Fa'thers, the name given to the disciples and fellow-laborers of the apostles, especially to those who have left writings. They are Barnabas, Clement of Rome, Ignatius, bishop of Antioch, Polycarp, bishop of Smyrna, Hermas, and Papias of Hierapolis. Some also include the author of the epistle to Diognetus among these Fathers. Cotelerius (Paris, 1672) issued an edition of the works of the Apostolic Fathers, which was improved by Clericus in 1698, and again in 1724. Of recent editors, the best are Jacobson (1838; 4th ed. 1866), Hefele (1839; 4th ed. 1855), and Dressel (1857; reissued 1863). Another ed. by Gebhardt, Harnack, and Zahn (1876, 1877, 1878).

Apostol'ici, or **Apostol'ic Breth'ren,** a name given to a sect of religious reformers who originated in Italy in the latter part of the thirteenth century, and had for their leader Gherardo Segarelli of Parma. They travelled over Italy, France, and Switzerland, preaching the duty of renouncing worldly ties, property, etc. Having denounced popery, they were condemned by Pope Honorius IV., and Segarelli was burnt at the stake (1300). His place was filled by Dolcino, formerly a priest of Milan, who, after a brave resistance, was, with his adherents, taken by the forces of the pope, and perished at the stake in 1307.

Apostol'ic Maj'esty, a title of the kings of Hungary, was first conferred on the duke of Hungary by Pope Sylvester II. in 1000 A. D. The title was renewed in 1758 by Pope Clement XIII. in favor of Maria Theresa.

Apostol'ic Par'ty, a party of fanatical Spanish Catholics formed about 1820 for the promotion of an absolutist political policy. Their leaders were priests. In 1830 they merged themselves into the Carlist party.

Apostool' (SAMUEL), a Dutch Mennonite theologian, born in 1638. He became in 1662 a minister of a Waterlandian congregation in Amsterdam. He and Galenus engaged in a doctrinal dispute which divided the Church into two sects, Apostoolians and Galenists. Died about 1700.

Apos'trophe [from the Gr. ἀπό, "from," "away," and στροφή, a "turning"], in rhetoric, a digressive address; a figure of speech by which the orator suddenly changes the course of his oration, and addresses with emotional emphasis a person present or absent, or some inanimate object. Frequent examples of it occur in the speeches and writings of great orators and poets.

Apoth'ecary [from the Gr. ἀποθήκη, a repository where anything is kept], a person who compounds and sells medicines and makes up medical prescriptions. In England the profession of an apothecary may be not incorrectly described as an inferior branch of the medical profession. He is legally entitled to attend sick persons and prescribe for them, as well as to make up and dispense medicines. It is not, however, usual for him to prescribe medicines to be prepared and supplied by others. But although he may attend sick persons and prescribe for them, he cannot charge both for his attendance and his medicines, but must make his election between the two. Although, therefore, the apothecary is inferior in professional rank and authority to the physician and surgeon, he is considered to be of a higher grade than the chemist and druggist, who merely vends drugs and medicinal compounds, but whose qualification, beyond the payment of a small annual tax by way of license, does not necessarily offer any test or guarantee of skill. The rules of the Pharmaceutical Society of Great Britain, incorporated in 1843 by royal charter, and the powers of which have been considerably enlarged by a statute passed on the 30th June, 1852, operate as some restraint on ignorance and want of skill. Apothecaries and grocers (like surgeons and barbers) were in England and other countries formerly members of the same guild, and hardly distinguishable from each other. They were chartered as one company in London in 1606, but in 1617 James I. granted the apothecaries a charter as a separate corporation.

In the U. S. the vocation of the apothecary is mostly quite distinct from that of the medical practitioner. Among physicians it is generally regarded as contrary to professional ethics for a practitioner, in large cities at least, to be directly interested in the retailing of medicines. The education of pharmacists in the U. S. has greatly advanced of late years. Many of them are now graduates of colleges of pharmacy (the most important of which are in New York and Philadelphia), wherein excellent scientific and practical training is obtained. There is also a well-organized national pharmaceutical association. To limit the danger connected with the unskilful dispensing of drugs, a law has recently been put in force in New York and other States, requiring all apothecaries to pass a rigid examination.

Apothe'osis [from the Gr. ἀπό, "away," and θεός, a "god;" the idea being to take one away from among mortals, and to place him among the gods], a Greek word meaning deification, or the practice of raising a human being to a place among the gods. This practice was common among the ancient Greeks, who deified and worshipped heroes and benefactors after their death. Among the Romans, Romulus was the first who received such an honor, and Julius Cæsar appears to have been the second. Alexander the Great sent to all the states of Greece an order that they must recognize his divinity, and received from Sparta this laconic answer: "Since Alexander desires to be a god, let him be (or become) a god!" Several Roman emperors apotheosized themselves and their favorites.

Appalach'ee Bay, a large open bay near the northern part of Florida, is a part of the Gulf of Mexico, and is about 30 miles S. of Tallahassee. It extends inland about 50 miles.

Appalach'ee In'dians, a once powerful tribe of West Florida. They were conquered and converted to Christianity by Spanish missionaries, but the oppression and cruelties of the colonial authorities, together with the destructive invasions of English colonists and Indians from Carolina, greatly diminished their numbers. Soon after 1700 a part removed to what is now Alabama, and the tribe soon ceased to exist.

Appala'chian Moun'tains, a general term for the numerous ranges of mountains traversing the eastern part of the U. S., mostly parallel to each other, and in the main parallel to the Atlantic coast. This mountain-system is about 1300 miles long, extending, under various names, from the northern part of Alabama to Maine, and occupying, with the valleys which it forms, a space nearly 100 miles wide. The portion of this chain in New Hampshire is called the White Mountains, the highest summit of which, named Mount Washington, rises 6288 feet above the level of the sea. In New York the system takes the name of the Adirondacs, the Catskill Mountains, and the Highlands. In Pennsylvania and the Southern States they are called the Alleghany Mountains, and the name of Blue Ridge is applied to the range in Virginia which is nearest to the Atlantic Ocean. These ranges are remarkable for the uniformity of their outline, and for the parallelism of their ridges and long narrow intervening valleys of limestone formation. Among the latter is the Great Valley of Virginia, which is bounded on the S. E. by the Blue Ridge, and extends across the whole State. The ridges are remarkable for their near approach to a rectilinear direction, and the comparative uniformity of their height. The highest summit of the system is the Black Dome, or Mitchell's High Peak, in N. C., which rises to 6707 feet.

The geological formations of this chain include all those from the metamorphic rocks to the coal-measures, including the latter, and the strata belong entirely to the oldest or palæozoic division of the fossiliferous rocks. The aggregate thickness of these, measured in Pennsylvania as they appear in succession at the surface, is about seven miles. They may be classed under the three great divisions of sedimentary rocks—namely, sandstones, slates, and limestones, between which are interstratified beds of coal and iron ore. Geologists affirm that the origin of the Appalachians is more ancient than that of the Andes and the Alps, as is proved by the fact that on the high summits or slopes of the latter are found strata of a formation more recent than the carboniferous age. Their original height has been greatly diminished by the long-continued degrading agency of rain, frost, etc. The strata of this system are remarkable for their plications and complexity of flexure, in consequence of which some parts of the strata are nearly vertical. "The coal-measures of Pennsylvania," says Dana, "which were originally spread out in horizontal beds of great extent, are now tilted at various angles or rise into folds, and the strata are broken and faulted on a grand scale. The folds vary from a few rods to one hundred or more miles in breadth, and are in many successions over the region, wave succeeding wave." . . . "The following are some of the most important facts established with regard to the Appalachian flexures: 1. They occupy the whole *Appalachian* and *eastern border-regions* of the continent, nearly or quite to the Atlantic Ocean. 2. They are parallel with the general course of the mountains, and nearly so with the Atlantic coast. 3. They are most crowded and most abrupt over the part of the regions which is towards the ocean—that is, the S. E. side. 4. The steepest slope of a fold is that which faces the N. W." "A uniform series of S. E. dips over such a region is evidence that the strata correspond to a number of decapitated folds." (*Manual of Geology.*) Among the mineral resources of this chain are coal, copper, iron, zinc, nickel, and lead.

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Ap'palachico'la, a river, formed by the union of the Chattahoochee and Flint, at the S. W. extremity of Georgia. It flows southward through Florida, and after a course of 100 miles enters Appalachicola Bay, a part of the Gulf of Mexico. It is navigable for steamboats.

Appalachico'la, city and port of entry, the capital of Franklin co., Fla. (see map of Florida, ref. 2-C, for location of county), is on the river of its own name, at its entrance into St. George's Sound, a part of the Gulf of Mexico, 85 miles S. W. of Tallahassee. It has a trade in timber and fish. Pop. in 1870, 1129; in 1880, 1336.

Appalachicola Bay, in the State of Florida, is situated in the N. E. part of the Gulf of Mexico, between St. George's Island and the mainland, at the mouth of Appalachicola River.

Appanage. See APANAGE.

Appara'tus [from the Lat. *ap'paro, appara'tum,* to "prepare," to "arrange"], a term which in modern language is applied to a complete set of instruments or utensils for performing a scientific experiment or operation; the implements or machinery used in the operations of practical chemistry, or in the illustration of the principles of natural philosophy. In physiology, it is applied to a system of organs all ministering to the same function, as the *respiratory apparatus* and the *digestive apparatus.*

Appara'tus Sculpt'oris ("the Sculptor's Workshop") is a constellation situated immediately E. of the large star Fomalhault. It hardly rises above the horizon in the northern hemisphere.

Appa'rent [Lat. *appa'rens,* the present part. from *ap-pa'reo,* to "appear"], that which appears to the eye in distinction from true or real. This term is used in astronomy to express several important distinctions, as "apparent time," which is indicated by the sun, and differs from true time. The apparent magnitude of a heavenly body is the dimension of the angle formed by two lines drawn from the ends of its diameter to the spectator's eye. The apparent diurnal motion of the sun and moon is an optical illusion caused by the rotary motion of the earth, and the real motion of the moon is contrary to its apparent motion. An heir-apparent to a throne is a person whose title is better than any other except the actual occupant of the throne, and whose succession does not depend on any contingency if he survive the reigning monarch.

Appari''tion [Lat. *appari''tio;* for etymology see preceding article], literally, an "appearance" or "appearing," in common language signifies a spectre, a ghost, a visible spirit. In astronomy it means the first appearance of a heavenly body after it has been eclipsed or obscured. Stars which appear to revolve around the Pole, and which never set below the horizon, are said to be within the circle of perpetual apparition, which circle grows larger and larger in proportion as the spectator approaches the Pole.

Appar'itor [from *appa'reo,* to "appear"], a general name among the ancient Romans for the officers or public servants who attended the magistrates and judges, including heralds, lictors, scribes, etc. In England it is applied to the beadle of a university, who carries the mace, and to a messenger of a spiritual court, who serves its process.

Appeal' [from the Lat. *appello,* to "call"], in law, is an accusation of a private citizen against another of some heinous crime, demanding punishment for the peculiar injury suffered, rather than for the offence against the public. This proceeding has been entirely abolished in England, and does not exist in this country. The word also means the removal of a cause from an inferior to a superior court for the purpose of obtaining a review and re-trial of the case. It differs from a *writ of error* and a *certiorari*, inasmuch as they merely bring up for review the questions of law involved in the proceedings in the lower court, while by an appeal the questions both of law and fact may be re-examined. In a popular sense, the word signifies the removal of a cause, or of a proceeding in a cause, from an inferior to a superior court for the purposes of review, by whatever means effected. Codes of procedure in a number of States abolish writs of error in civil cases, and establish a review by appeal in all actions, whether of a common-law or equity nature. The word "appeal" is used in parliamentary law to indicate the mode of questioning the decision of the presiding officer as to a parliamentary rule.

Appear'ance [from the Lat. *appareo*, to "be seen"], in law, the act by which a party to an action brings himself, or is brought, into court, usually applied to the defendant. Appearance is either voluntary or compulsory. It is said to be voluntary when no process has been served. It is also special or general. It is said to be special when made for special purposes, not extending to the entire subject of litigation. It is general when absolute and unconditional. A notice of appearance will suffice, or the performance of some act from which an appearance can be inferred, such as serving a pleading. In civil cases it may be made by an attorney as well as by a party. In criminal cases personal appearance of the accused is frequently requisite, particularly in cases of felony.

Appen'dage [Lat. *appen'dix*, from *ad*, "to," and *pen'do*, to "weigh" or "hang"], in botany, is applied to all parts which are regularly arranged around any other part. Thus, leaves are appendages of the axis; so are all the flowers, theoretically. The supernumerary sepals in a strawberry are appendages of the calyx, and so on. In zoology, the bones of vertebrate animals are appendages of the vertebræ; the limbs of articulates are appendages of the segments.

Ap'penzell, a canton in the N. part of Switzerland, is bounded on every side by the canton of St. Gall. In consequence of religious differences it was divided in 1597 into two half cantons—Appenzell Inner Rhodes (Catholic) and Appenzell Outer Rhodes (Protestant). Inner Rhodes has an area of 62 square miles, and had in 1880 a population of 12,841. Outer Rhodes has an area of 100 square miles; pop. in 1880, 51,958. It completely consists of a wild mountain-country, intersected by narrow valleys. It has manufactures of embroideries, linen, and calico. Appenzell contributes 4060 men to the federal army. Capital of Inner Rhodes, Appenzell; and of outer Rhodes, Trogen. The canton was formerly subject to the abbey of St. Gall, gained its independence early in the fifteenth century, and joined the confederation in 1513. The Reformation caused the division of the canton into two parts—the Inner Rhodes, appropriated to the Catholics, and the outer Rhodes, to the Protestants. (See Zellweger, "Geschichte des appenzeller Volkes," 4 vols., 1830.)

Appert (Benjamin Nicolas Marie), a French philanthropist, born in Paris Sept. 10, 1797. He founded schools for the mutual instruction of the poorer classes, and devoted much time to the improvement of the condition of prisons and their inmates. He published, besides other works, a "Treatise on the Education of Prisoners" (1822).

Ap'pian [Gr. *'Αππιανός*; Lat. *Appia'nus*], an historian, born at Alexandria, in Egypt, flourished about 120–160 A. D. He removed to Rome in early life, distinguished himself as an advocate, and obtained the important office of procurator. He wrote in Greek a valuable work on "Roman History" (Ῥωμαικὴ Ἱστορία) in twenty-four books, of which eleven are extant. His work is a mere compilation. The best edition of the text is that of Bekker, 1853. An English translation by John Daires appeared in 1679, 2d ed. in 1696.

Appia'ni (Andrea), an eminent Italian painter, born at Bosizio May 23, 1754, imitated the style of Correggio. He is thought to have excelled all the artists of his time in fresco-painting. About 1805 he was appointed court-painter to Napoleon, whose portrait he painted. His principal merits are grace, purity of design, and brilliancy and harmony of color. Among his masterpieces are the frescoes on the ceiling of the royal palace of Milan, and those in the church of Santa Maria Vergine, in the same city. Died Nov. 8, 1817. (See G. Longhi, "Elogio Storico di A. Appiani," 1826.)

Ap'pian Way [Lat. *Vi'a Ap'pia*], the most celebrated of the ancient Roman roads, was constructed by Appius Claudius Cæcus about 313 B. C. It extended originally from Rome to Capua, 125 miles, but was eventually continued to Brundisium. It was built in a very expensive manner, and was paved with large polygonal blocks of the hardest stone, accurately fitted to each other, so as to appear like a solid mass. The substructure was solidified by cement. The road has been partly restored by excavation, and is found to be in a remarkable state of preservation.

Applause [from the Lat. *applau'do, applau'sum*, to "strike upon," to "clap"], a shout of approbation; an approving acclamation; a public expression of approbation and praise by striking upon the floor or the clapping of hands. This custom prevailed among the ancient Greeks and Romans. The Roman comedians usually terminated their performances with a request that the audience would applaud, *valete et plaudite!* Three species of applause were used by the Romans—namely *Bombus*, a confused hum, like the buzzing of bees, produced by the mouth or the hands; and *Imbrices* and *Testæ*, which were sounds made by striking vessels placed in the theatre for this purpose. The last was like the sudden crash produced by the fall and fracture of a set of china-ware.

In modern times, French politicians and dramatists often avail themselves of the services of hired applauders, called *claqueurs*, who cry *Bis, bis!* ("twice," "again," "encore"), or *Bien, très bien!* The audiences of English actors signify their approbation by the cry of *Encore!* but in the British House of Commons applause is expressed by cries of *Hear! hear!*

Ap'ple (*Py'rus ma'lus*), a fruit of a tree of the natural order Rosaceæ, which is native or naturalized in the temperate regions of Europe and Asia. It was cultivated by the ancient Romans, who called it *pomum*. The fruit called apple in the English translation of the Bible was probably different from the fruit now known by that name. The wild crab-apple of the Old World is the parent of almost all the varieties of apple which are cultivated, and which have been much improved by cultivation. The apple is considered the most valuable fruit of temperate climates, and is more extensively cultivated than any other. The fruit in botanical language is a *pome;* the leaves are ovate, acute, serrate, or crenate; the blossoms are beautiful and fragrant. The tree, which is hardy and slow in growth, will live probably two hundred years under favorable circumstances. The number of varieties of cultivated apples is over 200, and is continually increasing. This fruit may be divided into three classes, with respect to the season in which it matures: namely, summer, autumn, and winter apples, the former of which, in the Middle States of the Union, begin to ripen about June.

Among the best varieties of winter apples are the Baldwin, Spitzenberg, Rhode Island Greening, Bellflower, Swaar, Northern Spy, Rambo, Roman Stem, Peck's Pleasant, Roxbury Russet, Wine Apple or Winesap, Ashmore, Belmont, Hubbardston Nonsuch. Large quantities of apples are exported from the Northern U. S. to Great Britain. The finest quality of this fruit is produced in New York and other States in the same latitude. Among the products obtained from the apple is a beverage called cider, and a chemical substance called Malic Acid (which see). The wood, which is hard, durable, and fine-grained, is used to make weavers' shuttles, shoe-lasts, cog-wheels, etc. Apples can be more successfully cultivated in high latitudes than any other fruit; those raised in northern regions are, however, small and crabbed. Great quantities of apples are preserved by drying them in the sun or by artificial heat.

The Siberian crab (*Pyrus baccata* or *Pyrus prunifolia*), a native of Siberia, is cultivated in Europe and the U. S. for preserves. The *Pyrus coronaria* (or American crab) is a small tree which grows wild in the U. S., and bears a sour and harsh-tasted fruit scarcely an inch in diameter. This is used for preserves. An important distinction among apples is expressed by the terms natural fruit and grafted fruit. The former, which is raised from the seed, is mostly very inferior in quality. (See Pomology.)

Apple Blight, a disease of apple trees, caused by a species of aphis (the *Aphis lanigera*). This little insect penetrates the chinks in the bark, extracting the sap, causing diseased excrescences, and ultimately the death of the tree.

Ap'pledore, a small seaport, situated in the parish of Northampton, county of Devon, England, at the mouth of the river Torridge and on Barnstaple Bay, about 2 miles N. of Bideford, is frequented in the summer as a bathing-place, and has a harbor which is subordinate to the port of Barnstaple.

Apple Oil (artificial), a solution of valerianate of amyl in six parts of alcohol.

Ap'ples of Sod'om, a fruit mentioned by Josephus and other ancient writers as growing near the Dead Sea. It was fair in appearance, but when grasped in the hand collapsed into dust and ashes. Some modern writers have supposed that it was the fruit of *Sola'num Melon'gena* (nightshade), but Robinson identifies it with the *Ascle'-*

pias gigante'a, the fruit of which looks like an orange, but disappoints those who touch it by its nauseousness in an immature state, and its emptiness when fully ripe.

Appleton, city and important R. R. centre, capital of Outagamie co., Wis. (see map of Wisconsin, ref. 5–E, for location of county), on the Lower Fox River, 30 miles S. of Green Bay. The river is navigable for steamboats, is the route of the Green Bay and Mississippi Improvement Company, and has here a constant fall of forty-nine feet, furnishing inexhaustible water-power. The city has a variety of manufactures, and is the seat of Appleton Collegiate Institute and of Lawrence University. Pop. in 1870, 4518; in 1880, 8005; in 1885, 10,927.

Appleton (JAMES). See APPENDIX.

Appleton (JESSE), D. D., an American theologian, was born at New Ipswich, N. H., Nov. 17, 1772, and settled over the Congregational church in Hampton, N. H., in Feb., 1797. In 1803 he was one of the most prominent candidates for the chair of theology in Harvard University. In 1807 he was chosen president of Bowdoin College, and died Nov. 12, 1819. A man of rare abilities and high classical culture, he was distinguished also for saintliness of character, and singular dignity and grace of manners. His works, in two vols. 8vo, with a memoir prefixed, were published by his son-in-law, Prof. Alpheus S. Packard, in 1837.

Appleton (JOHN), LL.D., a jurist, was born in 1804, graduated at Bowdoin College in 1822, became a judge of the supreme court of Maine in 1852, and chief-justice in 1862. He published two volumes of "Reports" (1841).

Appleton (JOHN), born at Beverly, Mass., Feb. 11, 1815, graduated at Bowdoin College in 1834, became a lawyer and prominent Democratic editor in Portland, Me., where he settled in 1837, became chief clerk of the U. S. treasury department in 1845, and afterwards held a similar position in the state department; was *chargé d'affaires* to Bolivia (1848–9), member of Congress (1850–59), secretary of legation in London (1855–56), U. S. minister to Russia (1860–61). Died Aug. 22, 1864.

Appleton (NATHAN), LL.D., a merchant, born at New Ipswich, N. H., Oct. 6, 1779, became a partner of his brother Samuel in Boston. He was one of the founders of Lowell, Mass., was several times in Massachusetts legislature, and was chosen a member of Congress in 1831, and again in 1842. Wrote speeches and essays on banking, currency, and the tariff. He was a member of the Academy of Sciences and Arts, and of the Massachusetts Historical Society. Died July 14, 1861.

Appleton (SAMUEL), an eminent merchant and philanthropist, brother of the preceding, was born at New Ipswich, N. H., June 22, 1766. He removed to Boston about 1794, and amassed a fortune by trade and the manufacture of cotton. He gave $25,000 annually for charitable purposes, and made a donation of $10,000 to Dartmouth College. He died July 12, 1853, without issue, and left $200,000 to be applied to "scientific, literary, religious, and charitable purposes."

Appleton (WILLIAM), born at Brookfield, Mass., Nov. 16, 1786, became a successful merchant of Boston, to which he removed in 1807. He was a member of Congress (1851–55, 1861–62), and was distinguished for his benevolence. He gave $30,000 to the Massachusetts General Hospital. Died Feb. 15, 1862.

Appleton City, on R. R., St. Clair co., Mo. (see map of Missouri, ref. 5–E, for location of county). Pop. in 1880, 1034.

Ap'pling (DANIEL), an officer of the war of 1812, was born in Columbia co., Ga., Aug. 25, 1787; entered the army of the U. S. as lieutenant of rifles May 3, 1808; became captain Apr., 1812; major First Rifles Apr., 1814; brevet lieutenant-colonel May 30, 1814; brevet colonel Sept. 11, 1814; rendered distinguished service at Sandy Hill and Plattsburg, N. Y.; resigned June 1, 1816. The county of Appling, Ga., was named in his honor. Died at Fort Montgomery, Ala., Mar. 18, 1817.

Appling, capital of Columbia co., Ga. (see map of Georgia, ref. 3–I, for location of county), 27 miles W. of Augusta. Pop. not in census of 1880.

Appoggiatura, ăp-pod-jă-too'ră, literally, a "support," an Italian musical term, indicates a form of embellishment by insertion of notes of passage in a melody. The notes are printed in a smaller character than the leading notes of the melody.

Appointment [remotely from the Lat. *ad*, "to," and *punctum*, the "point"], in law, a disposition of property made by one authorized by a power contained in a deed, will, or other instrument to direct its use; an instrument executed pursuant to a power of appointment directing the disposition of property agreeably to such power. (See POWERS.) The word is also used to indicate the designation by lawful authority of some person to hold an office or to perform a public duty. Under the U. S. Constitution the President has the power to nominate, and, with the consent of the Senate, to "appoint," persons to hold certain specified offices.

Ap'pold (J. GEORGE), F. R. S., an English mechanician, born in 1800, was the inventor of a celebrated centrifugal pump, of machinery for paying out marine telegraph cables, and of a process for dressing furs, which last gave him the control of that business. His house was a museum of wonderful mechanical devices, which opened and closed doors, shutters, and gates, and performed many other surprising acts, by automatic machinery. Died Aug. 31, 1865.

Appold Centrifugal Pump. See PUMP.

Appomat'tox, a river of S. E. Virginia, rises in Appomattox county, flows in a general easterly direction, and enters the James River at City Point. Length, estimated at 150 miles. It is navigable for large vessels to Petersburg, 20 miles from its mouth.

Appomattox Court-house, capital of Appomattox co., Va. (see map of Virginia, ref. 6–F, for location of county), was the scene of the surrender of Gen. R. E. Lee, with the Confederate army of Northern Virginia, to Gen. Grant, April 9, 1865. Pop. not in census of 1880.

Apponyi (GEORG), COUNT, born in 1808, became the leader of the Conservative party in Hungary, and opposed the revolutionary movements in 1848. He was appointed in 1859 a life member of the imperial council of Vienna. As royal commissary he opened the Diet at Buda in 1861.

Apponyi (COUNT RUDOLPH), born in 1812, was a descendant of an old and illustrious Hungarian family. He commenced his diplomatic career in 1836 as attaché in Paris. He was two years in the embassy at St. Petersburg, several years secretary to the embassy at Paris, became minister at Carlsruhe in 1847, and was envoy extraordinary and minister plenipotentiary at Turin, 1849–53, when he was transferred to Munich, and in 1856 to London; was ambassador there 1860–71, when he became ambassador at Paris. He became privy-councillor in 1854.

Appor'tionment [from the Lat. *ad*, "to," and *portio*, a "share"], in law, the division of a thing into parts; the distribution of a claim or charge among different persons in proportion to their interests in the subject-matter to which it attaches. The leading cases concern—1, Incorporeal rights in land, such as commons and rents; 2, Encumbrances upon land; 3, Contracts. 1. The principal case under this division is that of rents. The question of apportionment may arise as to the rights of different owners either of the rent or of the land to which the burden of the payment of the rent attaches, or it may occur in case of a partial failure of the title as to the territorial extent of the land rented, or because the right of the tenant to hold the land ceases before the time agreed upon, on account of the expiration of the landlord's estate. Thus, a landlord, after a lease of two houses by one contract for a specified rent, may sell one of them. The purchaser would be entitled to collect a proportionate part of the rent. So, if the lessee should assign to a stranger all his rights in one of the houses, the latter would during his ownership be bound to pay a proportionate part of the rent. In case the title to a portion of the premises failed, as if in the case supposed the landlord did not own one of the houses that he assumed to lease, and the tenant was accordingly evicted, he would pay a proportional part of the rent for the remaining house. By the common law there was no apportionment where there was a failure as to time. This case is illustrated by a lease made by a life tenant for a specified period—*e. g.* a year. Should he die before the time expired, the lease would of course instantly terminate, and the tenant would pay no rent for the time intervening since the last payment of rent fell due. This defect in the law has been remedied by statute. It should be added that there is by common law no apportionment where the property leased is simply diminished in value. Should a house and lot be hired and the house be destroyed by fire, no deduction can be claimed, as the rent is deemed to be paid for the land, which still remains. This rule may be obviated by agreement of the parties. 2. *Encumbrances.*—It is a general rule that several owners of land must bear the burden of an encumbrance upon it in proportion to their respective interests. Thus, if land were mortgaged, and then conveyed to A for life, and, subject to A's estate, to B, the respective owners should share between themselves the burden of payment; while the mortgage remained, A should pay the interest. If it became necessary to pay the mortgage, A would need to raise a sum equivalent to his entire duty to pay the interest during his life. His

probabilities of life are estimated by well-known tables indicating longevity, such as the Northampton, Carlisle, and others. On a similar principle, if mortgaged lands be sold in parcels, the duty to pay the mortgage is apportioned among the owners of the respective parcels. This is clearly the rule where the sales are contemporaneous; but if successive in point of time, the better opinion is that there is no apportionment, but that the lots must be taken to satisfy the mortgage in "the inverse order of alienation." By this is meant that the lands last sold by the proprietor must be first resorted to as a means of paying the mortgage. As soon as enough money is thus realized the remaining lots are discharged. 3. *Contracts.*—As a general rule, there is no apportionment of contracts. In other words, a party to a contract must completely fulfil his own obligation before he can enforce the agreement against the other party. Thus, if a servant agreed to labor for a year at a specified salary, and should work for a portion of the time, and leave without cause, he could collect no portion of his wages. There are special cases where a contract is apportioned. One is where, after it has been partly performed, it is dissolved by mutual consent. So also in a contract for personal service there is an implied understanding that the contract is not to be completely fulfilled unless life should continue. Accordingly, if the servant should die before the expiration of the time specified in the contract, his wages would be apportioned according to the time of actual service. Some jurists have objected to the severity of the general rule, and would allow an apportionment, even where a contract is deliberately broken by a party, corresponding to the benefit received by the other party; but the prevailing opinion of courts is, and the better philosophy would seem to be, to adhere to the rule as modified by the special cases referred to.
T. W. Dwight.

Apportionment Bill, in American politics, denotes an act of Congress which determines the total number of members sent by all the States of the Union, and also the number that each State shall send, to the House of Representatives. A new apportionment is made after each decennial census. The same term is applied to the act by which a State legislature distributes among the counties their respective portions of representation. A populous county often forms a district by itself, and elects several members, while another district is formed by the union of two or three small counties. Those of the dominant party of the State sometimes so contrive the apportionment that they gain an advantage in the election, by forming districts in each of which a county that gives a majority against them is joined to a county that gives a larger majority for their side. This is called *gerrymandering.*

Appraise'ment, or **Apprize'ment** [from the Lat. *appre'cio*, to "value," to "set a price upon"], the act of estimating the value of property; the valuation of property made by an authorized person, who is called an appraiser. The mode of appointing appraisers varies in the different States of the Union. The law of the U. S. requires that there shall be an appraisement of the inventoried property of decedents and insolvent debtors, of property appropriated to public use, and of real estate seized upon execution. In England, appraisement, as a legal term, signifies a valuation of goods taken under a distress for rent by two appraisers, who are sworn by the sheriff or constable. The appraisers of England must be licensed for the office.

Appren'tice [remotely from the Lat. *apprehendo*, to "comprehend," to "learn"], a person, ordinarily a minor, bound in due form of law, usually by indenture, to another for a certain time to learn some art, trade, or business. In most of the States of this country statutes borrowed from English legislation allow minors, with their own consent, and with that of their father, mother, or guardian, to be bound out to service—if males, till the age of twenty-one; if females, till the age of eighteen, or for a shorter time. When the child is a pauper, he may be bound without his consent by public officers or by orphan asylums, houses of refuge, or of industry. The same rule is followed in the case of children charged with petty crimes. Apprenticeship is thus to some extent a mode of penal discipline, and is reformatory in its nature, particularly where some central authority oversees from time to time the conduct both of the apprentice and the master. The master in many respects stands in the relation of a parent. It is his duty to instruct the apprentice in the art which he has undertaken to teach him, to give him a reasonable support, and to provide for him in case of sickness. The apprentice, on his part, is bound to render faithful service and obedience to his master, who may administer for misconduct reasonable corporal punishment. This relation is not regulated by the ordinary rules governing master and servant, but depends upon special grounds of public policy. It may usually be dissolved by magistrates where the object of the apprenticeship has failed, and in special cases the apprentice may be punished by them for wilful neglect to perform his duties. The contract of apprenticeship is of a personal nature, and is not assignable. T. W. Dwight.

Approach'es, a military term which denotes the entire system of works employed in the methodic *approach* by siege of a fortification. The works consist of enveloping trenches called *parallels*, and trenches of communication called *boyaux* or *zigzags* (terms indicating the tortuous or *zigzag* form given them, in order to screen from the fire of the place), *places of arms*, etc. The earth removed is thrown upon the side towards the besieged place, by the height of which and the depth of the trench itself adequate cover is gained for the passage of troops, and even of artillery. Approaches sometimes acquire great development, as at Sebastopol, where, as is stated, the allies dug seventy miles of trenches. Recent changes in artillery and small-arms have rendered almost obsolete the methodic rules for the location and construction of approaches laid down in text-books on sieges.

Appropria'tion [from the Lat. *ad*, "for," and *proprius*, "one's own"] **of Payments,** in law, the application of money paid by a debtor to his creditor to one of several debts. The general rule is that when the payment is voluntary, and not under process of law, the debtor has a right to direct the application of the money. If he does not exercise this right, the creditor may elect to which debt to apply it; and in case of the failure of both parties to make such election, the law will apply the money in accordance with certain rules, so as best to promote the rights of the parties. When the payment is not voluntary, but is made under compulsion, the rules as to election give way, and the money should be applied ratably to all the claims. Where a debt bears interest, that is extinguished before application to the principal.

Approx'imate [from the Lat. *ad*, "to," and *prox'imo*, *proxima'tum*, to "approach," to "draw near"], in zoology, is applied to that arrangement of the teeth in the jaws where one is placed against the side of the next, and there is no intervening vacancy or diastema. The disposition of the teeth in the human species and in the *Anoplotherium* forms an example.

Appui, ăp'pwē', a French word signifying "support." In military language the phrase *point d'appui* is applied to a base or position fitted to give support to troops; a fixed point at which troops form and on which operations rest. Lakes, marshes, hills, or steep declivities sometimes serve as *points d'appui.*

Appur'tenances [remotely from the Lat. *appertineo*, to "belong to"]. In law, this word signifies something belonging or appertaining to another thing as principal, as a right of way appurtenant to land. In a conveyance of land with the "appurtenances," all easements and privileges in use and necessary to the enjoyment of the estate granted will be included. Land itself will not be considered as appurtenant to land. It is often a difficult question of construction to determine whether land can be regarded as *a part* or *parcel* of the thing granted; in which case it will pass, while it would not be embraced in the word "appurtenances." Thus, in the conveyance of a "mill" or a "mansion-house," land which in the narrow acceptation of the terms "mill" or "mansion-house" would not be included, might be in a comprehensive sense, since there could be no complete enjoyment of the mill or mansion-house without them.

Aprax'in (Feodor Matveievitch), a Russian admiral, called the creator of the Russian navy, was born in 1671. He was one of the principal coadjutors of Peter the Great in his efforts to civilize Russia, and enjoyed his confidence in a high degree. He built several ships-of-war, became an admiral and president of the admiralty in 1707, and took Viborg from the Swedes in 1710. In 1713 he ravaged the coasts of Finland, and commanded a fleet in the war against Sweden. Died Nov. 10, 1728.

Apraxin (Stepan Feodorovitch), a Russian general, a grandson of the preceding, was born in 1702. He served in a war against the Turks, rose rapidly, and became a field-marshal. Having the command of a large army in the Seven Years' war, he defeated the army of Frederick the Great at Gross-Jägerndorf in Aug., 1757. He neglected to improve the victory by marching to Berlin, and was recalled and tried by a court-martial, but before the trial was finished he died, Aug. 26, 1760.

Aprice'na, a town of Italy, in the province of Foggia, 23 miles N. of Foggia. Pop. 5272.

Ap'ricot [from the Lat. *apri'cus*, "sunny"], (*Pru'nus Armeni'aca*), a fruit tree of the natural order Rosaceæ, is a native of Armenia, and is extensively cultivated in

Europe and the U. S. It is nearly related to the plum. The blossoms appear before the leaves, which are ovate, subcordate, and acuminate. The fruit, a velvety drupe, ripens earlier than the peach, which it resembles in some respects. The color of the apricot is mostly yellow, with a red-brown or ruddy cheek on the side which is most exposed to the sun. It is propagated by budding on plum, peach, or wild-cherry stocks. Among the numerous varieties of the apricot, the Moorpark is by many persons the most esteemed.

A'pries [Gr. 'Απρίης], a king of Egypt, called in the Bible Pharaoh-Hophra, was a son of Psammuthis (or Psammis), whom he succeeded about 595 B. C. He waged war against the Greeks, by whom he was defeated. His subjects revolted and killed him about 568 B. C., and Amasis then obtained the throne.

A'pril [Lat. *Apri'lis*], the name of the fourth month of the year, was derived from the Romans, but in the early age of the Roman republic it was the second month.

April Fool's Day, the name given to the first of April, from the custom of playing tricks upon people or sending them upon bootless errands on that day. Some have derived it from some ancient pagan custom, such as the Huli festival (March 31st) among the Hindoos, or the Roman Feast of Fools. Probably it was observed as the octave of March 25th, which used to be New Year's day. In France the person tricked is called *poisson d'Avril* ("April fish"), and in Scotland he is called a *gowk* (cuckoo).

A Priori. See A Posteriori.

A'pron, a term applied to a piece of sheet lead which covers the touchhole of a cannon, tied by two pieces of rope. In shipbuilding the apron is a piece of curved timber fixed behind the lower part of the stem, and just above the foremost end of the keel, to fortify the stem. Apron is also a platform or flooring of plank at the entrance of a dock.

Apron (in the Bible). See Appendix.

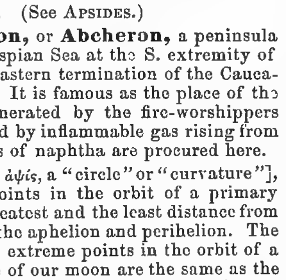
Apse [Lat. *ap'sis*], a semicircular recess usually formed at the east end of the choir or chancel of a Romanesque or Anglo-Norman church. Such structures are numerous in England and in Germany. (See Apsides.)

Apsheron', Apcheron, or **Abcheron,** a peninsula which extends into the Caspian Sea at the S. extremity of Daghestan. It forms the eastern termination of the Caucasian chain of mountains. It is famous as the place of the sacred flame which is venerated by the fire-worshippers (Ghebers), and is produced by inflammable gas rising from the soil. Large quantities of naphtha are procured here.

Ap'sides [from the Gr. ἀψίς, a "circle" or "curvature"], sing. **Ap'sis,** the two points in the orbit of a primary planet which are at the greatest and the least distance from the sun, corresponding to the aphelion and perihelion. The term is also applied to the extreme points in the orbit of a satellite, which in the case of our moon are the same as the apogee and perigee. The straight line connecting them is called the line of the apsides.

Ap'tera [from the Gr. *α*, priv., and *πτερόν*, a "wing"], in the Linnæan system an order of insects without wings, called *apterous insects*. This word is not recognized as the name of an order by recent entomologists, the wingless insects being assigned to various orders.

Ap'teral, a term applied to those temples of the ancient Greeks and Romans which had no lateral columns. The Greek temples were generally peripteral—*i. e.* with columns on the sides and ends.


Apteryx.

Ap'terygidæ [from the Gr. *α*, priv., and *πτέρυξ*, a "wing"], a family of ratite birds with rudimentary wings, very short humerus, only one ungual phalanx, with a hallux, long bill, and pilose plumage. Three species inhabit New Zealand, where they are called *kiwi*. They feed upon insects of various kinds, more especially on worms, which it is said they attract to the surface by jumping and striking on the ground with their powerful feet. The skin of the apteryx is very tough but flexible, and is prized by the chiefs for the manufacture of their state mantles. Three species have been found, but they are believed to be nearly extinct.

Ap'thorp (East), a clergyman of the Anglican Church, was born at Boston, Mass., in 1733, and educated at Cambridge University. He passed many years in England, and obtained a benefice at Finsbury. His four letters to Gibbon in defence of Christianity (1778) were very favorably received. Died April 17, 1816.

Apule'ius (Aulus Lucius), a celebrated Latin Platonic philosopher and satirical writer, was born at Madaura, in Africa. He lived about 150 A. D., travelled extensively, and was distinguished for his learning and eloquence. After he had spent his fortune in travel, he married a rich widow, and was involved in a lawsuit with her relatives, who accused him of using magical arts to gain her affection. He defended himself with success by an "Apology" which is still extant. He became popular as an orator at Carthage, the senate of which raised statues in his honor. His chief work is a fantastic and satirical novel entitled the "Metamorphoses, or the Golden Ass," which is of importance for the history of manners. It has been translated into English by T. Taylor (1822), by Sir George Head (1851), and by several others. Some of his works are lost. (See F. Hildebrand, "Commentarius de Vita et Scriptis Apuleii," 1835.)

Apu'lia [It. *La Puglia*], an ancient province of Southern Italy, was bounded on the N. E. by the Adriatic Sea, and was a portion of Græcia Magna. It was bounded on the S. W. by Lucania and Samnium. Among the chief towns of this once populous and famous region were Canusium, Arpi, Luceria, and Arpinum. The battle of Cannæ, and most of the important events of the second Punic war, occurred in Apulia. Many of its cities aided Hannibal, by whom it was occupied until B. C. 207, when it was abandoned to the Romans. It was conquered by C. Cosconius, B. C. 89, and by the Normans about 1042 A. D. Apulia was united to the Sicilian monarchy in 1127, and is included in the modern provinces of Foggia, Bari, and Lecce. Area, 8541 square miles. Pop. in 1879, 1,536,465.

Apu're, a river of Venezuela, rises in the Andes near lat. 7° N. and lon. 72° W. It flows eastward, and enters the Orinoco in lat. 7° 36′ 43″ N. and lon. 66° 45′ W. Length, estimated at 736 miles.

Apure, a province of Venezuela, is bounded on the N. by Merida, Barinas, and Caracas, on the E. by Guiana, and on the S. and W. by Colombia. Area, about 22,250 square miles. This province is in the most level and lowest part of Venezuela, and is almost entirely without trees. The chief occupation is the raising of cattle. Chief town, San Fernando de Apure. Pop. in 1881, of province, 21,112.

Apu'rimac', a river of South America, and one of the head-streams of the Amazon, rises in the Andes, in Peru, about lat. 15° 38′ S., and about 75 miles from the Pacific Ocean. It flows nearly northward, and unites with the river Urubamba about 8° 38′ S. The stream thus formed is called the Ucayale. Its length from its source to the Ucayale is estimated at 600 miles.

A'qua, plu. **A'quæ,** the Latin name for water; the pharmacopœial name for spring water, or natural water in its purest attainable state. It is a compound of oxygen and hydrogen; symbol H_2O, or Aq. The principal varieties of water are distilled water (*aqua destillata*), river water (*aqua ex flumine*, or *aqua fluvialis*), sea water (*aqua marina*), rain water (*aqua pluvialis*), and spring water (*aqua fontana*). These terms are used in pharmacy, in which various watery solutions are also called *aquæ*.

A'qua For'tis (*i. e.* "strong water"), a name given to nitric acid by the alchemists, is still the common commercial name of that compound. (See Nitric Acid.)

Aqua Marine, a name sometimes given to the Beryl (which see).

A'qua Re'gia (*i. e.* "royal water"), a name given to a mixture of nitric acid with hydrochloric (muriatic) acid. The usual proportion is one of the former and two of the latter acid. This is remarkable for its power of dissolving gold, regarded as the king of metals. The product is auric terchloride, $AuCl_3$. (See Gold, by Prof. W. P. Blake.)

A'qua Regi'næ (*i. e.* "queen's water") is a mixture of concentrated sulphuric acid and nitric acid, or of sulphuric acid and nitre. It has been used as a disinfectant.

Aqua'rians [from the Lat. *a'qua*, "water"], a name given to those ascetic persons who used water in the sacrament instead of wine, because they had scruples against the use of the latter. This practice is said to have originated with Tatian in the second century.

Aqua'rium (plu. **Aquaria**), or **Aquaviva'rium,** a Latin term commonly applied to a glass tank or vessel containing either salt or fresh water, in which living aquatic animals and plants are kept as an ornament of drawing-rooms, an aid to scientific study, and a source of rational amusement. It must contain both animals and plants in something like a due proportion, as the animals depend for breath on the oxygen which is given out by the plants, and the latter are nourished by the carbonic acid gas which the animals exhale. The water should be often aërated by agitation, which may be effected by dipping up portions of it and pouring them in again from a small height. Aquaria are stocked with Mollusca, Algæ, Confervæ, Crustacea, zoophytes, gold-fish, sticklebacks, minnows, and other fish, sea-anemones, etc. The presence of molluscous animals is necessary for the consumption of the vegetable matter which is about to decay and the numerous spores of the Confervæ, unless the water be continually renewed, as in the "fountain aquarium." No dead animal or decaying plant should be permitted to remain in the aquarium, the temperature of which should be kept between 50° and 70° F. (See P. H. Gosse, "Handbook of the Marine Aquarium," 1855. The great aquarium situated at the Jardin d'Acclimation at Paris is 50 yards long and 12 yards wide, and was constructed in 1860.

Aqua'rius [from the Lat. *a'qua*, "water"], the "Water-Bearer," is the eleventh sign of the Zodiac, into which the sun enters about the 20th of January. It is represented by ♒. Aquarius is also the name of a constellation which coincided with that sign at the time when the signs were named, but in consequence of the precession of the equinoxes it is now in juxtaposition with the sign Pisces.

Aquat'ic An'imals are those which live constantly in the water, as fishes, and those which frequent the water to swim on its surface or dive in search of food, as ducks and other web-footed birds, otters and beavers among quadrupeds, etc. Among the aquatic animals are the majority of the grand division of Mollusca; numerous tribes of the Articulata, as crabs, lobsters, and shrimps; and a large portion of the Radiata. Whales and dolphins are examples of aquatic animals of the class Mammalia. The total number of aquatic animals is greater than that of all terrestrial animals (exclusive of insects). Those which live partly on land, and cannot breathe under water, are called amphibious. The peculiarities of structure by which they are fitted for swimming, wading, etc. are very admirable. Some water-fowls have long legs for wading; others have webbed feet which enable them to swim with ease, and have waterproof plumage adapted to their mode of life. In aquatic animals of the higher vertebrate classes provision is made for the maintenance of the proper degree of animal heat by a coat of blubber, fur, or plumage, as in the case of otters, ducks, etc. The air-breathing animals that inhabit salt water have an organic structure greatly modified, and their extremities resemble the purely aquatic type more than the terrestrial.

Aquatic Plants, or **Water Plants,** a term applied to various vegetable organisms that grow either partially or entirely immersed in water. The latter mode of life is mostly confined to cryptogamous plants. Many phænerogamous plants which take root at the bottom of ponds, ditches, and running streams are called aquatic, although the flowers and leaves are raised above the water or float upon its surface. A primary distinction occurs between the plants that grow in salt water and those which grow in or near fresh water. The most of the plants which live in the sea belong to the division Algæ (which see). Among the cryptogamous plants that inhabit fresh water are the Confervæ. Aquatic plants have a less compact structure than most other plants, and are generally deficient in rigidity and firmness of stem. Some water-plants are furnished with air-bladders, which enable them to rise to the surface and float upon it. Besides those which grow in the sea, there are plants whose habitat is the sea-shore, and which require the influence of salt water. These are sometimes called saline or maritime plants. Among the aquatic plants growing in fresh water are the species of the orders Alismaceæ, Naiadaceæ, Ceratophyllaceæ, and Nymphæaceæ.

Aquatint. See Engraving, by Pres. M. B. Anderson.

A'qua Tofa'na, a secret poison, the invention of which is ascribed to a Sicilian woman, a notorious poisoner, named Tofana. She lived about 1650–1730. It is said that there was, about 1660, a society of young married women in Rome who used this aqua Tofana to poison their husbands. It was sold in vials marked "Manna of St. Nicholas of Bari." Some suppose it to have been a solution of arsenic.

A'qua Vi'tæ (*i. e.* "water of life"), [Fr. *eau de vie*], a Latin term applied to brandy, and sometimes to other ardent spirits.

Aquavi'va (Claudio), a son of the duke of Atri, born at Naples in 1543, was appointed Feb. 19, 1581, general of the Jesuits. His principal work is entitled "Ratio Studiorum" ("Method of Studies"), 1586. Died in 1614.

Aq'ueduct [Lat. *aquæduc'tus*, a "channel for conducting water"]. The name is applied more especially to artificial constructions for bringing water from a distance for the supply of cities, and to those bridges which serve to convey the water of canals of navigation and of irrigation, and of mill-races, at an elevation across deep valleys or streams.

As no very large city could exist without an abundant supply of water, we may assume that aqueducts were constructed very early in history. The Romans built many aqueducts, not only for Rome, but for their principal cities in Europe, Asia, and Africa, and the massive and picturesque ruins of the great bridges of these aqueducts are at once suggested to the scholar by the word "aqueduct."

Rome, the capital of the ancient civilization, was bountifully supplied with water by many aqueducts. Twenty are said to have existed in its period of greatest prosperity, bringing water from the hills and lakes of Italy from distances of from five to sixty miles. The greater part of the courses of all these aqueducts were subterraneous, but as the Romans were not as skilful in the working of metals as the moderns, as metal pipes were with them much more costly than masonry, and as cast iron was unknown, they were compelled to construct lofty bridges of stone and brick to conduct the channels of water at a regular slope or descent from the elevated ranges to the N. and E. of Rome across the wide and gradually descending slopes of the Campagna or country immediately surrounding the city. These bridges were generally built of rude masonry of brick or of rubble stones. The mortar was good, and the stone and brick, though rough, were durable. The masses, though not generally remarkable for their height, were in the aggregate immense, and hence, while the greater part of these constructions have perished, very considerable remains exist to this day.

Rome has never been without inhabitants, and the rulers of the city have from time to time repaired and utilized the different conduits, so that at the present day the city is amply supplied with water, the greater part of which is brought over ancient aqueducts repaired by the popes. The Appian aqueduct, attributed to Appius Claudius Cæcus, is said to have been completed 311 years before the Christian era, after the building of the Appian Way. Its length was about 6 miles, and it brought, by a devious course, to Rome the waters of a spring whose fountain-head was 5 miles from the city, near Rustica on the Via Collatina. The Aqua Augusta was at a later period added to this aqueduct. It supplied the most ancient portion of the town and the Transtiberine city.

The Anio Vetus was built B. C. 272 by Manius Curius Dentatus. It brought its supply from near Augusta in the valley of the Anio, 43 miles from Rome. It was almost entirely subterraneous, and the only fragment now visible lies below the road and under the Aqua Marcia, outside the Porta Maggiore.

The Aqua Marcia (B. C. 145), built by the prætor Quintus Martius Rex, was 37 miles long, of which 6 miles were on arches still visible, crossing the Campagna by the Frascati and Albano roads. This aqueduct is crossed by the Claudian aqueduct, which for some distance runs parallel to it. It has been restored, and the city is for its present population amply supplied with water.

Aqua Tepula (B. C. 126), the work of Cneius Servilius Cæpio and Cassius Longinus, is 10 miles long. Its channel or *specus* can still be seen at the Porta San Lorenzo and Porta Maggiore in connection with the channels of the Aqua Marcia and Aqua Julia.

Aqua Julia (B. C. 34), by Augustus, named in honor of Julius Cæsar, 12 miles long. Its water was brought to the city in a *specus* or conduit above the Tepula, and, like that, upon the arches of the Aqua Marcia, which thus brought the waters of three different sources separately to Rome. Its channel is still to be seen at the gate of San Lorenzo and at the Porta Maggiore.

Aqua Virgo, also by Augustus. Its source is said to have been pointed out by a young girl, whence its name. Its course is mostly subterraneous, about half a mile only being on arches. It was restored by Pope Nicholas V. as the Aqua Vergine, and it still supplies Rome with its cool water. The fountains in the Piazza di Spagna, Piazza Navona, and the magnificent fountain of Trevi are supplied by this aqueduct, as are many others. On the fountain of Trevi, the virgin pointing out the source to the soldiers sent by Augustus appears among many other marble reliefs and statues. This is perhaps the finest fountain in the world. An inscription, still legible, in a cellar of No. 12 Via del Nazareno, near the Palazzo del Bufalo, states that it was repaired A. D. 52 by Claudius, after having been disturbed by Caligula in the construction of his wooden amphitheatre.

Aqua Alsietina, 30 miles in length, built by Augustus; restored by Trajan, who added to its waters those of several springs along the hills to the W. of Lago Bracciano. Its original sources were around the smaller lake Alsietinus, now the Lago de Martignano. It was restored by Paul V., and now supplies the fountains of the great Piazza of St. Peter's and the magnificent fountain Paolina, and turns the wheels of many flour-mills on the slopes of the Janiculum. It is known indifferently as the Aqua Alsietina and the Aqua Paolina.

Aqua Claudia, built by Caligula and Claudius (A. D. 36 to 50). Its sources were near Agosta, about 38 miles from Rome. Its devious course was over 46 miles in length, of which 36 were below the surface and 10 miles were on arches. Six miles of arches stretching across the Campagna still attest the power and liberality of the Roman empire. Repaired by Septimus Severus, by Caracalla, and by Pope Sixtus V., its arches now bring to Rome the Aqua Felice from the springs near the Osteria dei Pantani, on the road to Palestrina. They supply the Fontana dei Termini, near the railroad dépôt in the Baths of Diocletian, the fountain of the Triton, that of Monte Cavallo, and some twenty-four others in different parts of the city.

Anio Novus, also by Claudius, from the forty-second mile of the Via Sublacencis. This was the longest of the ancient aqueducts, having a course of 62 miles, 48 of which were under ground. Its channel or *specus* is still visible above the Aqua Claudia on the arches of the Porta Maggiore. It is also visible at the Villa Braschi, near Tivoli, where it is nine feet high by four feet in width, but is choked up by a calcareous deposit, which encrusted, and finally, unless removed, obstructed the channels of many of these ancient aqueducts, especially those from the valley of the Anio.

It is estimated that Rome received daily 377,000,000 gallons of water. The Acque Vergine, Felice, Marcia, and Paola, having their sources in volcanic districts, supply a pure and delicious water, which does not obstruct its channels, and at this day they bring into Rome 160,000,000 gallons of water daily. By channels of masonry the water is led to fountains in every part of the city, and by pipes of metal and of burned clay it is distributed to most of the great houses or palaces, in each of which it flows constantly into a basin, frequently an ancient sarcophagus, of stone or marble. The water is rarely carried by pipes to the upper stories.

Rome being the capital of the civilized world for so long a time, its aqueducts were on a greater scale than any others, but the chief cities of the ancient world were supplied with water by aqueducts, many of which were built during the Roman domination.

During the Middle Ages also aqueducts were constructed, and the pointed arch of the Goths is seen in some of the existing remains. Among those most noted, generally lofty bridges of masonry forming part of the channels of true aqueducts, are those of Lyons, Nîmes, Segovia, Spoleto, Carthage, Constantinople, Lisbon, Marly, Caserta, Metz, Tarentum, and many others.

In modern times many aqueducts have been constructed. The New River of London and the Canal de l'Ourcq of Paris are true aqueducts. The new aqueduct of the Vanne is one of the supplies of Paris. The aqueduct of Roquefavour carries the water of the Durance to Marseilles; that of Loch Katrine supplies Glasgow.

Vienna has constructed an aqueduct to bring the water of two springs a distance of 59 miles. The conduit is of masonry, the channel itself varying in size from five feet eight inches by six feet to two feet nine inches by four feet, according to the slope, on which depends the velocity of the current. The sources are at a height of about 1000 feet, and the principal distributing reservoir is 277 feet above the site of the city. The supply is estimated at 24,000,000 gallons daily, or 24 gallons to each of 1,000,000 inhabitants. Whenever Vienna attains to this population it will appear that the supply is only one-fourth of that which modern civilized man requires.

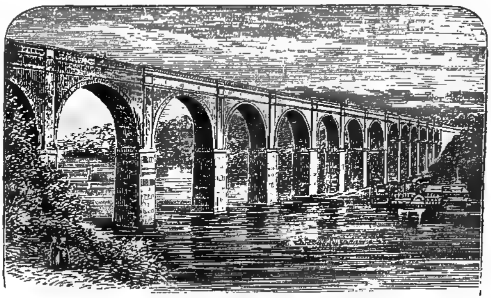
In the U. S. there has been of late years great activity in the construction of aqueducts for its rising cities. The city of New York has the Croton aqueduct, 50 miles in length. Boston has the Cochituate; Baltimore, that of Jones's Falls; and Washington, the Washington aqueduct.

Fig. 1 is a view of High Bridge (so called) over Harlem River, N. Y. The Croton Aqueduct passes over this bridge in three pipes, one wrought and two cast iron. The wrought iron is seven feet six inches in diameter, and the two cast iron are each three feet. The bridge is 1460 feet in length, having eight arches, in the river, of 80 feet span and 100 feet high, and seven others, of fifty feet span, on the two banks. The bridge is 116 feet above high-water mark.

The Washington aqueduct, which supplies the capital of the U. S., we select as one of the most recent and important examples of modern aqueduct construction for fuller illustration and description.

It is a circular conduit of brick and rubble masonry laid in hydraulic cement. Brick and stone were used indifferently in its construction, each section being built with the material which would be most easily and cheaply obtained. Its clear internal diameter is nine feet. Its descent or inclination is nine and a half inches to the mile. The length of the conduit from the Great Falls of the Potomac to the distributing reservoir is 11 miles; from the latter the aqueduct is continued by large iron pipes to the capitol, 5 miles. Its capacity is 70,000,000 gallons per day. Its construction is shown in ordinary ground (side-hill) by Fig. 4.

Fig. 1.

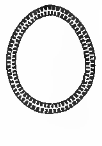


High Bridge, Harlem River.

It takes its water at the Great Falls from the Potomac River at an elevation of 150 feet above tide-water by a deep rock-cut passing under the Chesapeake and Ohio Canal (Fig. 5), to a gate-house (Fig. 5), furnished with gates and screens to regulate the flow of water and to exclude injurious substances. A dam raises the water of the river about six feet to the level of the aqueduct, 150 feet above tide. The aqueduct follows the valley of the Potomac, crossing the drainage of its left bank by six bridges and many culverts. It passes through several tunnels. A waste-weir permits any excess of water to escape before it can do injury to the conduit.

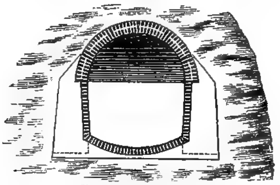
Its course is generally subterranean; embankments have been avoided wherever possible, as more liable to degradation and injury than a masonry conduit deep below the natural surface. There are four bridges under the conduit. Fig. 6 is the most important of these, the Cabin John Bridge or Union Arch, a granite arch of 220 feet span, the *longest* stone arch in existence. This bridge is 101 feet high and 20 feet wide. The water is delivered into the receiving reservoir, of about fifty-six acres, made by damming up the valley of Little Falls Branch. (Fig. 7.) Two miles farther on the aqueduct enters the distributing reservoir of forty acres by a gate-house. A branch of the conduit, seven feet only in diameter, leads around this reservoir for use when the reservoir is being cleaned.

Fig. 2.



Cochituate Aqueduct.

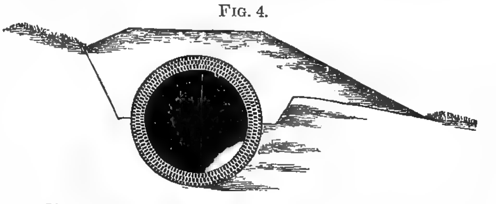
Fig. 3.



Croton Aqueduct.

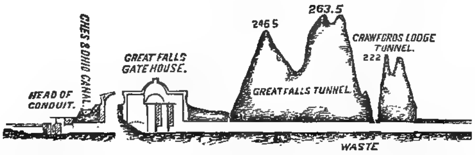
In Fig. 8 is a section of the tower, in which the branch terminates in a four-foot iron pipe, with regulating sliding iron gate. Fig. 9 is a profile of the outlet gate-house and screen-well, and of the subterranean vault in which are the stop-cocks and connections of the iron mains which convey the water into the cities. There are connections for four pipes of forty-eight inches diameter in this vault. There are now three mains laid, the original two, 30 and 12-inch, and a 36-inch main recently added, the cities having already outgrown the smaller ones laid fourteen years ago.

Fig. 4.



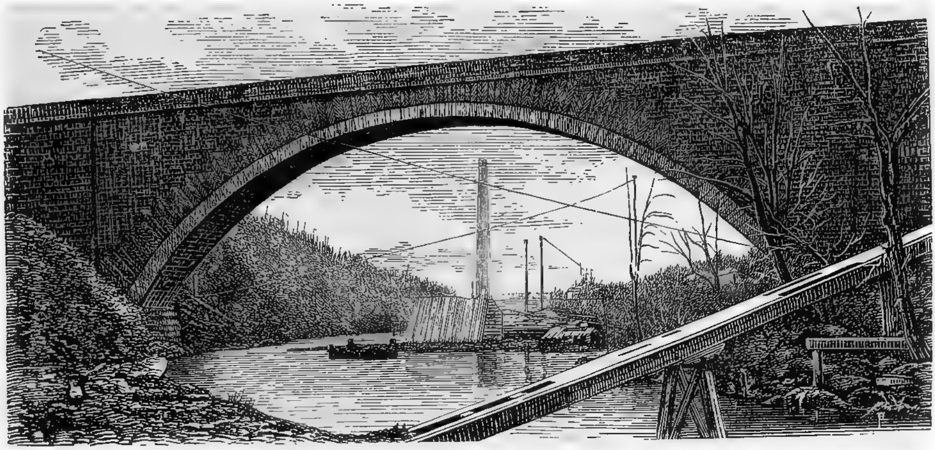
At College Branch two 30-inch mains, braced as in Fig. 10, cross a small inlet and valley by an arch of 120 feet span. Rock Creek is crossed by an iron bridge (Fig. 11) composed of two cast-iron pipes of four feet diameter, which serve as the ribs of an arch of 200 feet span and 20 feet rise. These pipes convey the water, and also support a platform bearing a road and railway track. This bridge, the College Branch, and the Cabin John bridge are unique. The highest portion of the streets of Washington is forty-five feet below the level of the reservoir; but a part of Georgetown is at a greater height than any part of the aqueduct. To supply this a circular reservoir covered by a brick dome (Fig. 12) has been constructed. It is supplied with water by a water-pressure engine situated in the vaults of the west abutment of the Rock Creek bridge, capable of pumping 10,000 gallons per hour into this reservoir, at a height of 220 feet above tide. It is worked by the pressure of water from the 30-inch main.

FIG. 5.



The aqueduct is capable of delivering 70,000,000 gallons per day. The three iron mains as yet laid, with 120 miles of small iron distributing pipes, which now supply 120,000 people, and are connected with 10,000 houses, are capable of bringing into the cities of Washington and Georgetown 30,000,000 gallons daily. The actual consumption of the cities is already 17,500,000 gallons in twenty-four hours.

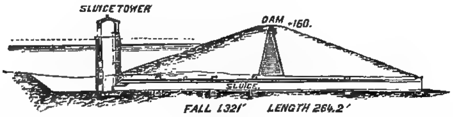
FIG. 6.



Washington Aqueduct: Cabin John Bridge (Union Arch), 220 feet span.

In California gold-mining the agent for the separation of the gold from the soil is water, and this has led to the construction of many large aqueducts, there called mining ditches. Some of these are 100 miles in length, and the ingenuity of their builders has made some veritable improvements in the science and art of hydraulic engineering. These aqueducts are generally open channels or ditches, which follow winding courses along the mountain-slopes, preserving regular grades, which are regulated by the necessity of the case, the limit being whatever the soil will bear without washing away. These grades are as high in some cases as thirteen feet to the mile. The channels are very crooked. Gulches, gullies, valleys, and streams are crossed by wooden troughs supported on trestles. These are estimated to last for about fifteen years. Deeper valleys are crossed by sheet-iron pipes. In one example a mining aqueduct brings to the mine, with a head of 300 feet, from 80,000,000 to 90,000,000 gallons of water daily. A valley is crossed by pipes of No. 14 to No. 16 gauge sheet iron—*i. e.* one-sixteenth of an inch in thickness—which are twenty-seven inches in diameter. These pipes are put together on the line of the work, the sheets, perforated with rivet holes, being brought into the mountains on wagons, and finally on pack-mules. They are bent to shape and riveted in place. The joints are slip-joints, like those of stove-pipe, and they are kept together against the pressure and shocks of the water by lashings of wire around lugs secured to the sheet iron.

FIG. 7.



Chopped straw is thrown into the water at the head, and soon packs all the imperfectly fitted joints and makes them water-tight. It is recorded that the Romans, who made much use of earthenware or terra-cotta pipes, used ashes in this way to stop all leaks. The cost of these 27-inch sheet-iron pipes is about $4 per foot, or $20,000 per mile. Many cities which hesitate to provide themselves with the best of all water-supplies—that by gravitation, natural flow—on account of the great first cost of the aqueduct, may profit by this California experience. While the wooden and sheet-iron pipes will not last as long as bridges of masonry and pipes of heavy cast iron, they will still last for many years, and the saving in interest upon the original capital needed for the more solid construction will not only keep them in repair, but rebuild them every fifteen years. The lighter constituents of the soil through which the aqueduct is carried as an open ditch or canal are soon removed by the current, leaving the bottom and sides of the channel protected by the gravel and pebbles, too heavy to be removed by the regular current, which remain and form a covering for the softer and lighter soil. Aqueducts thus constructed may be built for $15,000 to $20,000 per mile, and thus bring ample and cheap supplies of water to many cities which now depend upon steam-engines and a daily expense of fuel for scanty supplies of this precious element.

It has been customary in America to estimate twenty-eight to thirty gallons per day for each inhabitant, old and young, as a sufficient supply for a great city. But the experience of all those in which aqueducts have been in use for twenty years shows that in the U. S. the supply should not be less than 100 gallons per head per day. This consumption is reached in Boston, New York, Philadelphia, and Washington, and, where the works afford it, it promotes health and contributes to cleanliness, to pleasure, and to safety. It is better that this quantity be assumed in all projects for building aqueducts.

FIG. 8.

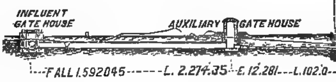
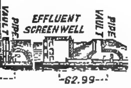


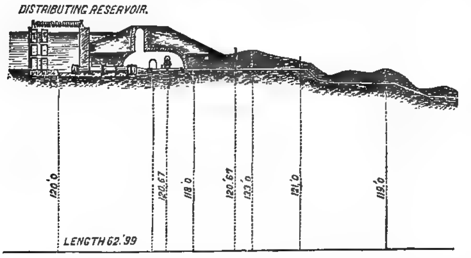
FIG. 9.



We have seen that the cross-sections of the *specus* or channel of the Roman aqueducts were generally rectangular. In modern times a great variety of forms have been used—rectangular, two-side walls with flat floor and roof; curved floor and arched roof, with vertical sides; oval, or egg-shaped, with the smaller end of the oval at the bottom; and finally circular.

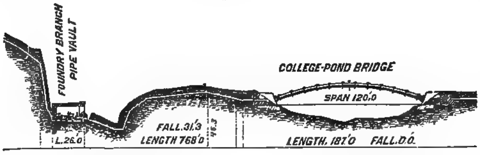
As the circle is that geometrical figure which with the least circumference encloses the greatest area, it follows that in lining with masonry a channel cut through the earth the circular form will convey the most water with the least masonry. Moreover, this form gives the channel with the least wetted perimeter. As it is at the surface of contact of the water and its channel that friction occurs, the flow of the water will be less retarded by friction in a circular channel than in any other of the same capacity. Therefore, in building a covered channel for conveyance of water this form will generally be found the best and cheapest.

Fig. 9,—*continued.*



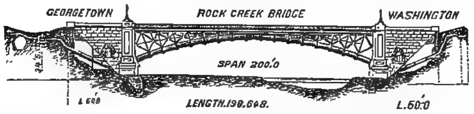
Bricks or flat rubble stones are laid with great rapidity into the form of a circular conduit. The excavation in the earth is cut carefully at the bottom to the form of a semi-cylinder to receive the masonry, which is laid in hydraulic mortar simply upon the earth, until the lower half cylinder of masonry is formed. Then two portable wooden centres, each of which is one quarter of the cylinder, are placed in position on props of wood, and the upper half of the conduit is laid as an arch upon them. The inside of the pipe is to be plastered with mortar of hydraulic lime and sand, and, the whole being covered to a proper depth, we have a conduit which will serve for ages, and is liable to no decay or destruction except by earthquakes or waterspouts, which may break it open or wash it away.

Fig. 10.



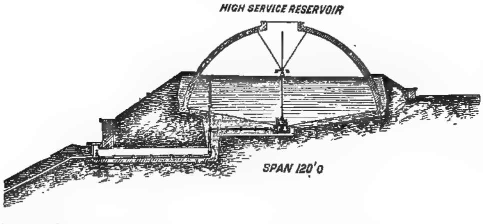
As the cost of the excavation and construction of the conduit is but a part of the aggregate cost of an aqueduct, it is wise in all such constructions for cities and villages to at first make the conduit itself large enough to convey all the water of the source. The conduit should also in any case be large enough for a man to pass through conveniently, for the purposes of cleaning it and repairing any cracks, which in long lines of masonry resting upon soils of different natures will occur from settlement of the soil and from expansion and contraction of the masonry itself.

Fig. 11.



When the source of supply is a great river or lake, the conduit should be built to convey more water even than 100 gallons a day for each inhabitant. Cities continually increase, and while at present this quantity appears to be enough for actual needs, the greatest abundance of water flowing through the fountains and cleansing the streets, courts, and drains of a city adds to the health, the pleasure, and comfort of the people. There is scarcely a city in the U. S. which in the course of twenty years has not found its aqueduct insufficient for its wants.

Fig. 12.



We defer till we treat of water-supply of cities remarks upon the reservoirs and pipes for the distribution through them of the water brought by the aqueduct from the source to their confines, noting only that the modern practice makes reservoirs much more extensive and capacious than the ancient. The Romans brought large supplies through aqueducts of rapid flow. A small portion only was stored in reservoirs, generally of masonry covered with arches, and the surplus was allowed to flow out through great fountains and cascades in constant streams. The moderns provide large reservoirs in which the water not used is stored up to compensate during periods of scarcity for the scanty supply of the original source. These reservoirs are sometimes covered with brick arches, as in London, but generally they are open ponds or lakes of many acres. The magnificent covered reservoirs, such as that for the Roman fleet at Baiæ, and the arched reservoirs of Constantinople, supported on stone columns, are no longer constructed. They remain among the most stately monuments of the Roman empire. (See WATERWORKS, by J. P. FRIZELL, C. E., and WATER-SUPPLY, by PROF. C. F. CHANDLER, Ph.D., M. D., LL.D.) M. C. MEIGS.

A'queous Hu'mor. See EYE.

Aqueous Rocks, a geological term synonymous with sedimentary rocks, is applied to rocks and strata which have been formed by the agency of water, and have been deposited at the bottom of seas and lakes. The materials of these strata were partly derived from the disintegration of older rocks, which, being reduced to particles of small size, have been carried along the rivers in the form of mud, sand, and sediment, and deposited in the sea. Humphreys and Abbott estimate that the Mississippi conveys into the Gulf of Mexico annually an amount of silt equal to a mass one square mile in area and 241 feet in depth. The waves of the sea also, dashing continually against the shores and undermining the rocks, contribute to this process of erosion and disintegration. Some aqueous rocks, as chalk and limestone, are formed by the accumulation of the calcareous shells of marine animalcules, called Foraminifera. Other strata of the carboniferous formation which are of vegetable origin are included among the aqueous rocks, which in reference to their composition are distinguished as arenaceous, argillaceous, calcareous, carbonaceous, and saline. The rocks termed metamorphic are now generally regarded as aqueous in their formation. (See LITHOLOGY and ROCK.) (For further information about these rocks the reader is referred to the articles on the Silurian, Devonian, Carboniferous, Cretaceous, Oolitic, Triassic, Eocene, Miocene, and Pliocene formations.)

Aqui'a Creek, in the eastern part of Virginia, flows south-eastward through Stafford county, and enters the Potomac River. It is navigable for schooners. It is also the name of a station on a branch of the railroad from Washington to Richmond, on the Potomac River, 75 miles N. of Richmond.

Aquifolia'ceæ [from *Aquifo'lium*, a former name of the holly], a natural order of exogenous plants, all trees or shrubs with simple leaves, and mostly natives of America. The ovary is superior, with two or more cells, each of which contains a solitary anatropal ovule, and generally becomes bony as a stone in the fruit, which is fleshy. Among the species of this order is the holly (*Ilex*). The flowers are white or greenish, and the species are quite numerous in the U. S.

Aq'uila ("the Eagle"), a constellation of stars near the equator, and on its N. side.

A'quila, a fortified town of Italy, capital of the province of Aquila, is situated on the Pescara, near the Apennines, 58 miles N. E. of Rome. It is well built, and has a cathedral and numerous churches. Here are manufactures of paper, linen, and wax. It was much injured by earthquakes in 1688, 1703, and 1706. Aquila was built by the emperor Frederick II. about 1240, on or near the site of the ancient *Amiternum*. It contains a citadel built in 1534, and has a large trade in saffron, which is extensively cultivated in the surrounding territory. Pop. in 1881, 18,426.

Aquila, a province of Italy, formerly called Abruzzo Ulteriore II., is bounded on the N. E. by Ascoli, on the E. by Teramo and Chieti, on the S. by Campobasso and Caserta, on the W. by Rome and Perugia, and on the N. W. by Perugia. Area, 2510 square miles. The chief products are grain, vegetables, rice, wine, oil, and fruits. Pop. in 1879, 356,371.

Aquilaria'ceæ [so called from *Aquila'ria*, one of the genera], a natural order of exogenous plants, all of which are trees and natives of the tropical parts of Asia. The leaves are entire; the perianth coriaceous, turbinate, or tubular; the stamens usually ten; the ovary 2-celled, with two ovules; the fruit a drupe or capsule. The order comprises only ten known species, one of which produces the fragrant ALOES WOOD (which see).

Aquile'ja, Aquileia, or **Aglar,** an old town of Austria, in the Littoral provinces, near the Adriatic or Gulf of Venice, with which it is connected by a canal, is 22 miles W. N. W. of Trieste. During the Roman empire it was an important city, was called the second Rome (*Roma Secunda*), and was the chief emporium of the trade between the north and south of Europe. The emperor Augustus often resided here, and here were held several councils of the

Church, the first of which was in 381 A. D. The bishops of Aquileja in the sixth century took the title of patriarch, and assumed the rank next to the pope. Aquileja was burned by Attila in 452 A. D., at which time it is said to have had 100,000 inhabitants. Pop. in 1880, 2152.

Aqui'nas (THOMAS), SAINT, a celebrated scholastic doctor and theologian, surnamed THE ANGELIC DOCTOR, was born in the kingdom of Naples in 1227. He was a grandnephew of the emperor Frederick I. Barbarossa. About 1243 he joined the order of Dominican monks, and became a pupil of Albertus Magnus. After he had studied theology and scholastic philosophy, he began to teach and preach at Paris with great applause. Having acquired a European reputation by his talents and learning, he left Paris in 1261, and was induced by Pope Urban IV. to remove to Rome, where he taught philosophy. He was distinguished for his modesty, and refused the offer of a bishopric, but he had great influence in the Church. The greatest of the schoolmen were the Dominican Thomas Aquinas and the Franciscan Duns Scotus. They were founders of rival sects, which wrangled with each other for two or three centuries. Aquinas wrote a number of works, the most important of which is his "Sum of Theology" ("Summa Theologiæ"), which was regarded as the most complete compendium of scholastic divinity. He died at Fossanuova, in Naples, 1274. His disciples were called Thomists. Aquinas was a great admirer of the philosophy of Aristotle. He was canonized in 1323. (See RENN D. HAMPDEN, "Life of Thomas Aquinas," 1848; MAFFEI, "Vita di Tommaso d'Aquino," 1842; THOLUCK, "Dissertatio de Thoma Aquinate," 1842; P. S. CARLE, "Histoire de la Vie et des Écrits de Thomas d'Aquin," 1846; "Philosophie de Thomas d'Aquin," par CHARLES JOURDAIN, Paris, 1857; "The Life and Labors of S. Thomas of Aquin," by the Very Rev. ROGER BEDE VAUGHAN, 2 vols., 1871–72. See DUNS SCOTUS.)

Aquita'nia [Fr. *Aquitaine*], the ancient Latin name of the most south-western of the three divisions of Gaul. It originally included the country between the Pyrenees and the Garonne, but Augustus added to it the territory between the Garonne and the Loire. The ancient inhabitants were Iberian tribes. In the fifth century the country was conquered by the Visigoths, and thus brought in close connection with Spain. It was taken from the Goths and added to the possessions of the Franks by Clovis. It was an independent duchy under the feeble princes of the Carlovingian dynasty, and became an English possession in 1152 by the marriage of Henry II. with Eleanor of Guienne, who was the heiress of the duke of Aquitaine. It was united to France in 1451.

Arabesque, ăr-a-bĕsk', signifies "in the Arabian style or manner." It is applied to the fantastic decoration which was profusely employed in the architecture of the Arabs or Moors in Spain. As employed by the Arabs, it consisted of infinitely diversified combinations of curved and straight lines, and imaginary foliage and flowers, curiously intertwined with other vegetable forms. Among the most beautiful specimens of Moorish arabesques are the decorations of the famous palace of the Alhambra. The name arabesque was applied to this mode of decoration because it had been long known and admired in the works of the Arabs before the discovery of the beautiful paintings in the Baths of Titus, by Raphael and his pupil Giovanni da Udine, made the world acquainted with a magnificent specimen of Roman work in the same style. The early Italian painters and sculptors, however, had always taken delight in this style of decoration, as they found it in the antique Roman sculpture, where scrolls, flowers, fruit, and leaves are mingled with animals and genii. Raphael painted his famous arabesques in the Loggie of the Vatican in direct imitation of the frescoes on the Baths of Titus. He was largely assisted by Giovanni da Udine. CLARENCE COOK.

Arabgir', or **Arabkir',** an important city of Asia Minor, on the Arabgir-Su, and on the road from Aleppo to Trebizond, 100 miles E. S. E. of Siwas. It has considerable trade, and a large community of Protestant Armenians. Pop. estimated at from 25,000 to 30,000.

Arabi. See ARABI PASHA.

Ara'bia [Arab. *Jezee'ret* (or *Jeziret*) *-el-A'rab*, *i. e.* the "isle or peninsula of the Arabs;" Turk. and Pers. *Arabistan;* Lat. *Ara'bia*], a peninsula forming the extreme S. W. part of Asia, is encompassed by the sea on all sides except the N. It is bounded on the N. by Asiatic Turkey, on the N. E. by the Persian Gulf and Sea of Oman, on the S. E. by the Indian Ocean, and on the S. W. by the Red Sea. It extends from lat. 12° 35' to 34° N., and from lon. 32° 10' to 59° 40' E. Its area is now estimated at 967,856 square miles. It is connected with Africa by the Isthmus of Suez at the N. W. corner. The Euphrates forms a part of the N. E. boundary of Arabia, the southern part of which is included in the torrid zone. The topography of the interior of this peninsula is imperfectly known to European geographers. We know, however, that it is generally arid and sterile, destitute of forests, has no large rivers, and few permanent streams. The surface is diversified by hills of naked rock, plains of sand, and ranges of mountains of no great elevation. The central part of Arabia appears to be occupied by an elevated table-land. A long range of mountains extends through the W. part nearly parallel with the Red Sea, from which it is not more than eighty miles distant, and in some parts less than that. The peaks of these mountains are from 5000 to 8000 feet high. In the vicinity of the mountains, and of the torrents which flow from them, are a number of fertile valleys called *wadys*. Among the remarkable features in the geography of Arabia is Mount Sinai, which is 7497 feet high. Ancient and foreign geographers divided this country into three parts—namely, ARABIA FELIX, the Happy; ARABIA PETRÆA, the Stony; and ARABIA DESERTA, the Desert. The first comprises the south-eastern part, bordering on the Persian Gulf, the Indian Ocean, and part of the Red Sea; Arabia Petræa includes the north-western part, bordering on the Red Sea; and Arabia Deserta, the interior and northern portions. According to the native geographers, the principal divisions are—1, Hedjaz, or Hejaz, which extends along the Red Sea from lat. 19° N. to 29° N., and is bounded on the N. E. by the desert; 2, Yemen, which borders on the Red Sea, and extends from Hejaz to the Strait of Bab-el Mandeb, and along the Gulf of Aden to Hadramaut; 3, Hadramaut, a large tract bounded on the S. E. by the Indian Ocean; 4, Oman, which extends from the Persian Gulf to the Indian Ocean, and borders on the Sea of Oman, being bounded on the W. by the desert; 5, Lahsa (El Achsa), or Hadjar, which extends along the Persian Gulf from Oman to the mouth of the Euphrates; 6, Nej'd or Nedjed, the central desert region, nearly coinciding with Arabia Deserta. The climate is hot and extremely dry. Muscat and Mocha, both on the sea-coast, are among the hottest inhabited spots on the earth. The temperature of the plains is often 100° in the shade. In many parts of Arabia rain never falls in the course of the year, and the sun is rarely obscured by a cloud. On the coasts of the Red Sea there is a rainy season of two or three months in summer, but on the southern or south-eastern coast the scanty supply of rain falls in the winter, so that the hottest months of the year are also the driest. To the extreme dryness of the atmosphere may be ascribed the remarkable degree of cold sometimes felt in Arabia, for ice and snow frequently occur on mountains ranging from 6000 to 8000 feet in height in the part of the peninsula which is in the torrid zone. Among the remarkable phenomena of the climate is a hot south wind called *simoom*, the poisonous quality of which has been exaggerated by travellers. The soil, where it is irrigated, produces cotton, coffee, indigo, tobacco, tamarinds, the date-palm, barley, rice, sugar, and many aromatic plants. The flora of Arabia comprises the characteristic plants of its neighboring countries. Among the wild plants are the mimosa, the Euphorbiaceæ, lavender, jasmine, the aloe, and the trees which yield gum-arabic and olibanum. The animal kingdom is here represented by the camel, the antelope, the ibex, hyena, wolf, jackal, wild-ass, wild-boar, the jerboa, monkey, ostrich, eagle, etc. The Arabian horse is celebrated, and perhaps unrivalled, for docility, endurance, beauty, and speed. Among the mineral resources of Arabia are copper, iron, lead, coal, emeralds, carnelians, agate, onyx, alabaster, marble, sulphur, and saltpetre. Few nations of the world have been more nearly stationary or have made such little progress in industrial arts. The division of the Arabs into numerous independent and unsettled tribes, with consequent absence of national unity, is a great obstacle to their improvement and organization. The government is neither a monarchy, a republic, nor an aristocracy, but each tribe is subject to a chief called an emir, sheik, or imâm. Having the advantage of occupying the coasts between India on the east and Africa and Europe on the west, the Arabs distribute the cotton goods of India among the peoples of Africa, and carry back ivory, gums, dyewoods, etc. Merchandise is conveyed across the deserts by large caravans of camels, which are styled "the ships of the desert." The principal exports of Arabia are dates, coffee, gum-arabic, myrrh, aloes, pearls, balsam, and other drugs. The population, formerly estimated at from 10,000,000 to 15,000,000, amounts, according to the recent calculations, to only 4,000,000, and is divided into two classes—the nomadic Bedouins, who have no habitations but tents, and have loose notions of the rights of property; and agricultural and mercantile Arabs, who live in towns and villages. The chief towns are Mecca, Medina, Loheia, Mocha, Aden, Muscat, Yembo (or Yambo), and Rostak.

History.—Owing to its desert character, Arabia was never touched by any of the great conquerors of ancient times.

After the death of Alexander the Great, the Arabians conquered a part of Chaldæa, and founded the empire of Hira. Another tribe founded the empire of the Ghassanides, on the river Ghassan. In 107 A. D. the Roman emperor Trajan was the first to penetrate to the interior. With the advent of Mohammed the different tribes began to unite and act in concert, and, leaving their peninsula, founded large and powerful empires in three continents. (See MOORS and CALIPHS.) At the time of the conquest of the caliphate of Bagdad in 1258, and the expulsion of the Moors from Spain in 1492, the Arabian rule in Europe and Asia Minor came to an end. In the sixteenth century the Turks conquered Yemen, but were driven back in the seventeenth, but again gained the nominal authority over the holy cities and Hejaz. From 1508 to 1609 Muscat was subject to Portugal. The most important event of recent times in the internal history of Arabia is the advent of the WAHABEES (which see) in 1770, and their defeat by Mehemed Ali in 1811. At present, the only European power having possessions in Arabia is England, which has taken possession of Aden. In consequence of an attack made on the Christians in Djidda in 1858, the city was bombarded by the British. (See CRICHTON, "History of Araby," 1852; SEDILLOT, "Histoire des Arabes," 1854; MÜLLER, "Beiträge zur Geschichte der westlichen Araber," 1868; WEIL, "Geschichte der islamitischen Völker," 1868; MALTZAN, "Wallfarth nach Mekka," 1865; WREDE, "Reisen in Hadhramaut," 1870, and the accounts of NIEBUHR, BURCKHARDT, BURTON, PALGRAVE, and others.) A. J. SCHEM.

Ara'bian Ar'chitecture, a style sometimes called MOORISH, originated almost simultaneously with the Mohammedan religion, and followed the progress of that religion into Eastern Europe, Spain, and Africa. The early temples or mosques of the Moslem Arabs were modifications of Byzantine architecture. The most peculiar and original feature of the Arabian architecture is the horseshoe arch. The pointed arch was also very extensively used by the Moors or Saracens. Among the finest specimens of Arabian style is the ALHAMBRA (which see).

REVISED BY CLARENCE COOK.

Arabian Language and Literature. The Arabic belongs to what is termed the Semitic (or Shemitic[*]) family of languages, and is closely related to the Hebrew, which it resembles in its general grammatical structure, as well as in the form of many of its words. Like the Hebrew, it is written from right to left, and like it, also, the vowels are not written in the body of a word or name, but are indicated (if indicated at all) by certain marks placed above or below the consonants to which they belong (see 29). The alphabet consists of twenty-eight letters, as follows:

	Unconnected.	Final Connected.	Medial.	Initial.	Name.	Power.
1.	ا[†]	ـا	ـا	ا	alif,	
2.	ب	ـب	ـبـ	بـ	bâ,	b.
3.	ت	ـت	ـتـ	تـ	tâ,	t.
4.	ث	ـث	ـثـ	ثـ	thâ,	th.
5.	ج	ـج	ـجـ	جـ	jeem or jîm,	j.
6.	ح	ـح	ـحـ	حـ	Hâ,	H.
7.	خ	ـخ	ـخـ	خـ	khâ,	kh.
8.	د[†]	ـد	ـد	د	dâl,	d.
9.	ذ[†]	ـذ	ـذ	ذ	dhâl,	dh.
10.	ر[†]	ـر	ـر	ر	râ,	r.
11.	ز[†]	ـز	ـز	ز	zâ,	z.
12.	س	ـس	ـسـ	سـ	seen or sîn,	s.
13.	ش	ـش	ـشـ	شـ	sheen or shîn,	sh.
14.	ص	ـص	ـصـ	صـ	sâd,	s or ss.
15.	ض	ـض	ـضـ	ضـ	dsâd,	ds or dh.
16.	ط	ـط	ـطـ	طـ	tâ,	ṭ.
17.	ظ	ـظ	ـظـ	ظـ	dza,	dz or dh.
18.	ع	ـع	ـعـ	عـ	ain (å'in or īn),	‡
19.	غ	ـغ	ـغـ	غـ	ghain (gå'in or gīn),	‡
20.	ف	ـف	ـفـ	فـ	fâ,	f.
21.	ق	ـق	ـقـ	قـ	ḳâf,	ḳ
22.	ك	ـك	ـكـ[§]	كـ	kâf,	k.
23.	ل	ـل	ـلـ	لـ	lâm,	l.
24.	م	ـم	ـمـ	مـ	meem or mîm,	m.
25.	ن	ـن	ـنـ	نـ	noon or nûn,	n.
26.	و[†]	ـو	ـو	و	waw,	w.
27.	ه	ـه	ـهـ	هـ	hâ,	h.
28.	ى	ـى	ـيـ	يـ	yå,	y.

1. ا at the beginning of a word is sounded variously, according to the vowel-points upon it (see the paragraph on Vowels given below); in the middle of a word it is sounded as *a* long, as in باب (*bâb*), a "gate."

2. ب sounds like *b* in English.

3. ت has the sound of the Spanish *t*, which is pronounced by placing the tip of the tongue against the upper teeth.

4. ث sounds like our *th* in *thin*.

5. ج is usually pronounced like the English *j*, though in some dialects (for example, in that of Egypt) it has the sound of our *g* hard.

6. ح sounds nearly like the German *ch* in *ach*, but it is formed lower in the throat.

7. خ sounds like the German *ch* in *ach*, *doch*, etc. It is usually represented in the French and English languages by *kh*, and in the German by *ch*.

8. د nearly resembles in sound the English *d*, but, in pronouncing it, the tip of the tongue is placed against the teeth. It may be said to bear the same relation to our *d* that the Spanish *t* does to our *t*.

9. ذ has no exact equivalent in any European language, though it resembles the sound of our *th* in *thy*. It is often represented by *dh*, and sometimes by *ds*, *dhs*, or simple *d*.

10. ر sounds like the French or Italian *r*, or like *rr* in the English word *terror*.

11. ز has the sound of *z* in English.

12. س sounds like our *s* in *this*.

13. ش is like the English *sh*.

14. ص sounds nearly like the English sharp *s*; but, in pronouncing it, the teeth are not brought so nearly into contact. It is sometimes represented by *ss*, or by *ç*.

15. ض has no equivalent in any European language. It is variously represented by *dz*, *dh*, *dd*, and *ds*.

16. ط is in sound nearly like the English *t*, but is pronounced somewhat harder. It is commonly represented by *t* or *tt*, and often, especially by German writers, by *th*.[‖]

17. ظ somewhat resembles ض in sound. It cannot be represented by any English letter or combination of letters.

18. ع has no exact equivalent in any European tongue. It nearly corresponds to the Hebrew ע. In the hiatus produced in uttering å—å in quick succession, we make a sound similar to the Arabic *ain*, but the latter is formed lower in the throat.

19. غ has no equivalent in English. It bears nearly the same relation to hard *g* that *kh* does to *k*. It is sometimes represented by *g*, but more frequently by *gh*, especially by French and English writers.

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[*] A term derived from Shem, the eldest son of Noah.

[†] The letters thus marked ought never, according to the rules of Arabic orthography, to be connected with those that follow them.

[‡] These letters have in sound nothing like them in English.

[§] Written, also, ﻜ.

[‖] In such cases *th* is not intended to indicate a sound like *th* in English or the Greek *θ*, but rather one similar to that of the Hindoo *th*.

20. ف has the sound of our *f*.

21. ق is similar to our *k*, but is formed lower in the throat. It is sometimes represented by *ḳ* (with a dot under it), and sometimes by *q*.

22. ك in sound is exactly like our *k*.

23. ل is like the English *l*.

24. م is pronounced like our *m*.

25. ن is in sound like the English *n*.

26. و, as a vowel, is equivalent to ōō or û; as a consonant, it sounds like the English *w* or *v*.

27. ه sounds like our *h;* when final, it is nearly silent.

28. ى, as a vowel, sounds like *ee* (or î), in which case a *kasra* is implied or expressed; as a consonant, like *y*. In the middle of a word the sound of ى may be doubled by means of the *tashdeed*, which, in writing, is often omitted. Preceded by *fatha* (see Vowels below), this letter assumes the sound of our long ī, and is represented by *ai*.

☞ All the foregoing characters are regarded by Arab grammarians as consonants. Alif has been compared to the soft breathing (*spiritus lenis*) of the Greeks; Ain is a similar breathing, though the place of its formation is lower in the throat.

VOWELS.

29. In Arabic the true vowels are three. They are called —1. *Fat'ha* (*a**); 2. *Kas'ra* (*i*, sometimes ĕ); and 3. *Dhamma* (*oo* or *u*†). Fatha is written over the consonant to which it belongs, thus ـَ; kasra is placed beneath its consonant, thus ـِ; dhamma (which is in fact a minute و) is written over its consonant, thus ـُ. These vowels are always joined to the consonant which in pronunciation they follow: thus, in قَلَم (kălăm), a "reed" or "pen," the first fatha is considered to belong to the *kâf*, over which it is placed, the second to the *lâm* (not to the *meem* which comes after it); and so in all similar cases: it necessarily follows that no vowel can stand by itself.‡ Hence, if we wish to write an initial short fatha, it must be associated either with *alif* or *ain*, as أَحَد (ăhăd), a "unit," عَفُو (ăfû), "forgiveness." If we would write a short initial kasra or dhamma, we must begin the word in the same manner: *e. g.*, إِبْن (ĭb'n), a "son," عِبَاد (ĭbâd), "servants," أُف (uf or ŏŏf), "fie!" عُبُور (ubûr or ŏŏbōōr), a "passage" or "crossing."

30. If any one of the simple vowels is joined to an ordinary consonant, or to an initial *alif* or *ain*, it is generally short, as will be seen from the foregoing examples; but if in any syllable *not initial* they are joined with any of the (so-called) consonants (*alif*, *ain*, *waw*, etc.) to which they naturally correspond, they become long: thus, fatha with *alif* or *ain* gives us the sound of *â*, as بَاب (bâb), a "gate," بعد (bâd or bå-ạd), "after;" so kasra with *yâ* gives the sound of î (or *ee*), as سِين (seen or sîn), the name of the letter س; so also dhamma with *waw* gives the sound of û or ōō, as نُون (nûn or nōōn), the name of the letter ن. It should be observed that the fatha or dhamma is not written *on* the *alif* or *waw*, nor the kasra *under* the *yâ*, but is joined to the previous consonant, the semi-consonants coming after, for the sole purpose, it would seem, of prolonging the vowel.§ In order to indicate the sound of *â* at the beginning of a word, it is usual to place a circumflex over the *alif*,—thus, آ. The initial long *i* (*î* or *ee*) is represented by إِي, and long *u* (*û* or *ōō*) by أُو.

The vowels are usually omitted in Arabic manuscripts, and they are scarcely needed by the native Arabs, who are already familiar with the language; but they are of the utmost importance to foreigners in learning Arabic. The same may be said of the jăzm or jĕzm (ْ), a mark placed upon a consonant to show that it has no vowel following it, as أَزْرَق (ăzrăk, "blue," which without the jăzm might be pronounced ăzărăk), and the tashdeed or tashdîd (ّ), placed on a consonant to show that it is to be doubled in pronunciation; as مُحَمَّد (Mohammed).

It is proper to observe that when the Arabic article *al* or *el* is followed by certain letters, the sound of the *l* is changed to that of the letter following; thus, *el-Deen* becomes *ed-Deen; el-Dowlah, ed-Dowlah; al-Rahman* or *el-Rahman, ar-Rahman* or *er-Rahman; al-Temeemee, at-Temeemee;* and so on.

The Arabic characters are supposed to have been derived from the Syriac, and to have been introduced into Arabia by Christian missionaries before the time of Mohammed. The oldest form is called the Cufic (or Kufic), from Koofa, a town in the Euphrates, where it is said the transcription of the Koran was extensively carried on. These characters were extremely rude and coarse, and, being only sixteen in number, could but very imperfectly represent the twenty-eight consonant sounds of the Arabic tongue. In the tenth century they were replaced by the *neshki* characters, as they are called, which are still in use. At present the Cufic letters are scarcely to be met with, except in ancient inscriptions or in the books of antiquarians.

Of the Arabic tongue there are two principal dialects—namely, the northern or prevailing dialect, in which the Koran is written, and the southern, which included the Himyaritic, originally spoken in Yemen and the extreme southern portion of Arabia. The Himyaritic (a term derived from Himyar, an ancient king of Yemen) is supposed to have been the basis of the Ethiopian language.

The Arabic is one of the most extensively diffused languages in the world. It not only prevails in Arabia, in Syria, and in a part of Mesopotamia, but it is spoken in its various dialects (which are more or less corrupted) throughout a large part of Northern Africa, from the shores of the Atlantic to the Red Sea. The language is spoken with much purity in Egypt, which, since its conquest during the caliphate of Omăr, in 640 A. D., has been one of the principal centres of Arabian culture. From about the ninth to the twelfth or thirteenth century it was the prevailing tongue of a large part of the Spanish Peninsula, and its traces are still seen not merely in many of the names, but in the language, of Spain at the present day.

ARABIAN LITERATURE is very rich, especially in poetry and other productions of the imagination. Even before the time of Mohammed, the Arabs had celebrated poets, who sang the praises of heroes and the charms of beautiful women. During the great fairs at Mecca poetic contests were held in much the same manner as at the games of ancient Greece, and the poems which received the prizes were, it is said, written out in golden characters, and suspended in the Kaaba (Caaba) at Mecca, the famous temple which was said to have been built by Ishmael. From this circumstance they are called Mo'allakât (معلقات) —that is, "suspended."

Among the Arabian poets, Mohammed is admitted to hold, beyond all comparison, the highest place. His followers were wont to refer their opponents to the sublimity and beauty of the Koran as an unanswerable proof that its author was divinely inspired.

It may be said that, with perhaps the exception of Mohammed, the Arabs have had no poet of the highest class, nor have they produced any great epic, or any drama worthy of the name. It is in lyric and romantic composition that they most excel.

There is one kind of poetical fiction, called "Assemblies" (Arab. Makâmât مقامات), which may be said to be peculiar to Arabic literature. The "Assemblies" may be regarded as the first step towards dramatic composition. The author of this species of writing was Hamadânee (or Al-Hamadânee), who flourished towards the close of the tenth century. He imagined a witty and unscrupulous improviser wandering from place to place, and living on the presents which the display of his marvellous talents procured from his hearers, and a narrator, or story-teller, who should be continually meeting with the other, should relate his adventures and repeat his excellent improvisations. He gave to these compositions the name of "Assemblies," because the improviser was always introduced as making his appearance in some company or assembly of strangers, where the narrator also happens to be, and is sure to be greatly astonished at the tricks, wit, and genius of the other, which he afterwards relates in his own language, and these relations constitute the "Assemblies" as they are presented to us. Of this species of composition the "Assemblies" of Hareeree (Harîrî) furnishes, perhaps, the best specimen. Hareeree is regarded by the Arabs as a consummate master of diction, and the highest authority in the use of language. "For more than seven centuries," says a recent writer, "his work (the 'Assemblies') has been esteemed as, next to the Koran, the chief treasure of the Arabic tongue. Contemporaries and posterity have vied in their praises of him. His 'Assemblies' have been commented on with infinite learning and labor in Andalusia and on the banks of the Oxus." (See Introduction to the "Assemblies of Al-Harîrî," translated by T. Chenery, London, 1867.)

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*Often represented by *e*, and sometimes (in English) by *u* short.

†Often represented by *o*, as in the name of Mohammed.

‡It may be remarked as an apparent exception to this rule that Ibn, "son," is often written simply بن (*bn*); but this is usually to be considered as an abbreviation for إبن, though *ben* or *bin* is not unfrequently used instead of the longer form *ibn*.

§The long vowels in Arabic are to be pronounced very full and long, especially the long *a*, which is not only longer, but somewhat broader, than our *a* in *far*.

In romance especially the Arabs may be said to excel. Among the works of this class we may name the "Feats of Antar," the stories or fables of Ibn Arabshâh, etc. But perhaps the most universally popular, not merely of Arabian fiction, but of all fiction of which we have any knowledge, is the famous collection of tales known as the "Arabian Nights" (which see).

In philosophy, mathematics, history, geography, medicine, and physics, the Arabs, during the period of their power, rendered important services to science and civilization; the Arabic terms still found in the language of science, such as *alcohol, algebra, almanac, azimuth, nadir, zenith*, etc., sufficiently attest their influence on the early intellectual culture of Europe. During the period known as the Dark Ages the scientific works of Aristotle and other Greek philosophers were translated for the most part by Christian scholars, who resided as physicians at the courts of the califs in great numbers. These works were diligently studied in the Mohammedan capitals of Bagdad, Damascus, and Córdova, and served to diffuse a knowledge of those great writers among nations who otherwise would have remained in utter ignorance of them and their writings.

The most glorious period of Mohammedan culture extended from about 750 to 1200 A. D. During this period the Abbasside califs, Haroun-al-Raschid, Mamoon, and Motassem, reigned at Bagdad, which, under their auspices, became a magnificent centre of science, letters, and the arts. In the far East, Mahmood of Gazna (about 990–1030), though a sanguinary conqueror, was ambitious of the distinction of a patron of literature. At his court flourished Firdousee[*] (Firdausi), the greatest not only of all Persian but of all Moslem poets, Mohammed only excepted. In Spain, under the califs of the Omeyyade dynasty, the period of Arabian culture was not less glorious, and was of much longer duration, than that under the Abbassides. Al-Hakem, calif of Córdova (961–76), had, it is said, a library of 600,000 volumes. The high reputation for learning of the Spanish Arabs is shown by the fact that some of the best students of Christendom visited Córdova in order to study the philosophy of Aristotle, medicine, and mathematics under Arabian professors. To the Arabs we are indebted for the preservation of many works from classical antiquity, which without their care and zeal would in all probability have perished during the long period of darkness and semi-barbarism that followed the overthrow of the Western Roman empire.

Among the most distinguished Arabian authors, besides those already mentioned in this article, we may name—1. In poetry, Khansâ, a female poet contemporary with Mohammed; Ibn-Doreid (838–933); Al-Mootenabbee (about 900–965); and Booseeree (or Busîrî), who flourished in Upper Egypt (about 1250). 2. In philosophy, Alchindus flourished under the calif Mamoon (about 820); Alfarabius, who lived at Damascus (about 950); Avicenna (980–1037), who was even more celebrated as a physician than as a philosopher; Averroes (about 1120–98), wrote at Córdova, in Spain, a commentary on Aristotle, to which Dante alludes. 3. In medicine the Arabs excelled all the nations of that period; they are commonly regarded as the earliest experimenters in chemistry (alchemy). Among their celebrated physicians were Razes (or Rhazes), (870–930), who is said to have been the first to describe the smallpox accurately; Avicenna (Ibn Sînâ), already mentioned, the most famous of all the Arabian physicians; Averroes was also distinguished as a physician; Abulcasem (Abulcasis), the most distinguished of Arabian surgeons, is supposed to have practised in Córdova (about 1050–1110); he left a treatise on surgery, the most valuable that has come down to us from early times. 4. In mathematics the labors of the Arabs were not less useful than in other branches of science, though they cannot perhaps boast of so many famous names as in philosophy and medicine. They contributed greatly to simplify and improve the science of numbers by the introduction of the Indian numerals, with the decimal notation. They appear to have been the first to introduce the knowledge of algebra (which had been previously cultivated by the Greeks and Hindoos) into Western Europe. Mohammed Ibn Moosa (who flourished at Bagdad from about 810–833) is said to have been the first of his countrymen who wrote on algebra. He also wrote on optics and astronomy. Albategnius (Albatenî), who died at Bagdad in 929, wrote some valuable works on astronomy; Aboolfeda combined mathematics and astronomy with geography. 5. In history and geography, Masoodee, one of the first of Arab historians, was born at Bagdad, and died at Cairo in 956. His "Meadows of Gold and Mines of Gems" comprises the history, the politics, the religion, and the geography of many Oriental and European nations. Aboolfeda (1273–1331) has left works of great value in this and other departments of knowledge. His "Description of the Countries" is considered the best work on geography which the Arabian writers have bequeathed to us. Abulfaragius and Elmacin (or Elmakin), though Christians, wrote in the Arabic language valuable general histories. Ibn Khaldoon (1332–1406) wrote a valuable history of the Arabs, Persians, and Berbers. Makreezee flourished at Cairo (1360–1442), and wrote some excellent historical works. Makkaree, or Al-Makkari (1585–1631), wrote a history of the "Mohammedan Dynasties of Spain," which has been translated into English by Gayangos, London, 1840.

Those who seek for a general view of Arabian literature are referred to Hammer-Purgstall's "Encyklopädischen Uebersicht der Wissenschaften des Orients" (Leipsic, 1804), and his "Literaturgeschichte der Araber" (7 vols. 4to, 1850–56); Renan, "Averrhoes et l' Averrhoisme;" Whewell, "History of the Inductive Sciences."

J. Thomas.

Arabian Nights, sometimes called **The Thousand and One Nights,** the title of a collection of wild and fanciful Oriental tales, first brought to the notice of Europe in the latter part of the seventeenth century, by Antoine Galland, a French Orientalist. These fascinating fictions are probably more widely diffused and read than almost any other production of the human mind. The origin and author of this collection are still unknown. According to some authorities, the "Arabian Nights" may be properly divided into three portions, which may be respectively traced to a Persian, an Indian, and an Arabian origin. Throughout the entire work, however, everything appears to be conformable to the character and customs of the Arabian people and to the Mohammedan faith. The fact that Haroun-al-Raschid figures in several of the stories goes to prove that they, at least, must have been written after his death; while the omission of any mention of coffee and tobacco (except in two or three instances, where the names are supposed to be interpolations) shows that the work must have been composed before the introduction of those articles into Western Asia (in the latter half of the fifteenth century). "Many of the tales," says Mr. Lane, referring to this remarkable work, "are doubtless of different and early origins, and its general plan is probably borrowed from a much older production bearing the same title." After some further remarks, he states it as his opinion that the composition in its present form was probably commenced in the last quarter of the fifteenth, and completed in the first quarter of the sixteenth, century, and that the author or authors must have been Egyptian, because the description of Arab life as it is seen in Cairo is so minutely accurate in all respects. But respecting the date and place of its composition, Oriental critics are far from being agreed. The work has been translated by W. Beaumont (1811), Macnaghten, Scott, Torrens, E. Foster (1802), and Lane (1839). Most of these translations were from the French. It is noteworthy that the tales differ considerably in various Arabic texts. Among the best translations of the "Arabian Nights" is that of the celebrated Oriental scholar already mentioned, Mr. Edward Lane. The translation is perhaps unequalled for its thoroughness and accuracy, and in the graces of style is probably not inferior to any other in our language. The "Arabian Nights" has given rise to many imitations, among the best of which in English is "Tales of the Genii," by Rev. James Ridley. J. Thomas.

Arabian Numerals or **Figures,** a name given to the characters 1, 2, 3, 4, 5, 6, 7, 8, 9, 0, which the Europeans received through the Arabs from the Hindoos. The use of these numerals was not general in Europe before the invention of printing.

Arabic, Gum, exudes spontaneously from the stems of several species of acacia. (See Arabin and Gum.)

Arab'ici (*i. e.* "Arabians"), an heretical sect which arose in Arabia in the third century, the founder of which was Beryllus, bishop of Bostra. They denied Christ's divinity, and believed that the soul dies, and is raised again with the body. They were confuted by Origen.

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[*] All Mohammedan culture may be considered to be in one sense an offshoot of Greek culture. Not only was the genius of the poetry of the modern Persians greatly modified by the influence of Islamism, but the Persian language itself includes a very large mixture of Arabic words and phrases. This is especially remarkable with respect to some of the later poets. To understand thoroughly the works of Saadi, for example, a very considerable knowledge of Arabic is absolutely requisite.

Ar'abin, the essential principle of gum-arabic, is obtained pure by adding alcohol to a solution of gum-arabic in water. It dissolves readily in cold water, forming a gummy solution, and is precipitated by alcohol. It appears to be a weak acid, and to exist in the natural gum in combination with lime, magnesia, and potash. Its composition, like that of cane-sugar, is $C_{12}H_{22}O_{11}$.

Arabi Pasha (AHMED-EL-URABY), the leader of the Egyptian rebellion of 1882, was born about 1835 on a state farm at Tantah, on the delta of the Nile, where he worked till he was twenty-six, and where his father was a laborer. This farm was managed by Jean Ninet who in the rebellion of 1882 was the only European in Arabi's camp. Arabi received no education while young, but afterward learned to read and write a little Arabic. He was a private soldier in the Egyptian army for twelve years; became lieutenant through the influence of Jean Ninet, who favored Halim Pasha, from whom the late khédive, Ismail Pasha, had usurped the throne. Ninet persuaded Arabi to support Halim and get other officers to do the same. Arabi became afterward colonel, minister of war, and then pasha. The khédive had pledged all of Egypt and every possible source of revenue to the bondholders. The taxpayers refused to pay; the interest of the foreign loans could not be paid. England and France semi-officially interfered; the khédive was compelled to allow all high positions of trust to be filled by men sent from the English and French foreign offices; the natives were excluded, and thousands of them joined Arabi's party. Arabi proclaimed to the troops that he was inspired by the Prophet to fulfil a holy mission, the motto of which was "Egypt for the Egyptians," and he became the leader of a great rebellion. The massacre by his forces at Alexandria soon followed. The English intervened, and the forts at that place were bombarded and dismantled by their fleet July 11 and 12, 1882. The war lasted but a few months, and Arabi's army was totally defeated at Tel-el-Kebir, Sept. 13, 1882, by the English under Gen. Wolseley. Arabi soon after surrendered himself to them, and was sentenced to death Dec. 3, 1882; but his sentence was commuted by the khédive to exile for life, and he was soon after sent to Ceylon.

Aracan, or **Arracan** [called by the natives **Rakhaing'**], a British province of Farther India, extending along the E. side of the Bay of Bengal, and bounded on the E. by the Burmese empire, from which it is separated by a range of high mountains. The greatest length from N. to S. is about 280 miles, and the area is 15,104 square miles. The surface is diversified, and extensively covered with forests. The chief productions are rice, tobacco, indigo, cotton, salt, oil, ivory, hides, and timber. Aracan was conquered from the Burmese by the British in 1826. Chief town, Akyab. The principal rivers are the Náf estuary in the N., forming the boundary between the province and Chittagong, the Myu, the Koladyne, running into the Bay of Bengal and navigable for 40 miles, and the Lemyhu, a few miles S. of the Koladyne. Farther S. the rivers are short, and are unimportant except the Gwa, whose mouth forms a harbor. Pop. 461,136.

Aracan, or **Arracan,** a town of Farther India, in the above province, situated on the river Aracan, about 50 miles from its entrance into the Bay of Bengal, about lat. 20° 45′ N., and lon. 93° 15′ E. It was formerly the capital of the province and a populous town, but it is now much reduced. Pop. estimated at 10,000.

Araça'ri, or **Aricari** (*Pteroglos'sus*), a genus of birds, natives of tropical South America, and nearly allied to the toucan, but generally smaller, with longer tails. The bill of one species is white, with a blood-red stripe along the middle. One of the most remarkable is the curl-crested araçari, having the feathers upon its head beautifully curled.

Araca'ty, a port in the province of Ceará, Brazil, has three churches, several schools, and a trade in hides and cotton. It is on the river Jaguaribe; lat. 4° 31′ S., lon. 37° 48′ W. There is a bad bar at the river's mouth. Pop. about 20,000.

Ara'ceæ [so named from *Arum,* one of its genera], a natural order of endogenous herbaceous plants, natives of temperate and especially of tropical countries. The leaves are sheathing at the base, convolute in the bud; the flowers are naked, arranged on a spadix, which is usually enclosed in a spathe; the male flowers at the upper part of the spadix, and the female at the base. The genus *Arum* is the type of this order, which is characterized by an acrid juice and a nutritious amylaceous substance which is used for food. The *Amorphophallus* is cultivated in India for its roots (or corms), which are edible. (See ARUM.)

Arachis. See PEA-NUT.

Arach'nida, or **Arach'nides** [from the Gr. ἀράχνη, a "spider"], an order of articulated animals which resemble insects in many respects, and are properly regarded as a subdivision of that class, but they have no antennæ, have simple eyes, and generally have eight legs. Like the Crustacea, they have the head and thorax united into one piece. They are mostly carnivorous, and some of them are parasitic. The primary divisions of this class are Araneina (spiders), Pedipalpi (scorpions, etc.), and Acarina (ticks and mites).

Arach'noid [from the Gr. ἀράχνη, a "spider," also "spider's web," and εἶδος, "form" or "resemblance"], resembling a spider's web, applied to the second or middle membrane of the brain. (See next article.)

Arach'noid Mem'brane (sometimes called *me'ninx me'dia*), the fine cobweb-like serous membrane situated between the dura and pia mater. It covers both brain and spinal cord. It is a closed sac, disposed in two layers.

Arad, a county of Hungary, is bounded on the N. by Bihar, on the E. by Zarand and Transylvania, on the S. by Temes and Krasso, and on the W. by Csanad. Area, 2322 square miles. In the E. it consists of high mountain-ranges, but the W. is a fertile plain, traversed by the White Körös. Grain of all kinds, wine, and tobacco are produced here in large quantities and of an excellent quality. Chief town, Arad. Pop. in 1880, 304,797.

Arad, NEW [Hun. *Uj Arad*], a town of Hungary, in the county of Temesvár, and on the left bank of the Máros. Here is an extensive fortress, which is one of the strongest in the Austrian empire, and is used as a prison for political offenders. Pop. in 1880, 5141.

Arad, OLD [Hun. *O Arad*], an open town, capital of the county of Arad, is on the right bank of the Máros, 35 miles E. of Szegedin. It is a bishop's see, has a Greek theological seminary, a normal school, and manufactures of tobacco, etc It is an important cattle-market, and has a considerable trade in grain. Pop. in 1880, 35,556.

Ar'adus [the *Arvad* or *Arpad* of the Bible], one of the chief cities of ancient Phœnicia, was built upon the island now called *Ruad,* which is small and rocky, and is situated 35 miles N. of Tripoli, and 2 miles from the main land. It long continued to be a place of great population and importance. It was supplied with water from submarine springs. It was destroyed and depopulated by the Moslems in the seventh century. Many relics of its former greatness remain. It has still a small population.

Arafat', Mount, or **Jebel-er-Rahm** (*i. e.* the "mountain of mercy"), a granite hill of Arabia, 15 miles E. of Mecca, rises about 200 feet above the plain. To facilitate its ascent, steps have been cut in the rock or built of solid masonry. It is visited annually by a great multitude of Mohammedan pilgrims, who believe that this is the place where Adam and Eve first met after they had been expelled from Paradise and had been separated 120 years. It has a chapel on its summit, which is said by the Mohammedans to have been built by Adam.

Arago (DOMINIQUE FRANÇOIS), a French astronomer and savant, was born at Estagel, near Perpignan (Eastern Pyrenees), Feb. 26, 1786. He entered the Polytechnic School in 1803, and became in 1805 secretary to the bureau of longitudes. In 1806, Arago and Biot were employed by the government to perform the measurement of an arc of the meridian from Barcelona to the Balearic Isles, in order to complete an important operation which Delambre and Méchain had commenced. While he was engaged in this arduous work among the mountains, war broke out between the French and Spaniards. Arago escaped from the violence of the Spaniards, who suspected him to be a spy, but on his voyage towards home was driven by a tempest to Algiers, where he was held as a slave. He was finally liberated, and returned to France in July, 1809. In consideration of his services and sufferings he was elected a member of the Institute in 1809, although he was under the age that the rules required. About the same time he was appointed professor of analysis in the Polytechnic School, where he lectured for many years. He afterwards devoted much attention to optics, astronomy, and magnetism. In 1812 he commenced a course of lectures on astronomy, which were rendered very popular by a brilliant style added to their other merits. Arago and Gay-Lussac founded in 1816 the "Annales de Chimie et de Physique." He advocated the undulatory theory of light, and made several discoveries in the science of electro-magnetism. For his discovery of the development of magnetism by rotation, he received the Copley medal of the Royal Society of London in 1825. He became in 1830 director of the Observatory of Paris and perpetual secretary of the Academy of Sciences. His reputation as a writer was increased by the eulogies which he composed on Condorcet, Ampère, and Carnot, and other members of that academy. He displayed a remarkable faculty of popularizing science in his writings and lectures.

Arago promoted the revolution of 1830, and was elected in 1831 to the Chamber of Deputies, in which he acted with the *extrême gauche*, the advanced republicans. He was a member of the provisional government formed by the republicans in Feb., 1848, and co-operated with Lamartine in resistance to the socialists and in the maintenance of order. He officiated as minister of war and the marine for several months, and was one of the executive committee of five elected by the Assembly in May, 1848. About this time the voters of his native department elected him to the National Assembly. He opposed the election of Louis Napoleon to the presidency, and refused the oath of allegiance after the *coup d'état* of Dec., 1851. The emperor recognized his eminent services by excepting him from the enforcement of the law on this point. Arago died on the 2d of Oct., 1853, leaving a son, Emmanuel, noticed below. He was a friend of Alexander von Humboldt and of Faraday; was a man of a generous disposition, an ardent temperament, and great energy of character. "The popularity of M. Arago," says De Loménie, "the European reputation which he enjoys, his marked position in politics, have all combined to attach to his name the idea of a species of intellectual royalty." The same biographer attributes to him a "marvellous faculty of illumining with unexpected radiance the most abstract theories." (See L. de Loménie, "Galerie des Contemporains;" D. F. Arago, "Histoire de ma Jeunesse," 1854; Charles Robin, "Biographie de D. F. Arago," 1848; J. A. Barral, "F. Arago," 8vo, 1853; Bertrand, "Arago et sa Vie Scientifique," 1865; Audiganne, "François Arago," 1869.) William Jacobs.

Arago (Emmanuel), a son of the preceding, born at Paris Aug. 2, 1812. He studied law, and gained distinction as an advocate and counsel for the defence in political trials. Like his father, he was a keen republican, and took an active part in the revolution of 1848. In this crisis he was selected by the republicans to protest in the Chamber of Deputies against the appointment of a regency. He was sent as commissary-general to Lyons in March, was elected to the Constituent Assembly in April, and was sent as minister to Berlin in May, 1848. He resigned this position in Dec., 1848, in consequence of the election as president of Louis Napoleon, whose designs he constantly opposed. The *coup d'état* of Dec., 1851, and the *régime* that followed, excluded Arago from the public service. On the formation of a provisional government by the republicans in Sept., 1870, he became a member of the same. He was elected a member of the National Assembly in 1871.

Arago (Étienne), a dramatic author, a brother of the great savant, D. F. Arago, born at Estagel, near Perpignan, Feb. 9, 1802, produced a number of successful comedies and vaudevilles, which exhibit a talent for satire. Among his works is "The Aristocrats" (1847), a comedy in verse. He fought for the popular cause in the revolution of 1830, and founded the "Reform," a daily republican journal, in 1834. He was director-general of the post-office from Feb., 1848, until December of that year, and in that position acted with much vigor and ability. As a member of the National Assembly he voted with the *gauche* and opposed the policy of Louis Napoleon. He was exiled in June, 1849. After the proclamation of the republic in Sept., 1870, he was appointed maire of Paris, which position he held until November. In Feb., 1871, he was elected a member of the National Assembly, but soon resigned on account of his age.

Arago (Jacques Étienne Victor), a French *littérateur*, brother of the preceding, was born at Estagel Mar. 10, 1790. He accompanied the exploring expedition of Freycinet, as draughtsman, in 1817, and on his return in 1821 published a "Tour round the World in the Uranie," etc. (2 vols., 1822). Among his works are several dramas. Although he had become blind, he joined a party that went to California in 1849 to dig for gold, and published "Travels of a Blind Man in California," etc. (1851). Died in 1855.

Ar'agon, a former kingdom of Spain, bounded on the N. by France, on the E. by Catalonia, on the S. by Valencia, and on the W. by Navarre and the Castiles. Length from N. to S., about 200 miles. Area 17,980 square miles. It is now divided into the provinces of Huesca, Saragossa (Zaragoza), and Teruel. The Pyrenees, which extend along the northern border of Aragon, rise to the height of 11,000 feet. The surface is diversified by several ranges of mountains and many fertile and beautiful valleys. Aragon is intersected by the river Ebro, which flows south-eastward and divides it into two nearly equal parts. A considerable portion of the soil is sterile. Among the mineral resources of this region are copper, iron, lead, cobalt, quicksilver, marble, stone coal, alum, and salt. Aragon was conquered by the Moors in the eighth century. The Christian kingdom of Aragon, founded in 1035, became a powerful state, which was united with Castile by the marriage of Ferdinand of Aragon and Isabella of Castile in 1469. The chief towns are Saragossa and Huesca. Pop. in 1877, 894,727. (See Schmidt, "Geschichte Aragoniens im Mittelalter.")

Arago'na, a town of the island of Sicily, in the province of Girgenti, 8 miles N. of Girgenti. It has a ruined castle and large sulphur-mines. Pop. 11,424.

Ar'agonite, or **Ar'ragonite,** a variety of carbonate of lime, first found in Aragon. It crystallizes in hexagonal prisms, or in crystals of which the primary forms a rhombic prism. It resembles calcareous spar in composition, but differs from it in the form of its crystals, and is reduced to powder by a heat in which calcareous spar remains unchanged. Satin spar is a variety of aragonite.

Ara'gua, a former province of Venezuela, bounded N. by Carabobo and Caracas, on the E. by Caracas, on the S. by Guarico and Carabobo, and on the W. by Carabobo. Area, about 3720 square miles. This province is one of the most beautiful and fertile parts of Venezuela, and is traversed by the river Aragua, from which it takes its name, and numerous other small rivers, which all enter Lake Valencia. The hills and mountains are covered with plantations, gardens, and country-seats. Here the strange scene strikes the eye of wheat-fields and plantations of sugar and coffee side by side at an elevation of 3000 feet. Chief town, Victoria. Pop. 81,500.

Araguay', or **Araguay'a,** a large river of Brazil, rises in the mountains about lat. 18° 10' S. and lon. 51° 30' W. It flows northward, forms the boundary between Goyaz and Matto-Grosso, and after a course of 1300 miles joins the Tocantins at São João. It is navigable for about 1100 miles. About midway from its source to its mouth it encloses the island of Santa Anna, 210 miles long. The stream on the E. side of this island is called *Furo*.

Ara'lia, a genus of plants of the order Araliaceæ, natives of the U. S., of the Himalaya Mountains, and other regions. It comprises a number of species which are used in medicine, as the ginseng, *Aralia quinquefolia; Aralia nudicaulis*, called wild sarsaparilla, which grows in the U. S.; *Aralia spinosa*, a native of Virginia, which is a stimulant diaphoretic, called angelica tree or toothache tree; and *Aralia racemosa*, or American spikenard, which produces an aromatic gum-resin. Chinese rice-paper is cut from cylinders of the pith of *Aralia papyrifera*.

Aralia'ceæ [so called from *Ara'lia*, one of its genera], a natural order of exogenous plants, natives of tropical, temperate, and cold regions in various parts of the globe. It comprises about 160 known species (trees, shrubs, and herbaceous plants), generally possessing stimulant or aromatic properties. The fruit consists of several one-seeded cells. The leaves of several species are used as fodder for cattle in India. One species of this order, the ivy, is a native of England.

Ar'al, Sea of, a large inland sea or lake in Independent Tartary, is about 150 miles E. of the Caspian Sea. It is included between lat. 43° and 47° N. Length, estimated at 262 miles; breadth, about 184 miles. Area, 26,900 square miles. Next to the Caspian, it is the largest inland sea or lake of Asia. Having no outlet, it is consequently saline or brackish. The S. W. part, called Lake Landau, is shallow, and not more than five feet deep in the deepest part. The Aral is fed by the large river Oxus or Amoo, which enters the sea at its S. side: it also receives the river Sihon or Sir-Daria from the E. The latest measurements make it twenty-six feet above the level of the sea. Seals, sturgeons, and other fish are found in it.

A'ram (Eugene), an English felon, born in Yorkshire in 1704. He had not the advantage of a liberal education, but he acquired a good knowledge of the Latin, Greek, Hebrew, Chaldee, Arabic, and Welsh languages. He became a schoolmaster at Knaresborough, where he was intimate with a shoemaker named Daniel Clarke. The latter, having purchased some goods on credit, suddenly disappeared, leaving his debts unpaid. Aram was suspected of being an accomplice of Clarke in an attempt to defraud. A portion of the goods which Clarke had purchased was found in the garden of Aram, who was tried, but acquitted, after which he removed from Knaresborough. In 1759 a man named Houseman having confessed that he was accessory to the death of Clarke, whom Aram had killed, Aram was tried for the murder, and made an elaborate argument in his own defence, but was convicted, and afterwards confessed his guilt. He was hung Aug. 6, 1759. His story forms the subject of one of Bulwer's novels and of a poem by Hood. (See Scatcherd, "Memoirs of Eugene Aram," 1832.)

Aramæ'a [from *A'ram*, the son of Shem], the ancient name of a region of Asia, the boundaries of which are not well defined. It extended from Mount Taurus on the N. to Arabia on the S., and coincided nearly with the countries called by the Greeks Syria, Babylonia, and Mesopotamia. The Aramaic language, a branch of the Semitic, was divided into two forms or dialects—the Syriac or West Aramaic, and the Chaldee or East Aramaic. The former was the language commonly spoken by the Jews in Palestine at the Christian era.

Aran'da (Don Pedro Abaraca de Bolea), Count of, an able Spanish statesman, born of a noble family at Saragossa Dec. 21, 1718. He served many years in the army, and rose to the rank of general. In 1765 he became president of the council of Castile and prime minister. He used his power to promote reform and a liberal policy, and procured the expulsion of the Jesuits from Spain in 1767. In 1773 he was removed from power by the intrigues of the clergy, but he was sent as an ambassador to France, where he remained until 1787. He was again prime minister for a short time in 1792, and was driven from power by Godoy. He died in 1799.

Aran'goes, a kind of beads made of rough carnelian, and usually in cylindrical shape, which, before the abolition of the slave-trade, were imported from Bombay and constituted an article of trade with Africa.

Aranjuez' (anc. *A'ra Jo'vis, i. e.* "altar of Jupiter"), a town and royal residence of Spain, in New Castile, on the left bank of the Tagus, 30½ miles by rail S. S. E. of Madrid. It is situated in a beautiful valley, has spacious streets, elegant squares and a royal palace, and gardens laid out by Philip II. Here are also a theatre, a hospital, and several summer-houses in the royal gardens. Aranjuez suffered severely from the French during the Peninsular war. The treaty of 1772 between France and Spain was concluded here. It was the scene of the insurrection which ended in the abdication of Charles IV. in Mar., 1808. Pop. in 1881, 8154.

Aran'sas, a small river of Southern Texas, rises in Bee county, flows south-eastward, and enters Aransas Bay.

Aran'sas Bay, sometimes called **Aransa'zua,** or **Aransaso, Bay,** is on the coast of Texas, in the N. W. part of the Gulf of Mexico, about 15 miles N. by E. of Corpus Christi Bay, and is about 18 miles long and 8 miles wide in its broadest part.

Aransas Pass, the principal inlet to Aransas Bay and Corpus Christi Bay, Tex., between St. Joseph and Mustang islands. It is becoming commercially important, but has a troublesome shifting bar. The lighthouse is of brick, forty feet high, and stands on Low Island, inside the pass; lat. 27° 51′ 51″ N., lon. 97° 2′ 58″ W. The Confederate works at this pass were captured by the Federal troops, with 100 prisoners and some guns, Nov. 20, 1864.

Arany (János), a popular Hungarian poet, born at Nagy-Salonta in 1817, became in 1851 professor at Nagy-Körös, in 1859 member of the Hungarian Academy, and in 1860 director of the Kisfaludy Society at Pesth. His first work was a humorous poem called "The Lost Constitution of the Past" (1843), which gained a prize. He wrote, among other poems, "Buda Halála," which in 1864 was crowned by the Hungarian Academy. D. Nov., 1882.

Arapahoe Indians, a tribe of American savages who are associated with the Cheyennes. The two tribes together number about 4000.

Arapai'ma, a genus of fresh-water fishes found in the rivers of South America, and highly esteemed for food. They are the largest fresh-water fishes in the world, and are allied to the Clupeidæ or herring family. Some of them measure about fifteen feet long, and weigh 400 pounds or more. The body is covered with strong, bony, compound scales.

Arapi'les, a small village of Spain, situated 4 miles S. E. of Salamanca, was the scene of a severe engagement which was called "the battle of Salamanca," between the allies under Wellington and the French under Marmont, July 22, 1812, in which the latter were defeated.

Araramboya, a name sometimes given to the dog-headed boa or bojobi, a green snake most abundant in Brazil.

Ar'arat, a celebrated mountain of Western Asia, rises from the plain of the Aras (or Araxes) about 33 miles S. W. of Erivan. It is called by the Persians Koh-i-Nooh, "Mountain of Noah." It is on the boundary between Persia, Asiatic Turkey, and the Russian possessions. The highest peak is in lat. 39° 42′ N. and lon. 43° 38′ E., is covered with perpetual snow, and has an altitude of 17,000 feet above the level of the sea, or 14,200 feet above the plain of the Aras. It is a volcano, the last eruption of which occurred in July, 1840, when a great earthquake shook the surrounding country. See James Bryce's "Transcaucasia and Ararat" (1877).

Ararat, Little, a peak which is S. E. of the preceding, and rises in the form of a cone to the height of 12,840 feet above the level of the sea. The summits of these two mountains are seven miles apart in a direct line, but their bases are nearly in contact. According to the eighth chapter of Genesis, the ark rested "upon the mountains of Ararat."

Ararat, or **Pilot Mountain,** a hill in Surrey co., N. C., between the Ararat and Dan rivers, is 3000 feet high. It is visible at a distance, and serves as a landmark to travellers.

Arari'pe, Ser'ra de, a table-land or chain of mountains in Brazil. It forms a semicircle around the plain in which Crato is situated, and is near the boundary between Ceara and Pernambuco.

Aras' (the ancient *Arax'es*), a river of Western Asia, rises in the Turkish pashalic of Erzrum. It flows eastward, passes near the northern foot of Mount Ararat, and traverses the Persian province of Adzerbijan. It afterwards turns towards the N. E., and enters Georgia or the Russian dominions, and unites with the river Kur about 60 miles from its entrance into the Caspian Sea. Its whole length is about 500 miles.

Ara'tus ['Αρατος], an eminent Greek poet and astronomer, born at Soli, in Cilicia, flourished about 290–260 B. C. He was patronized by Antigonus Gonatas, king of Macedonia, at whose court he passed his latter years. He wrote an astronomical poem entitled "Phenomena," which is the oldest extant poem on that subject, and was much admired by the ancients. It was translated into Latin by Cicero, and was the subject of a commentary by Hipparchus. He is supposed to be the poet quoted by St. Paul in a discourse to the Athenians. (See Acts xvii. 28.) Aratus also wrote a poem on the weather, called "Diosemeia," or "Prognostica." A good edition of his poems was published by Buhle, 1793–1801.

Ara'tus of Sic'yon, a celebrated Greek general and statesman, born at Sicyon in 271 B. C., was a son of Clinias, who was assassinated about 264. Aratus then escaped to Argos, where he was liberally educated. In 251 B. C., with the aid of other exiles, he liberated Sicyon from the tyrant Nicocles, and united it with the Achæan League, of which he was chosen general (*strate'gos*) in 245. An important object of the league was to maintain the independence of the Greek states against the king of Macedonia. He expelled a Macedonian garrison from Corinth in 243 B. C., was many times re-elected general-in-chief, and managed the affairs of the league with much ability. About 226 the league was involved in a war against Cleomenes, king of Sparta, who defeated Aratus in several battles. Aratus formed in 222 an alliance with Antigonus of Macedon against the Spartans. He died in 213 B. C., leaving the reputation of a true patriot. (See Plutarch, "Life of Aratus;" Polybius, "History.")

Arauca'nia, or **Arauca'na,** an independent state in the S. part of Chili, is bounded on the E. by the Andes and on the W. by the Pacific Ocean. It extends from the river Bio-Bio on the N. to Valdivia, or to lat. 40° S., being about 190 miles long. The physical features, climate, and productions are similar to those of Chili. The Araucanians are remarkable for their independent spirit and their successful resistance to foreign domination. The Spaniards made an unsuccessful attempt to subdue them in 1537 and at several subsequent periods. On this subject Ercilla, a Spaniard, wrote a celebrated epic poem called "Araucana." It is said that they possess many noble qualities, and cultivate poetry, but abhor the restraints of civilization. They recognize a Supreme Being and a future state, but build no temples. The government is administered by four hereditary *toquis*, each of whom rules over one of the provinces into which their country is divided. The most important national questions are decided by the grand council composed of these *toquis*, or by a general assembly. In 1860, a French lawyer, De Tonneins, who had gained considerable influence among the Araucanians, proclaimed himself, under the name of Orélie Antoine I., constitutional king of Araucania. He was in 1861 taken prisoner by the Chilians and sent back to France. In the treaty of Jan. 22, 1870, the Araucanians promised to recognize the authority of Chili, but subsequently King Orélie once more made his appearance in Araucania and defied the Chilian troops. In 1873 financial agents of Orélie made great efforts to effect a loan in London. (See Molina, "History of Chili;" Edward R. Smith, "The Araucanians," etc., New York, 1855.) Area, 120,000 square miles; pop. 70,000.

Arauca'ria [said to be derived from Araucania (which see)], a genus of plants of the natural order Coniferæ, natives of the southern hemisphere; all evergreen trees, distinguished by having the male and female flowers on separate trees, the pollen contained in from ten to twenty cases pendent from the apex of each scale, the female flowers two under each scale, each having one ovule. The *Araucaria imbricata*, or Chili pine, a native of the Chilian Andes, attains the height of 150 feet, and produces a seed which is an important article of food; also a fragrant resin in abundance. The timber is hard, heavy, and suitable for the masts of ships. This tree is cultivated as an ornament of landscapes. The Norfolk Island pine, which is about 200 feet high, is *Araucaria excelsa*, a noble tree, and Australia has two or three fine species.

Arau'co, a province of Chili, is bounded on the N. by Concepcion, on the E. by the Andes, on the S. by Valdivia, and on the W. by the Pacific Ocean. Area, 13,714 square miles. The soil is fertile, but as the ground is covered for a large part by forests, agriculture has made very little progress. The chief article of export is timber. Chief town, Arauco. Pop. in 1880, 56,019.

Arau'jo d'Azeve'do (Antonio), Count da Barca, a Portuguese statesman, born at Ponte de Lima May 14, 1754. He negotiated at Paris, and signed, a treaty of peace with France in 1797, but the French Directory annulled it. He became minister of foreign affairs in 1806. After Napoleon had invaded Portugal and captured Lisbon, Araujo accompanied the king, John VI., to Brazil in 1808. He was appointed minister of marine in 1814, and in 1817 sole minister. He was a man of various accomplishments; he wrote poetry and gained distinction by his scientific attainments. Died June 21, 1817.

Arau'jo Por'to-Alle'gre, de (Manoel), one of the most prominent poets of Brazil, was born at Rio Pardo in 1806. He was appointed in 1859 consul-general for Brazil to Prussia. His principal works are an epic entitled "Colombo," and lyric poems called "Brasilianas."

Aravul'li, or **Aravali,** a mountain-range of Hindostan, traverses Ajmeer, and is about 300 miles long. The highest summits are about 5000 feet above the level of the sea. It constitutes the watershed between the Arabian Sea and the system of the Ganges. The general direction of the range is N. N. E. and S. S. W.

Ar'baces [Gr. 'Αρβάκης], a Median general who revolted against Sardanapalus, captured Nineveh, his capital, and on the ruins of the Assyrian empire founded the kingdom of Media, about 876 B. C.

Ar'balest, or **Arbalast** [Lat. *arcuballis'ta*, from *ar'cus*, a "bow," and *ballis'ta*, "an engine for shooting;" Fr. *arbalête*], a name of the crossbow, which was much used in the battles of the Middle Ages. It was sometimes made of steel. The arrow or other missile was placed in a barrel or groove which was perpendicular to the cord or bowstring. The arrow discharged by these bows was called a quarrel.

Arbe'la, now **Arbeel** (**Arbîl** or **Erbil**), a small town of Asiatic Turkey, in Koordistân, about 40 miles E. of Mosul. The modern town has some large mosques and bazaars. Arbela gave its name to the battle in which Darius was finally defeated by Alexander the Great, in 331 B. C., but it was fought at Gaugamela. Pop. about 6000, which are mostly Koords.

Ar'biter [a Latin word signifying "umpire"], a person chosen by parties in a controversy to decide a question; sometimes applied to a person who has the power of judging and determining, or who is able to control the destiny of others. Some cases among the ancient Romans were decided by an arbiter, especially when the parties differed in respect to the amount of money which one of them should pay to the other.

Arbitra'tion [from the Lat. *arbitror*, to "act as judge" (*arbiter*)], a submission of some matter in dispute to the judgment and decision of a person called an "arbitrator." It applies to civil cases only, and may be either oral or written. It is voluntary in its nature, as any party has a legal right to have an adjudication upon his case by a court of justice. Statute law sometimes makes arbitration compulsory, as where the investigation of a long account is necessary. Even after parties have agreed to submit a controversy to arbitration, one of them may withdraw his consent against the will of the other at any time before the hearing is closed. The only remedy of the other party is to bring an action for damages, which would usually be nominal. However, when parties enter into a contract, they may stipulate that no rights of action shall accrue under its provisions unless there is a submission on their part to arbitration; in which case the duty to submit becomes a condition precedent, and cannot be avoided. The result of the arbitration is termed an *award*. It is not, however, equivalent to a judgment of a court, and if not performed the regular course of the successful party would be to bring an action upon the award, and thus make it a judgment of a court. To avoid this inconvenience, statute law frequently provides that on reducing the submission to writing a clause may be inserted that the award may be entered on the records of a specified court as a judgment, whereupon it shall have the like force and effect. Having the characteristics of a judgment, the award falls under the control of the court, and modes are provided by which mistakes and errors may be rectified by judicial action. As a general rule, there is no review of the result of an arbitration. There are no methods of appeal provided, as the theory of the proceeding is that the arbitrator is to be the judge of the difference between the parties. This rule does not prevent the rectification of mistakes in matters of fact, nor does it include the case of fraud or the violation of the first principles of justice; as, for example, the act of hearing one party, and not the other.

Arbois, a town of France, department of Jura, about 25 miles S. W. of Besançon. It is celebrated for its wine, and has manufactures of paper and earthenware. Here are some Roman antiquities. Pop. in 1881, 4957.

Arbol-a-brea, the resin of *Canarium album* (an amyridaceous tree), from the Philippine Islands. Baup (*Ann. Ch. Phys.* [3], xxxi., 108) obtained several distinct principles from it.

Arbor'iculture [from the Lat. *ar'bor*, a "tree," and *cultu'ra*, "culture" or "cultivation"], the art of cultivating trees, includes the raising of plantations of forest trees for timber and fuel, and ornamental trees for landscape gardening; but the culture of fruit trees is commonly assigned to a separate head, or to horticulture and pomology. Arboriculture is becoming an art of increasing necessity in the U. S., as the native forests are rapidly disappearing by the consumption of wood for building, manufactures, railway structures, and many other purposes.

Its Importance.—Though at the present time the timber crop is more important than any other product of the land, yet little attention is paid to it by land-owners. We have extended treatises on the management of wheat, corn, and other grain crops, on the best systems of rotation, and on the many details of farm management, but little is said on tree-planting; and not one farmer in a thousand sufficiently appreciates the importance of growing young timber on an extensive scale to supply the deficiency which will soon be felt everywhere as our native woodlands are rapidly cut away. An approximate statement of the amount of consumption may serve to show the absolute necessity of urging the importance of arboriculture on the attention of landowners at large. In the State of New York alone about 1,500,000 acres are cleared of timber in ten years; and in the U. S. about 3,000,000 yearly, or 30,000,000 acres in ten years, are stripped of their trees. Of the wood thus obtained, about 6,000,000 cords are consumed annually for railroad fuel; and over fifty million dollars' worth of ties has been used in the construction of the railroads of the Union. The wood value of freight and passenger cars is over seventy million dollars, and of wooden bridges fifty million dollars. More than one hundred million dollars' worth of sawed lumber is annually used for shipbuilding, cooperage, and the vast number of manufactures wherein this material is extensively employed. The wood used as fuel cannot be less than twenty-five million cords per annum. Such facts as these naturally suggest the same thoughts that were uttered three hundred years ago by the illustrious and far-seeing Bernard Palissy, when expressing "his indignation at the folly of men in destroying woods." He adds, "I cannot enough detest this thing, and I call it not an error, but a curse and calamity to all France; for when the forests shall be cut, all arts shall cease, and they who practise them shall be driven out to eat grass with Nebuchadnezzar and the beasts of the field. I have divers times thought to set down in writing the arts which shall perish when there shall be no more wood, but when I had written down a great number, I did perceive that there could be no end to my writing, and having diligently considered, I found that there was not any that could be followed without wood."

Forming Wood-plantations.—But we cannot ask landowners to keep their old woods untouched. They cannot afford to hold a large amount of dead capital in the shape of the original forests. But new timber should be carefully restored as fast as the old is cut away. It is more economical to renew a dense growth of young wood, and to clear it off frequently, or once in about twenty years, than to allow the trees to grow a hundred and fifty years. The land will in the former case yield five or six times as great a quantity as in the latter. There are two modes of renewal. One is to clear away the old trees entirely, and to allow the new growth to spring up spontaneously or from the closely-cut stumps; and the other is to make new plantations on well-cultivated land. The value of the new growth from the renewal of old trees depends much upon its character and denseness. To secure a good start, the old trees should be entirely cleared away, and not, as is too often the case, merely thinned out, leaving the middle growth standing, for the few scattered trees of medium size which remain will shade and greatly retard everything below them. Every farmer knows that no young crop can flourish under the shade of thin woods. Young trees require the same advantages of air and sunshine as Indian corn, and shaded trees grow only one-fourth or fifth as fast as those under full exposure. To induce free sprouting from the stumps the old trees must be cut away in autumn, winter, or early spring, and not while growing or in full leaf.

Thinning.—The young plantations having been started a few years (cattle being carefully excluded), the first work is thinning. If this is not attended to, trees will crowd and enfeeble each other. The first thinning may be done when the trees are large enough for hoop-poles. The more crooked and feeble growth may be cut out, leaving the best and straightest at as uniform distances as practicable. If the plantation is a fine one, the hoop-poles will more than pay the interest on the land, if not afford a handsome revenue. The first thinning may leave the trees about four feet apart, and should never be so severe that the shade and fallen leaves will not prevent the growth of grass—the leaves mulching the surface. It will be found more convenient, when the growth is abundant enough, to leave the thinned trees as nearly as practicable in straight lines, to allow the free passage of wagons for drawing out the timber. A good approximate rule for distance in successive thinnings, as the trees become larger, is to allow a height of two or three times as great as the distance asunder. If too much sunlight is let in, the growth of side-limbs will render the timber knotty; if too little light is admitted, the trees will be feeble and slender. Experiments show that thinning not only increases the amount of wood grown in a given time, but renders it more valuable and free from defects. A well-managed wood-plantation, on fertile soil, will yield an amount of wood equal to forty cords per acre if cut every twenty years, or two cords per acre annually.

Raising trees from seed, although attended with more labor and care at first, gives more perfect and profitable plantations in the end. The land must be well prepared by ploughing, as for corn or other farm-crops. The seed may be planted in drills or in hills, like corn, and the young trees kept well cultivated a few years, till large enough to shade the ground. If the seeds are of free-growing kinds, the hills may alternate the first year with hills of corn; or if in drills, the corn and trees may be in alternate rows. Such large seeds as those of the chestnut, black walnut, hickory, and oak may be planted in this way, if the seeds have been properly kept through winter. To ensure evenness, a surplus of seed should be used, and the supernumerary plants afterwards thinned out. The smaller and more delicate kinds of seeds should be planted in seed-beds of fine mould, and covered by sifting it over them, and the trees transplanted into rows when they have attained a few feet in height. The depth for covering all these seeds may be nearly determined by observing the general rule (liable to slight exceptions) of burying them at a depth of about three times, and never more than five times, their diameter. At a much greater depth few of the young plants will find their way to the surface, and in most germination will be prevented. The only objection to planting very shallow is the want of sufficient moisture to sprout the seeds. Young evergreen seedlings, in addition to the care here prescribed, will require a partial shading through most of the first summer, gradually removing it to harden the young plants. With the larger seeds which have a horny covering—such, for instance, as the chestnut and horse-chestnut—entire failure to germinate commonly results from permitting this covering to become dried and impervious to moisture; and the only way, therefore, to ensure success is to plant them soon after the seeds ripen, or to keep them from drying by packing in moist sand or pulverized moss. It is for this reason that experiments in planting chestnuts which are bought in market nearly always fail.

Transplanting young trees from seed-beds, after they have been once removed to nursery-rows, is extensively adopted in Britain and other parts of Europe for obtaining woodlands. Setting them out when not more than three or four feet high is attended with less labor, less check in growth, and more certainty of all the trees surviving, than if taken at a greater size. Setting out very large trees is never profitable for any purpose. Much more depends on a good deep soil and thorough after-culture for a few years. The great arboriculturist Loudon confidently affirmed that he could show larger, finer, and more luxuriant trees in five years by setting those of moderate size in deeply-trenched ground, and giving them constant cultivation, than could be obtained in a shorter period by the removal of larger ones—an assertion that was corroborated by the experiments of Sir Henry Stewart in the moist climate of Scotland, where he formed in a single year a landscape garden of large trees set out at great expense, these trees never entirely recovering from the sickly appearance which their removal gave them.

Woodland belts, for protection against winds, are found of much utility and value, both in the Eastern States and on the vast plains of the West. Where the face of the country has become denuded, and wintry winds and summer storms sweep farms with more fury than formerly, belts of this character are found to protect young crops and to increase the product of the land. Young plants of grass and winter grain, after heaving by frost, are beaten about and sometimes torn out by the action of the winds on the bare surface. Grain-crops and meadows are prostrated by tempests. We are informed by landowners who have planted screens of evergreens that in some instances the increase of crops raised within the range of their protection, and out of their immediate shade, has amounted to fifty per cent. greater than with entire exposure. Belts of timber a few rods in width, traversing farms fully exposed to winds, are therefore profitable in two ways: First, by the increased amount of the crops; and secondly, by the timber perpetually furnished by these belts. They should be placed at intervals of from sixty to eighty rods. Where rising land faces prevailing winds they should be nearer; but where it falls, they may be more remote. If the belts are evergreen, a rod wide will be sufficient; if deciduous, they should be three or four rods, or more. When cut, one half in breadth may be taken at a time. Or the belts may be planted thirty or forty rods apart, and alternate ones removed for timber. By selecting thrifty growers, such as the Norway spruce (evergreen) and the Scotch larch (deciduous), a growth of from twenty-five to thirty feet may be reached in about ten years, if the young trees are well cultivated at first, and fifty feet in twenty-five years. If planted closely, they will spread less and will shoot up higher than if thin and scattered. *The profits* of timber plantations must become greater each year as the forests of the country are consumed. For ordinary fuel alone, the two cords per acre which may be yearly obtained would be a constant revenue of ten dollars in many portions of the country; and when good timber trees are raised, which may be employed in the innumerable manufactures of tools and machinery, for cooperage, ships, buildings, carriages, and cabinet-work, the annual revenue would be several times greater.

If the planting of the timber-belts already described were generally adopted throughout the country, they would occupy about one twenty-fifth part of the two hundred million improved acres of the Union; would possess a money value when grown of at least $800,000,000, afford a yearly revenue in wood and timber of more than $80,000,000, and render the land they shelter more valuable than before.

But it is not merely the pecuniary profit that should induce our people generally to raise trees. The improved and polished appearance which ornamental trees would give the country at large, if planted along roadsides and on the lawns of farm-residents, would increase the attractions of country life and make their homes more desirable to young people. The moral influences of tree-planting would in this way become an important agency for improving the character of the people. (For means of accelerating the growth of young ornamental trees, see G. P. Marsh's "Man and Nature," p. 320, note.) (See Forestry.) John J. Thomas.

Ar′bor Vi′tæ (literally the "tree of life"), a term applied to the thick mass of white substance in either hemisphere of the cerebellum. This mass, when cut parallel to the median line, presents a tree-like appearance.

Arbor Vitæ [see preceding article], (*Thu′ya*), a genus of plants of the natural order Coniferæ, consisting of evergreen trees or shrubs, with compressed or flattened branchlets, and small, scale-like, and imbricated leaves. The *Thuya occidentalis* is a native of the U. S., and is often planted as an ornamental tree in the parks and pleasure-grounds of America and Europe. It is one of the trees known as white cedar. The Chinese arbor vitæ (*Thuya orientalis*), a native of China, has larger strobiles and more upright branches than the preceding. It is cultivated in Europe and the U. S. as an ornamental tree, and produces a resin which has been supposed to possess medicinal virtues. The genus comprises several other species.

Ar′broath, Ab′erbroth′wick, or **Ab′erbroth′ock,** a seaport-town of Scotland, in Forfarshire, at the mouth of a small stream called the Brothock, 16 miles N. E. of Dundee, with which it is connected by railway. It has a public library, and manufactures of coarse linens, canvas, leather, etc. About 100 vessels (tonnage 13,896) belong to this port. Here are picturesque ruins of a richly-endowed abbey, founded by William the Lion in 1178. Robert Bruce and the Scottish nobles met in this abbey in 1320 to organize a resistance to Edward II. Pop. of the parliamentary burgh in 1881, 21,785.

Ar'buckle (James) was born at Glasgow, Scotland, in 1700; wrote "Snuff," a mock-heroic poem, in 1719. Died in 1734. (See Campbell, "Introduction to the History of Poetry in Scotland.")

Arbuckle (Matthew), an American general, born in Greenbrier co., Va., in 1775. He served many years on the frontier among the Indians; also in the Mexican war (1846–47). Died June 11, 1851.

Arbuth'not (Alexander), a Scottish theologian and poet, born about 1538. He became principal of the University of Aberdeen in 1569. Among his works are a poem called "The Praises of Women" and a "History of Scotland." Died Oct. 17, 1583.

Arbuthnot (John), M. D., F. R. S., an eminent physician, born at Arbuthnot, near Montrose, in Scotland, in 1660. He studied at Aberdeen, where he graduated, and settled in London. His first work was an "Examination of Dr. Woodward's Account of the Deluge" (1697). His reputation was increased by his "Tables of the Greek, Roman, and Jewish Measures, Weights, and Coins" (1705). He was appointed physician to the queen in 1709, and obtained an extensive practice. He was an intimate associate of Pope, Swift, and Lord Bolingbroke. In 1712 he published a humorous political allegory entitled a "History of John Bull," in which the great powers then involved in war were personated by John Bull the clothier, Nick Frog the linen-draper, and Louis Baboon (Louis XIV.). This work displays a great talent for satire. He produced another humorous and ironical work, called "The First Book of the Memoirs of Martinus Scriblerus." This was part of an unfinished work which Pope, Swift, and Arbuthnot projected in partnership, and which was designed to be a satire against pedantry and the abuse of learning. In 1723 he was chosen second censor of the Royal College of Physicians, and in 1727 was made an elect of the college. Died Feb. 27, 1735. He was a man of amiable character. "He has more wit than we all have," said Swift, "and his humanity is equal to his wit." Comparing him with contemporary British authors, Dr. Johnson said, "I think Dr. Arbuthnot the first man among them. He was the most universal genius, being an excellent physician, a man of deep learning, and a man of much humor."

Ar'butine, a principle found in the leaves of the red bearberry (*Arctostaphylos uva ursi*).

Ar'butus, a genus of plants of the order Ericaceæ, mostly natives of America and Southern Europe. They are evergreen shrubs, bearing a fleshy fruit which has five cells and many seeds. The arbutus mentioned by Virgil was the *Arbutus unedo* or strawberry tree,[*] which bears bright red and yellow berries, with beautiful foliage, and is cultivated as an ornamental evergreen. The fruit has narcotic properties, and is used for making wine in Corsica. Another species, the *Arbutus Andrachne,* a native of the Levant, is admired as an ornamental plant, and bears an esculent fruit. The *Madroña* of California is a species of this genus; but the *Manzanita,* and also the bearberry (or *Uva ursi,* a trailing shrub of the northern hemisphere, the leaves used as an astringent tonic in medicine), belong to the related genus *Arctostaphylos,* although formerly included in *Arbutus.* "Trailing arbutus" is Epigæa repens (which see).

Arc [from the Lat. *ar'cus,* a "bow"], in geometry, any part of a curved line. An arc of a circle is any portion of the circumference. The straight line joining the extremities of an arc is its *chord,* which is always shorter than the arc itself. Arcs of circles are similar when they subtend equal angles at the centres of their respective circles. To rectify an arc is to find the length of a straight line to which it would be equal if it had the same length in a right direction as it has in a curved. The area included between an arc and its chord is a segment of a circle. A diurnal arc is that part of a circle described by a heavenly body between its rising and setting.

Ar'ca, a chest or coffer. 1. A chest in which the Romans placed their money; these chests were made of or bound with iron or some other metal. The name *arca* was generally given to the money-chests of the rich, and was opposed to the smaller *loculi, sacculus,* and *crumena.* 2. *Arca publica,* in the time of the Roman empire, signified the city funds, which were separate from the *ærarium* and the *fiscus.* The name *arca* was, however, equivalent to *fiscus,* or the imperial treasury. 3. *Arca* signified also either a coffin or a bier. 4. *Arca* was also a strong oaken cell in which slaves and criminals were confined.

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[*] In the U. S. the name of strawberry tree has been applied to the *Euonymus Americanus,* a plant of a different order.

Ar'ca, or **Arc Shell,** a genus of bivalve mollusks which are lamellibranchiate, and are the type of a family called Arcadæ. The hinge is straight, and is coextensive with the whole breadth of the shell, the breadth being greater than the length. Numerous species of Arca occur in tropical and other seas. Many others are fossil. One living species occurs in fresh water in India.

Arcade [from the Lat. *ar'cus,* a "bow," an "arch"], a row of arches supported by columns or square pillars. This term is sometimes applied to a long arched building or gallery lined on each side with shops; also to a row of piers or columns and arches by which the aisles are divided from the nave of a church. The arcade in Gothic corresponds to the colonnade of classical architecture. Arcades were employed by the ancient Romans in theatres, aqueducts, amphitheatres, and temples. The finest covered-passage arcades are found in Paris, and are more or less lined with elegant shops.

Arcade, R. R. junction, Wyoming co., N. Y. (see map of New York, ref. 5–D, for location of county), 35 miles S. E. of Buffalo, has extensive woollen mills, mowing-machine works, also an academy and union school. Pop. in 1870, 573; in 1880, 762.

Arca'dia [Gr. 'Αρκαδία], a celebrated state of ancient Greece, was the most central part of the Peloponnesus (now called the Morea). It was bounded on the N. by Achaia, on the E. by Argolis, on the S. by Laconia and Messenia, and on the W. by Elis. The area was about 1600 square miles. It was enclosed on nearly all sides by mountains, and a large part of it was occupied by fertile valleys and verdant mountain-ridges. The principal river was the Alpheus. It was also watered by the Helisson, the Ladon, the Erymanthus, and several smaller streams, which cut their way in numerous instances by underground channels through the limestone rocks. There were a number of lakes in the E. The Arcadians were a simple, pastoral people, inferior to most of the other Greeks in genius and culture. This inferiority may be ascribed to their isolated position, which deprived them of the influence of the sea and of the advantages of commerce. The chief towns of Arcadia were Mantinea, Tegea, Orchomenos, and Megalopolis. The Arcadians resembled the Swiss in their love of freedom and money, and in their tendency to enlist as mercenaries in foreign armies. Among the Ten Thousand whose famous retreat Zenophon described, more than two thousand were Arcadians. This country was a favorite of ancient pastoral poets, who praise the peaceful and happy life of the Arcadian shepherds. At present, Arcadia is one of the thirteen nomarchies of the kingdom of Greece. Area, 2028 square miles. Pop. in 1879, 148,905.

Arca'dius [Gr. 'Αρκάδιος], emperor of the East, the eldest son of Theodosius the Great, was born in Spain in 383 A. D. In 395 Theodosius died, after he had divided his empire between Arcadius and Honorius, the latter of whom received the western part. The eastern empire, of which Byzantium was the capital, included Thrace, Asia Minor, and Syria, and extended from the Adriatic to the Tigris. During the minority of Arcadius, Rufinus and Eutopius successively acted as regents of the empire. The empress Eudoxia acquired the control over Arcadius, who was a feeble and indolent prince. He died in 408 A. D., and was succeeded by his son, Theodosius II.

Arca'ni Discipli'na (*i. e.* the "Discipline of Secrecy"), a term for the first time used by the Protestant theologian Dallæus in 1666 for the secrecy observed in the early Church with respect to certain doctrines; as, for example, those of baptism, the Eucharist, and some others. These were withheld from candidates until after they had been received into full communion with the Church. Soon after the introduction of the term, the subject gave rise to a very animated controversy between Catholic and Protestant theologians, which has continued ever since. The former used it to account for the silence of the early Church writers as to certain doctrines and practices of their Church. Protestant writers generally regard it either as a natural outgrowth of the oppressed condition in which the Church found itself at that time, or a degeneration of the simple forms of primitive Christianity in the interest of the hierarchy. The best Catholic treatises on the subject are those by Döllinger (1826), Toklot (1836), Hefele (1846), and Mayer (1868); the best Protestant, those by Richard Rothe (in Herzog's "Real-Encyklopädie"), Zezschwitz ("Katechetik," 1863), Niedner ("Kirchengeschichte," 1846), Harnack ("Der christliche Gemeindegottesdienst," 1854), and, in particular, Bonwetsch (in "Zeitschrift für historische Theologie," 1873), who gives a complete history of the controversy.

Arcano, d' (Mauro), born about 1490, was a famous Italian burlesque poet. Died in 1536.

Arca'num (plu. **Arca'na**), a secret, a mystery; sometimes applied to a medicine the composition of which is kept a secret. This term was much used by the alchemists, whose object was to discover the grand arcanum, the philosopher's stone.

Ar'ce (Manuel José), a general who in 1824 was chosen president of the republic of Central America for four years. He favored the clerical party, at whose instigation he arrested Barrundia, governor of Guatemala, in Sept., 1826. This act provoked a popular revolt and a civil war, in which Arce was defeated in 1827. He was expelled in 1829.

Arcère (Louis Étienne), born at Marseilles, France, in 1698, was an ecclesiastic, a poet, and an historian. He wrote "History of Rochelle and of Aunis" (1756–57). Died in 1782.

Arcesila'us ['Αρκεσίλαος], a Greek philosopher, born at Pitane, in Æolis, in 316 B. C., was the founder of the New (or, as it is sometimes called, the Middle) Academy. He was a pupil of Theophrastus, and was an admirer of Plato, but taught a modified form of Platonic philosophy. He was eloquent, witty, and ingenious in argument, revived the Socratic method of teaching, and recommended an abstinence from dogmatism. It appears that he left no written statement of his doctrines, which are known to us only through the medium of his adversaries, the Stoics. Among the sayings ascribed to him is, that "he knew nothing, not even his own ignorance." Died in 241 B. C. (See Ritter, "History of Philosophy;" G. H. Lewes, "Biographical History of Philosophy.")

Arch [Lat. *ar'cus*, "a bow," "an arch"], a curved structure of stone or brick supported by the mutual pressure of its component parts, intended to cover the space between two piers or two columns, and to support at the same time a superincumbent weight. The wedge-shaped pieces of which the arch is composed are called *voussoirs*. The middle stone of the arch is called the *key-stone*, and the lowest stone on either side is the *springer*. The highest part is the *crown*, the sides are termed *haunches*, the inner curve is the *intrados*, and the exterior or upper curve is the *extrados;* while the base which supports the lowest *voussoir* or *springer* on each side is the *impost*. Arches are of various shapes, but the principal distinction is into *round* and *pointed*. All other shapes are merely described in one of these, and the principle of construction is the same for all. The arch was known to the Egyptians, the Ethiopians, the Assyrians, the Greeks, and the Etruscans, though no one of these peoples made any extensive use of it, since the post-and-lintel system met all their wants. Its first considerable use was by the Romans, who employed exclusively the round form. They used it in doors and windows, in their aqueducts, bridges, and triumphal arches, and they early developed from it a complete system of vaulting. (See Vault.) Among the oldest arches known is the Cloaca Maxima, a great sewer built in Rome in the time of the Tarquins, and still in good condition. The pointed arch came into use later. It was at first sparingly employed, but lending itself more easily than the round arch to the increasing desire for height in building, it gradually superseded the round arch, and became so inherent a feature of the Gothic style that the name of Pointed Architecture is often applied to the works of the mediæval builders.

Clarence Cook.

Arch, Triumphal [Lat. *ar'cus triumpha'lis;* Fr. *arc de triomphe* or *arc triomphal*], a monumental structure erected in honor of a victorious general or in commemoration of some important event or victory. It was usually placed at the entrance of a city or over a grand avenue. The ancient Romans built numerous triumphal arches at Rome and elsewhere. Scipio Africanus erected one on the Capitoline Hill, about 190 B. C. Magnificent structures of this class were raised by Augustus at Rimini and Ancona. Three triumphal arches at Rome are still extant—namely, the Arch of Titus, which commemorates the conquest of Judea; the Arch of Septimius Severus; and the Arch of Constantine, a beautiful and imposing structure adorned with bas-reliefs. The most magnificent of modern triumphal arches are those of Paris, and the finest among these is the Arc de l'Étoile, erected by Napoleon I. at the Barrière de Neuilly. It has three arches, the central one of which is 95 feet high. The whole structure, which is equal in grandeur and splendor to the ancient Roman arches, is about 160 feet high and 150 feet in length.

Arch (Joseph), president of the English National Agricultural Laborers' Union, was born in Barford, Warwickshire, England, Nov. 10, 1826. He was the child of laboring people, and was brought up as a laborer, with no education but what he has picked up by himself. He has learned from the newspapers all he knows about the important questions of the day, and has taught himself to read and write. Being a total-abstinence man and a Methodist, he added to his daily labor the duties of "a local preacher;" that is, a layman who preaches in the chapel or in the open air within a certain district, and without pay. He says of himself that in his twenty-seven years as a preacher he walked over 7000 miles to expound the gospel to his fellows. When a young man, Arch felt that he and his kind were badly treated, and he rebelled against it. In a speech at Leamington in 1872 he said: "Men, I'll tell you what I had to do. I had a wife and two children, and one-and-sixpence a day (thirty-six cents) was all I was getting, working hard, morning and night. I asked my master for more; he said, 'One-and-sixpence a day is all I shall give you.' I had sworn at the altar to love and cherish my wife, and I knew that would not keep her and the children; so I struck. I went away to work where I could get higher wages. Sometimes I could not get anything but straw to sleep on, and once I slept for nights and nights on corded wood; but I thought if any one was to suffer, it was not my wife and children, but myself." He roamed over England, working at job or piece work, sending all he earned to his wife, and preaching on Sundays on the village-greens. After a long time, and with much labor and sacrifice, Arch saved money enough to buy the freehold of his little cottage at Barford. When the Warwickshire farm-laborers struck they appealed to Arch to be their leader. The strike began in Feb., 1872, at Wellesbourne, 7 miles from Warwick. The laborers there and in the neighboring hamlets struck for an advance of four shillings ($1) per week. Their leader was one John Lewis, who proposed that they should form a union, but it was necessary to have for leader a better-taught man; so Joseph Arch, the local preacher, was sent for. After much foolish opposition from high-placed people, both lay and clergy, the union was fairly started by the active assistance of rich Radicals in Birmingham, with Mr. Auberon Herbert, Mr. Edward Jenkins (the author of "Ginx's Baby"), Dr. Langford, and other reformers. Arch travelled through all parts of England, organizing branches of the union wherever he went. In two months such progress was made that on the 29th and 30th of May a meeting was held at Leamington of delegates from all parts of the country, presided over by Mr. G. Dixon, M. P. for Birmingham. At this meeting Arch was unanimously elected president of the union. The movement, which at first was only a demand for a few more shillings a week, has now become one of political importance, and the laborers demand a vote in the counties, as the artisans have already done in the cities. Arch at first avoided all political references, but when the queen, through her steward, discharged the laborers on her private estate for demanding a few more shillings a week, he spoke strong words, and even as the movement has advanced there is no doubt his ideas have advanced also. The union did not at first encourage emigration. Arch said, "I wish to assist a man to get a living in England, not to run away from it." Emigration had been tried, and many laborers had been persuaded to go to Brazil, where they had suffered terribly from the insufficient food and from the yellow fever. Their fate was learned from some of their number, who were sent to New York by the Brazilian authorities. (See on this subject, "Reports respecting the Condition of British Emigrants in Brazil, presented to Parliament by Her Majesty's Command," 1873, and a heartrending letter from one of the emigrants, Thomas Sheasby, published by order of the earl of Kimberley in the *Times* of Aug. 29, 1873. See also, for a thorough exposure of the whole nefarious business, a little book, "Brazilian Civilization, from an European Point of View," by Jacaré Assu (a *nom-de-plume*), London, 1873.) As the men sent by the Brazilian authorities to New York immediately got good places, and as the superintendent declared that they were just the sort of men needed here, and that he could obtain places for all such who should arrive, Arch determined to visit America and look into the matter for himself. He accordingly came over in the summer of 1873, and made a careful study of Canada, returning to England in the late autumn of the same year, and promising to return to America in the following spring and make an equally careful study of the U. S. as a field for emigration. His report will be looked for with great interest. (We are indebted for the facts in this notice mainly to an article in the New York "Tribune" for Aug. 16, 1873. A brief review of Jacaré Assu's book will be found in the "Athenæum" for Oct. 18, 1873.) For a detailed account of his career, see "The English Peasantry," by Francis George Heath, 1874. Clarence Cook.

Archæol'ogy [from the Gr. ἀρχαῖος, "ancient," and λόγος, a "discourse," a "science"], literally, "the science of antiquities." The term in its widest sense includes the knowledge of the origin, language, religion, laws, institutions, literature, science, arts, manners, customs—everything, in fact, that can be learned of the ancient life and being of mankind. Archæology may thus be made to comprehend a part, in greater or less degree, of many branches of knowledge which are recognized as distinct or independent pursuits; but in its narrower, and perhaps more popular signification, it is understood to have reference to the *materials* from which a knowledge of the ancient condition of a country is to be attained. These materials may be divided into three groups—written, monumental, and traditional. The first, or written archæology, includes both the science of ancient writings and the knowledge of printed books. The second, monumental archæology, admits of almost endless subdivisions, according to the character of the remains to be studied, which may be works of art, such as buildings, sculptures, paintings, inscriptions, coins, armorial bearings, furniture, enamels, glass, porcelain, etc.; works of engineering, such as roads, canals, aqueducts, mines, etc.; articles of dress, armor, or personal ornament; tools, weapons, utensils, etc.; forms of sepulture; vestiges of man and animals, such as bones, etc. The third, or traditional archæology, may be said to include the oral literature of a people, their dialects, legends, proverbs, ballads, as well as their sports, customs, and superstitions.

In regard to the application of the words Archæology and Antiquities, it may be remarked that the latter has reference properly to the objects studied, the former to the study itself. And though archæology in its more limited signification refers to the materials studied, those materials are considered not as individuals, but in their totality. Thus, while we might say a "collection of antiquities" (*i. e.* of antique objects), we could not so properly say "a collection of archæology," though we might say "an archæological collection." The study of archæology was long almost exclusively confined to the antiquities of the Greeks and Romans, but about the middle of the sixteenth century attention was turned to the antiquities of other ancient nations and of the Middle Ages. Since the discovery of the Rosetta Stone, which gave a key to its hieroglyphics, the archæology of Egypt has made considerable progress; while the discoveries of Layard, Rawlinson, and others have already far advanced that of Assyria. Within the last few years the archæology of India and that of China have been successfully prosecuted. The rude and scanty remains of the aboriginal inhabitants of North America have occupied the attention of men of letters in this country; while the more stately and instructive monuments of Central and South America have fully rewarded the investigations of antiquaries. Pre-historic archæology, or the study of the relics of man as he existed before the dawn of history, is of late attracting much attention, the Royal Society of Antiquaries at Copenhagen having given this branch of the subject especial attention, Northern Europe being peculiarly rich in remains of the pre-historic ages.

In Great Britain, too, pre-historic remains of the most ancient origin have been abundantly found, and there can be but little doubt that many ancient relics which have been regarded as Druidical are in reality ante-Celtic. But in France and Belgium, especially, have the labors of Boucher de Perthes, Lartet, De Vibraye, and others been rewarded by the discovery of very ancient human relics. In Switzerland (see Lake Dwellings), in Italy, Turkey, Germany, India, America, and in many other lands, the study of these profoundly interesting pre-historic remains has aroused much enthusiasm. But the work is as yet in its early infancy. The Cyclopean walls of the southern peninsulas of Europe are now generally assigned to the pre-historic ages. The fruits of the discoveries near the supposed site of ancient Troy are by many referred to pre-historic times. Still, the presence of inscriptions with what seem like Semitic characters must link these supposed "treasures of Priam" with historic peoples. The later heroic age of Greece has left but few undoubted relics. The discovery of Phrygian ruins bearing the name of King Midas is interesting in this connection, though it does not appear that these ruins can with confidence be referred to the age of Mīdas. The deeply interesting discoveries in Cyprus (see Cyprus and Cesnola, di) have shown us unquestionably the works of historic times. The recent (1873) discovery of the key to the reading of the strange inscriptions in the syllabic alphabet of Cyprus have thus far given no evidence of their being of very remote origin, and the inscriptions themselves are in Greek of a very marked dialect.

While pre-historic archæology opens to us a world of mystery and wonder, the archæology of later times serves to dispel mysteries; the resulting effect of the two being to remove the mysterious age farther backward into the past. Much that has hitherto been unexplained is receiving light from the labors of archæologists in the valley of the Euphrates-Tigris, as well as in that of the Nile. Biblical archæology is greatly forwarded by the labors of the English and Americans in the Holy Land. The Asiatic societies find abundant material for examination in South-eastern India, a new and almost untrodden field. Osiander, Fresnel, and other Semitic scholars would appear to have solved the riddle of the Himyaritic inscriptions in Arabia; and the wonders of the semi-civilizations of America before the time of Columbus have been much diminished by the simple and yet admirable generalizations which have been of late brought forward with regard to them. (See the article Architecture of the American Aborigines in the present work, by Lewis H. Morgan, LL.D.) But an interest hardly less intense than attaches to the above-mentioned works is, and long has been, felt in the antiquities of the Middle Ages, both ecclesiastical and social. The civilizations of ancient Rome and Greece are quite clearly marked off from ours, while the Christian civilization that sprang up on the ruins of the old is our own civilization, and must possess for ever a deep interest to the student of the science of humanity. The French and Italians have given special attention to this department.

Among other archæological works going on at present or quite recently, may be mentioned the interesting and quite important excavations at Ephesus and other points in Asia Minor; those at Cyrene and Carthage; and the labors of Mariette Bey in Egypt, so pregnant with important consequences, extended, by the direction of the khedive of Egypt, to Nubia and the Soudan. The British war in Abyssinia has led to discoveries of much interest in regard to the literary archæology of that remarkable region. The monumental archæology of Brazil, Ecuador, Peru, and the rest of South America has been studied with important results.

The quite modern science of "folk-lore," which examines and compares the traditions, legends, superstitions, and immemorial customs of existing peoples, links itself inseparably with some departments of archæology; and it is from the study of long-overlooked traces of the old Ayran and Sanscrit traditions, legends, superstitions, and customs that they receive much of the light which has lately been shed upon them—a light which shows very plainly that a common, if very remote, kinship unites all the Indo-European peoples. Such considerations show that the true archæologist is no mere antiquarian curiosity-hunter, but a student of matters which have a very wide and deep interest to nearly every thoughtful mind.

The science of archæology has been greatly promoted by the publication of chronicles, records, catalogues, etc., by the formation of clubs and societies, and by the establishment of museums for the collection and classification of antiquities. Among the societies formed for this purpose may be mentioned the Society of Antiquaries of London, which was founded in 1572, but was not incorporated by royal charter until 1751; the Society of Antiquaries of Scotland, chartered in 1780; and the Royal Irish Academy, for promoting "the study of science, polite literature, and antiquities," which was chartered in 1786. The last two have good museums of national antiquities. Among the most celebrated antiquarian collections are those of the British Museum in London, which contains, besides a great collection of early manuscripts, galleries of Assyrian, Egyptian, Etruscan, Greek, Roman, British, and mediæval antiquities; the museums of the Louvre and the Hôtel de Cluny in Paris, which contain an unrivalled collection of mediæval in addition to more ancient antiquities; and the Royal Museum at Naples, which contains most of the objects recovered during the last one hundred years from the ruins of Herculaneum and Pompeii. Among the best works on classic antiquity are those of Montfaucon, particularly his "Antiquité Expliquée" (10 vols., 1719), and Winckelmann's "Geschichte der Kunst des Alterthums" (1766), and his "Monumenti antichi inediti" (1766). On Egyptian archæology, see the works of Champollion and Bunsen. Among the recent works on archæology those by Westropp, "Handbook of Archæology" (1867), Jahn, "Aus der Alterthumswissenchaft" (1869), and J. H. Parker's "Archæology of Rome" (vol. i. 1874), deserve to be here mentioned. On pre-historic archæology see Lubbock, "Pre-historic Times" (2d ed. 1869); Baldwin, "Pre-historic Nations" (1869), and "Ancient America" (1872); C. C. Jones, "Antiquities of the Southern Indians" (1873); Foster, "Pre-historic Races of the U. S." (1873). Among the writers upon Scandinavian pre-historic remains we may mention N. M. Petersen, Finn Magnusen, and Worsaae. (See also the articles Hieroglyphics; Cuneiform Inscriptions, by W. Hayes Ward; Biblical Archæology; and Pre-historic Races.)

Revised by C. W. Greene.

Archæop'teryx [from the Gr. ἀρχαῖος, "old," and πτέρυξ, "wing"], a remarkable fossil bird found in the lithographic limestones (Jurassic) of Solenhofen, Bavaria, and named by Prof. Owen. This bird exhibits some peculiarities of anatomical structure which have led zoologists to consider it as a kind of connecting link between birds and reptiles. The head is not distinctly shown in the fossil. The wings are short, but provided with long plumes spread somewhat like a fan. The tail is long, and composed of a large number of vertebræ, from which feathers diverge on either side. The feet are similar to those of birds.

Archaig' (or **Arkeg**), **Loch,** a beautiful lake of Scotland, in the county of Inverness, 1 mile W. of Loch Lochy (or Lochie). It is about 17 miles long and 1 mile wide. The adjacent scenery is picturesque.

Archan'gel [Gr. *ἀρχάγγελος*, from *ἄρχω*, to "be first," and *ἄγγελος*, a "messenger" or "angel"], an angel of the highest order; a ruling angel. (See ANGEL.) This term is used in the New Testament—Jude 9 and 1 Thess. iv. 16.

Archan'gel, or **Archangelsk',** a government or province of European Russia, is bounded on the N. by the Arctic Ocean, on the E. by the Ural Mountains, on the S. by Wologda and Olonetz, and on the W. by Finland. It comprises Russian Lapland, and is divided into two parts by the White Sea. The surface is flat, and the soil mostly barren, but produces valuable timber. The climate is very severe. Area, 286,739 square miles. Pop. in 1879, 307,231.

Archangel, a seaport-town of Russia, the capital of the province of that name, is on the Dwina, about 20 miles from its entrance into the Bay of Archangel (or the White Sea); lat. 64° 32' N., lon. 40° 33' E. The houses are mostly of wood. It has about twelve churches and an ecclesiastical college. The harbor is closed by ice except about three months, from July to September, during which period it is visited by many foreign vessels. The chief articles of export are fish, furs, lumber, tallow, flax, linseed, tar, iron, and bristles. This place, which was founded in 1584, was for a long time the only seaport of Russia. Pop. in 1882, 19,540.

Archbish'op [Lat. *archiepis'copus;* Gr. *ἀρχιεπίσκοπος*, from *ἄρχω*, to "be first," and *ἐπίσκοπος*, an "overseer," a "bishop"], the term applied to the head-bishop of an ecclesiastical province containing several dioceses, who has also a diocese of his own. The title came into use in the fourth century, and is said to have been first employed by Athanasius. It was hardly known in the Latin Church before the seventh century after Christ. The Church of England has two archbishops—one of Canterbury, and the other of York.

Arch'dale (JOHN), an Englishman and member of the Society of Friends, became governor of Carolina in 1695. He introduced the cultivation of rice, and in several respects promoted the prosperity of the colony. In 1707 he published a "Description of the Province of Carolina."

Archdea'con [Lat. *archidiac'onus*], an ecclesiastic whose jurisdiction is immediately subordinate to that of a bishop. An archdeacon was originally an assistant of the bishop, and an overseer of the deacons and younger clergy. The authority of the archdeacons gradually increased, and became distinct from that of the bishops, so that in the twelfth century they were recognized as influential prelates. Since that time their power and influence have been much reduced. The Church of England has seventy-one archdeacons, who have a limited vice-episcopal territorial jurisdiction. (See DEACON.)

Archduke' and **Archduch'ess,** titles assumed by all the sons and daughters of the emperor of Austria, and inherited by their descendants through the male line. The title of archduke was first taken by the dukes of Austria in the fourteenth century, or earlier, but their claim to that mark of precedence over the other dukes of the German empire was not recognized by the emperor and the electors until 1453.

Archegosau'rus [from the Gr. *ἀρχηγός*, a "leader" or "beginner," and *σαῦρος*, a "lizard" or "saurian"], a fossil animal, so named because it was supposed to have been the beginning of reptilian life. It is found in the Bavarian coal-measures. Goldfuss in 1847 described three species discovered in the coal-field of Saarbrück, and gave them the generic name of *Archegosaurus*. Professor Owen considers this animal as a remarkable connecting link between reptiles and fishes. Agassiz and Dana regard it as a ganoid fish, while others class it with salamandroid batrachians.

Archela'us, a Greek philosopher, surnamed PHYSICUS, because he applied himself chiefly to physical science, was a native of Miletus, or, as some say, of Athens. He was a pupil of Anaxagoras, and flourished about 450 B. C. Socrates was one of his pupils. Archelaus taught that there were two principles of generation—heat, which moves, and cold, which remains at rest. His works, if he wrote any, are not extant.

Archelaus [Gr. *Ἀρχέλαος*], king of Macedonia, was a son of Perdiccas II., whom he succeeded in 413 B. C. He patronized Euripides and Zeuxis and other Greek poets and artists. Socrates was invited to his court, but did not go. This king promoted the prosperity of Macedonia by roads and other internal improvements. Died in 399 B. C.

Archelaus, an able general of Mithridates the Great, was a native of Cappadocia. He commanded a large army which that king sent to oppose the Romans in Greece in 87 B. C. He captured a number of islands and occupied Athens, where he was attacked and besieged by Sulla. Having been forced to evacuate Athens, he retired to Thessaly in 86 B. C., and was defeated by Sulla at Chærone'a and Orchomenus. He signed a treaty of peace with Sulla in the year 85, and deserted to the Romans in 81 B. C.

Archelaus, a son of the preceding, became high priest of Comana about 63 B. C. He pretended to be a son of King Mithridates, and by that imposture induced Berenice, queen of Egypt, to marry him. After he had reigned about six months in Egypt, he was defeated and killed by the Romans in 55 B. C. He left a son, Archelaus, who was high priest of Comana until he was deprived of that office by Cæsar in 47 B. C.

Archelaus, a son of Herod the Great by Malthace, a Samaritan woman. On the death of his father (4 B. C.) he became ethnarch of Judea, Samaria, and Idumea; his full brother Antipas and his half brother Philip receiving the rest of the kingdom. Fear of him sent the parents of Jesus into Galilee. In 7 A. D. he was deposed by Augustus, and banished to Vienne, Gaul, where probably he died.

Archelaus, a Greek sculptor, a native of Priene, is supposed to have lived about 30–60 A. D. He produced an admirable marble bas-relief representing the apotheosis of Homer, which is now in the British Museum.

Archenceph'ala [from the Gr. *ἀρχή*, the "first or highest place," and *ἐγκέφαλος*, the "brain"], a term applied to the highest division of the class Mammalia, to which the order Bimana, composed of the solitary genus *Homo*, belongs.

Ar'chenholz', von (JOHANN WILHELM), BARON, a German historian, born at Dantzic Sept. 3, 1745. He served in the Prussian army in the Seven Years' war, after which he travelled in England and other countries. He wrote, besides other works, "England and Italy" (2 vols., 1785), and a popular "History of the Seven Years' War" (2 vols., 1793), which was translated into many languages. Died Feb. 28, 1812.

Ar'cher [from the Lat. *ar'cus*, a "bow; Fr. *archer*] and **Archery.** An archer is one who shoots with a bow. In ancient times archers formed an important portion of the armies of most Oriental and of all barbarous or semi-barbarous nations. Among the ancients, the Cretans, Parthians, and Thracians, and in the Middle Ages the English, were especially distinguished for the skill and efficiency of their archers. The use of the bow and arrow in war was probably first introduced into Britain by the Romans, but it was under the Norman rule in England that archery was extensively practised and greatly improved. Her archers became superior to those of all other nations. The English archers decided the fate of the day in the important battles of Crécy, Poitiers, and Agincourt. Among the Asiatic Turks, the Persians, the Tartars, and other nations of the East, as well as certain native African tribes and some American Indians, the bow and arrow are still used as weapons of war. In England archery is now no more than a pastime; it is promoted by archery clubs or societies. During the reign of Charles II. of England archery was much patronized by the court. After his reign archery fell into disuse for about a century. Towards the latter part of the last century it was revived as a fashionable pastime; even ladies often taking part in the trials of skill. The exercise, especially in the form of target-shooting, is still popular. (See BOW and ARROW.)

Archer, capital of Archer co., Tex. (see map of Texas, ref. 2–G, for location of county). Pop. not in census of 1880.

Archer (BRANCH T.), M. D., born in 1790 in Virginia, studied medicine in Philadelphia, and was long a prominent physician and politician in Virginia. He went to Texas, in 1831 took part in the revolution, was in 1835 president of the "Consultation," and was sent as a commissioner to the U. S. He was a member of the first Texan Congress, and speaker of the house of representatives and secretary of war 1839–42. Died Sept. 22, 1856, in Brazoria co., Tex.

Archer (JOHN), M. D., born in Harford co., Md., in 1741, graduated at Princeton in 1760, was the first person who received the degree of M. D. in America. This degree he received from the Philadelphia Medical College in 1768. He served for a time as an officer in the Revolutionary war, and was a member of Congress from Maryland (1801–07). Died in 1810.

Archer (Stevenson), LL.D., a son of Dr. John Archer, born in Harford co., Md., and graduated at Princeton in 1805. He was a member of Congress from Maryland (1811–17 and 1819–21), and was a judge in the State court of appeals, and for a time U. S. judge in Mississippi Territory. Died June 5, 1848.

Archer (Stevenson), Jr., a son of the preceding, born in Harford co., Md., in 1827, graduated at Princeton College in 1846, became a lawyer, and in 1866 was elected to Congress, of which he was a member till 1875.

Archer (William S.), a Senator, born in Amelia co., Va., Mar. 5, 1789. He was educated at William and Mary College, was a member of Congress from 1820 to 1835, and was elected to the U. S. Senate by the Whigs of Virginia in 1841. He was chairman of the Senate's committee on foreign relations. Died Mar. 28, 1855.

Archer Fish, the name of certain small East Indian fishes of the acanthopterygious family of Bramidæ. They project drops of water at insects, which they thus cause to fall from the air into the water, and then devour them. The *Toxo'tes jacula'tor*, one of these archer fishes, is a native of Java, and about six inches long. The only remarkable peculiarity in the form of this fish is its greatly elongated lower jaw, which perhaps may aid it in directing the liquid missile upon which its subsistence partially depends, as does that of the hunter on the accuracy of his rifle. "So powerful," says Wood, "is the projectile force, and so marvellously accurate is the aim [of the *Toxotes jaculator*], that it will strike a fly with certainty at a distance of three or even four feet."

Archer Fish.

Ar'ches, Court of, a court of ecclesiastical law in England, is the chief court of appeal in the province of Canterbury, which includes nearly all England. The dean of arches is usually the deputy of the archbishop of Canterbury. This court is so called because it was once held in the church of St. Mary le Bow (*de Arcubus*).

Ar'chetype [from the Gr. ἀρχή, a "beginning," "origin," and τύπος, "a type"], the original pattern or model of a work; the original type on which others are formed. Among Platonic philosophers the term archetype was applied to the original patterns or ideas existing in the Divine mind before the creation.

Archiac, d' (Etienne Jules Adolphe Desmier de Saint-Simon), Vicomte, a French geologist and author, born at Rheims in 1802. He published, besides other works in French, a romance entitled "Zizim, or the Chivalry of Rhodes" (3 vols., 1828), and a "History of the Progress of Geology from 1834 to 1863" (8 vols., 1847–62). The latter was published at the expense of the state.

Ar'chias (Aulus Licinius), a Greek poet, born at Antioch in Syria about 120 B. C., became a resident of Rome in 102 B. C., and obtained the right of citizenship. He was intimate with Cicero and Lucullus, and was courted or patronized by several eminent men on account of his genius or learning. Having been accused of assuming citizenship illegally, he was defended by Cicero in an able oration ("Pro Archia"), which contains the only information we have concerning Archias, about 60 B. C. Among the works of Archias which are lost were a poem on the Mithridatic war, and one on the Cimbric war of Marius. (See Wallenius, "Dissertatio de Aulo Licinio Archia," 1806.)

Archia'ter, or **Archiator** [Gr. ἀρχίατρος, a "chief physician," from ἄρχω, to "be first," and ἰατρός, "physician"], a title given by the Roman emperors to some of their medical attendants; also to certain officials who were paid by the state or city, and were expected to give gratuitous medical treatment to the poor.

Archibald (Adams G.), born in Truro, Nova Scotia, May 18, 1814, became a lawyer in 1839, solicitor-general of Nova Scotia in 1856, and was a prominent legislator in that province. In 1867 he was president of the Canadian council and one of the secretaries of state, and in 1871–72 lieutenant-governor of Manitoba and the North-west Provinces.

Archida'mus II., of Sparta, became king about 470 B. C. He waged war against the Messenians, and commanded the army which invaded Attica in 431 B. C., but the Athenians declined a battle. This was one of the earliest campaigns of the Peloponnesian war. He was the father of the famous Agesilaus. Died in 427 B. C.

Archidamus III., king of Sparta, was a grandson of the preceding and son of Agesilaus II. He defeated the Arcadians and Argives in 367 B. C., in a battle which was called the "scarless" or "tearless," because no Spartan was killed in it. In 362 he defended Sparta with success against Epaminondas. He began to reign on the death of his father, 361 B. C., and was an ally of the Phocians in the Sacred war. Having led an army to Italy to aid the Tarentines, he was killed in battle in 338 B. C.

Archidamus V. was the last king of the Proclid line. He was a brother of Agis IV., whom he succeeded in 240 B. C. He was soon killed by the parties that murdered Agis.

Archido'na, a village of Spain, in the province of Malaga, 9 miles E. N. E. of Antequera. It is on the railway from Granada to Antequera. It has large quarries of marble, and many Roman antiquities. Pop. 7410.

Ar'chil, Or'chil, or **Orseille** [perhaps a corruption of *roccel'la*, a "little rock," so named because the plant grows on rocks], a reddish-purple dye obtained from various species of lichens, among which are the *Lichen roccella* or *Roccella tinctoria, Roccella fuciformis*, and *Lecanora tartarea*. These are gathered from rocks near the shores of the Canaries, the Azores, the Cape de Verde Isles, Sardinia, Corsica, Ceylon, Madeira, Lower California, Auvergne, the Pyrenees, Sweden, and many other countries. The lichens do not contain the coloring-matter ready formed, but they contain colorless acids, *erythric, lecanoric, orsellinic, evernic*, etc., which readily change to Orcin (which see). By the action of air and ammonia the colorless orcin changes to purple *orcein*, which is the coloring-principle of archil. To produce the archil, the weeds are reduced to pulp, a little putrid urine or ammonic carbonate is added, and the whole is allowed to putrefy or ferment. In a week or ten days the color is fully developed. By adding potassic or sodic carbonate, instead of ammonia, a blue color, Litmus (which see), is obtained instead of archil. *Cudbear* is a variety of archil made at Glasgow. Archil produces beautiful shades of purple, violet, mauve, red, etc., but, unfortunately, they are not, as generally employed, permanent. Dr. Stenhouse suggested some improvements in the manufacture of archil, which were in 1856 put in practice by M. Marnas of the firm of Guinon, Marnas & Bonnet of Lyons. He treated lichens with milk of lime, filtered, precipitated the color-producing principles by hydrochloric acid, washed them on a filter, dissolved them in ammonia, and subjected the solution to a temperature of from 153° to 160° for twenty or twenty-five days. The color being at this time fully developed, he precipitated it by adding calcic chloride. The purple lake thus obtained was sold as *French purple*. To dye with this lake it is mixed with oxalic acid and water, boiled, and filtered. The color all goes into solution, a little ammonia is added, and on introducing the silk, wool, or mordanted cotton (mordanted with albumen, or as for Turkey-red), they become dyed with magnificent fast shades of purple. Unfortunately for M. Marnas, in the same year that he developed his *French purple* (1856) Mr. Perkin discovered his *mauve*, which was the starting-point in the great aniline-color industry. Archil has therefore a comparatively limited application. C. F. Chandler.

Archil'ochus [Gr. Ἀρχίλοχος], a Greek poet, was born in the island of Paros. He flourished about 710–670 B. C. At an early age he emigrated to Thasos and became a soldier, but he lost or threw away his shield in a battle between the Thasians and Thracians. He afterwards went to Sparta, from which he was banished, probably for the licentiousness of his verses. He wrote odes, elegies, and satires, which were extremely severe and personal, was regarded as the inventor of iambic verse, and was ranked by ancient critics as second to Homer. His versatile and brilliant genius is highly praised by Quintilian. According to tradition, he was killed in a battle between the Parians and the people of Naxos. The extant fragments of his poetry have been edited by Bergk in his "Poetæ Lyrici Græci," 4th ed. 1878–82. (See MÜLLER, "Literature of Ancient Greece.")

Archima'gus, the chief of the ancient Persian magi. This title and office belonged to the reigning king of Persia after the time of Darius I., who, having ordered a general massacre of the magi, directed that it should be recorded on his monument that he was the master of the magi. It is also the name of a powerful and wicked magician in Spenser's "Faerie Queene."

Archiman'drite [Lat. *archimandri'ta*, from the Gr. ἀρχή, the "first place or power," and *μάνδρα*, a "retreat" or "resting-place"], an ecclesiastic who presides over monasteries of the Greek Church. The Russian bishops are chosen from the archimandrites. The title is retained in the Greek rite of the Roman Catholic Church.

Archime'des [Gr. 'Αρχιμήδης], the greatest of ancient geometers, was born at Syracuse about 287 B. C., and was of Greek extraction. He is said to have been a pupil of Conon and a kinsman of Hiero II., king of Syracuse, by whom he was patronized. He enriched geometry, mathematics, and mechanics with important discoveries, and invented several useful and powerful machines. King Hiero suspecting that a goldsmith had mixed alloy with a golden crown which he had made for him, applied to Archimedes to detect the fraud. The solution of this problem suggested itself to him as he entered a full bathing-tub, and perceived that his body must displace a volume of water equal to its own bulk. Greatly delighted with the discovery, he ran out of the bath, without having dressed (as the story goes), exclaiming "Eurēka!"—"I have found it!" He discovered the proportion which a sphere bears to a cylinder by which it is enclosed. He was the author of a celebrated saying, "*Δὸς ποῦ στῶ καὶ τὴν γῆν κινήσω*"—"Give me where I may stand and I will move the world" (or "universe"). When Syracuse was besieged by the Roman general Marcellus, Archimedes exerted his ingenuity in the invention and construction of powerful machines or engines for the defence of that city. The tradition that he burned the Roman ships by mirrors is not confirmed by Polybius and Plutarch, and is discredited by many writers. He was killed, it is said, at the capture of Syracuse, in 212 B. C., by a Roman soldier, who would have spared his life if Archimedes had not been so absorbed in a problem that he would not comply with the soldier's summons to surrender or to follow him. He wrote numerous works, of which eight are extant, namely: "On the Sphere and Cylinder;" "The Measurement of a Circle;" "On the Equilibrium and Centre of Gravity of Planes;" "On Conoids and Spheroids;" "On Spirals;" "The Quadrature of the Parabola;" "The Arenarius;" and "On Floating Bodies." According to his direction, a cylinder enclosing a sphere was engraved on his tombstone, to commemorate his discovery of their relation. His extant works were edited by Torelli, Oxford, 1792. "He possessed," says Professor Donkin of Oxford, "in a degree never exceeded, unless by Newton, the inventive genius which discovers new provinces of inquiry, and finds new points of view for old and familiar objects, and the power and habit of intense and persevering thought, without which other intellectual gifts are comparatively fruitless." (See HENNERT, "Dissertation sur la Vie d'Archimède," 1766; DOMENICO SCINÀ, "Discorso intorno ad Archimede," 1823.) WILLIAM JACOBS.

Archimedes, a genus of fossil Bryozoans found in the lower carboniferous limestone of the Mississippi Valley, of which the calcareous portion consists of a central axis, around which is spirally wound a reticulated, poriferous, divergent, ribbon-like band, forming a screw. Several species have been described, and they are so abundant in the rock which contains them that this has been sometimes called the *archimedes limestone.*

Archimedes, the Principle of, an important principle in the science of hydrostatics, the discovery of which is ascribed to Archimedes, is this: "A body immersed in a fluid loses exactly as much of its weight as is equal to the weight of the fluid which it displaces."

Archimedes' Screw, a machine for raising water, supposed to have been invented by Archimedes. The most simple form of it is a flexible tube bent spirally around a solid cylinder, the ends of which turn on pivots. The machine is placed in an inclined position, the lower mouth of the tube being under the surface of the water, which can be raised to a limited height by turning the crank at the upper end. It is often formed of a centre shaft, on which metal plates are fixed like the thread of a screw, and enclosed in a cylindrical trough, the lower end of which is inserted in the water. It is used in Holland for draining low grounds.

Archine, a measure of length in Russia exactly equal to twenty-eight British or American inches.

Archipel'ago [from the Gr. ἄρχι, "first," "chief," and πέλαγος, "sea"], a name originally applied to a part of the Mediterranean called the Ægean Sea, which lies between Greece and Asia Minor and encloses numerous islands. These are mostly arranged in two groups, the Cyclades and Sporades. The principal islands of the former group are Melos or Milo, Naxos, Paros, Andros, Tenos, Delos, Seripho, Syra, Cythnos, and Thera. These islands, with Negropont, which is the largest island in the Archipelago, belong to Greece. Some writers include Crete in the Archipelago. Among the Sporades, which belong to Turkey, are Rhodes, Samos, Scio (Chios), Lemnos, Metelin or Mitylene, Imbro, Samothraki, and Thasos. The islands of this sea are generally of calcareous formation, and have a fertile soil, beautiful scenery, and a pleasant climate. Many of them have produced famous philosophers, artists, and poets, and have been the scenes of interesting events of ancient history. (See ÆGEAN SEA.) In modern times the term is applied to any sea or expanse of water which contains many islands, or to a group of islands, as the Malay or Eastern Archipelago.

Archipelago (EASTERN). See EASTERN ARCHIPELAGO.

Arch'itecture [Gr. ἀρχιτεκτονική, "chief art;" Lat. *architectu'ra;* It. *architettu'ra;* Fr. *architecture;* Ger. *Baukunst*, the "building art"]. The art of architecture, like all the fine arts, except, perhaps, the art of music, has its roots in pure utility. It begins everywhere with the construction of a shelter against the elements. The rudest peoples, and even those who live in the mildest climates, feel the need of a roof. The Otaheitan has his hut, the American Indian his tent, the Esquimaux his dome of ice, the Indian his cave. Every race shows that there is inherent in man the instinct of building. He shares it with the beaver, the ant, and the bird. It exists in him as the power of language exists in him, and, like that, as like any one of his native powers, it may be developed or may remain undeveloped. So long as it continues in this merely rudimentary condition, serving man's necessary physical needs, and them alone, it is not a fine art, and it is sometimes questioned whether, even when it is at its highest, it deserves that distinction. But without entering upon too subtle an argument, it may at least be asserted that building only becomes architecture and enters the region of art when man begins to decorate his shelter in order to gratify a craving for beauty, a love of proportion. Still, it is necessary in studying the history of architecture to observe and to record its rudimentary condition in the several countries where it has been developed to a high point. For man's social experience is written in his buildings; their grandeur and beauty are a measure of his civilization. They are the material mould of his politics, his religion, and his laws.

Egyptian Architecture.—Any sketch of the history of architecture, however slight, must necessarily begin with Egypt, because there the oldest civilization of the human race is recorded in the oldest buildings of which we have any knowledge. Scholars are now generally agreed that the date of the Pyramids of Ghizeh is not less that 3000 years B. C. It is suspected that the Sphinx and the small temple of granite and alabaster near it may be very much older than this. But, whatever may be the result of the researches that are now being pushed by scholars and explorers in the domain of Egyptian history written all over these stupendous monuments, that Time has only partly overthrown and partly buried, it is not possible their age can be reckoned at much less than is at present believed,* and the oldest buildings of other peoples are but young in comparison with these.

The architecture of Egypt consists of temples, palaces, and tombs. The Pyramids are now believed to be tombs. They have been thoroughly explored and patiently studied by many able people, and there seems no explanation of their purpose more simple and intelligible than this. They were built by the different kings whose names they bear as receptacles for their bodies, which were concealed in them with the most ingenious art; the object in piling up these mountains of stone being to make an indestructible resting-place for the body during the ages that must elapse before the soul should return and take again her accustomed seat. The entrances to the Pyramids are carefully concealed, and have been discovered only by stripping off the outer coating of stone. The passages that lead to the chambers where the royal mummies once reposed (for every pyramid has been entered and rifled) were purposely made difficult, and even dangerous, to traverse, and the entrances to the burial-chamber, when reached, were so artfully and securely closed as to be passable only to force. Even when entered, the sarcophagus of polished granite in which the mummy lay could only be opened by breaking the solid stone that formed the lid, for this had been closed by a device at once so simple and effectual that no wit of man could better it. All these devices for concealment can have but one reasonable interpretation; and it may be said, we think, without fear of contradiction, that the many theories by which a mystic or scientific origin has been proposed for the Pyramids are none of them held at present by any Egyptologists of eminence, who are all agreed that the Pyramids were intended simply as tombs. They stand in the midst of a vast necrôpolis, and are in all about a hundred in number. The three largest, named after their builders, Cheops or Soofoo, Chepheren or Shafra, and Mycerinus, Menkeres, are the best known. The pyramid of Cheops originally covered a little over thirteen acres of ground, and was 480 feet 9 inches in perpendicular height. Owing to the removal of the coating of polished granite with which this pyramid, like both the others, was originally covered, and the heaping of the ruins about the base, both these dimensions are somewhat reduced. Col. Vyse makes the present area slightly in excess of twelve acres, and the present height 450 feet 9 inches. But in the case of the Pyramids, as with all great buildings, the measurements of no two persons agree, and these must be taken as merely approximative. Beside the Pyramids, the necropolis of Memphis contains many smaller tombs, the greater part of which are structural, others being hewed out of the solid rock where there was a good opportunity, as was the case at Ghizeh. At Beni-Hassan, farther up the Nile, there are tombs, all of which are excavated from the rocky hillside, and are of singular interest from an architectural point of view. Both the exterior and the interior of these tombs are carved in imitation of a post-and-lintel system. The entrance consists of a portico of two columns supporting a pretended architrave; the stone above is cut into an imitation of projecting eaves, with rafters showing underneath. The whole of this portico, end-piers, columns, architrave, and eaves, is carved out of the solid face of the rock, which behind it is smoothed down to the appearance of a wall, in which is the door that gives entrance to the chamber. The roof of this chamber is carved into the semblance of architraves, between which it is hollowed out in the form of shallow barrel-vaulting. These make-believe architraves are supported by rock-cut columns. In several of these grotto-tombs the pillars within and without have so strong a resemblance to the Doric column that they have been called *proto-Doric*, and many modern writers on the subject are persuaded that the Greeks borrowed the Doric column from the Egyptians. We cannot enter on the subject here, but we may express a doubt whether at present this belief ought to be considered as having any better foundation than conjecture and a striking resemblance.

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* According to Poole, Sir Gardiner Wilkinson, and others, the three great Pyramids of Ghizeh were built B. C. 2450; Bunsen puts the date at B. C. 3209; and Mariette at B. C. 4235.

The buildings next in antiquity to the Pyramids are the palaces of Thebes. The principal ruins of this once magnificent city lie on both sides of the Nile, covering an area that extends about two and a quarter miles N. and S. and three and a half miles E. and W. The principal group is at Karnac, on the eastern bank, and consists of a palace-temple 1200 feet long, with five or six smaller buildings grouped about it with that lack of symmetry which was a characteristic of the builders of that age and of the later times, as distinguished from the period of the Pyramids. Farther S., about two miles, but once united with it by an avenue of sphinxes now in ruins, was the temple of Luxor, 820 feet long, and with no other buildings connected with it. The rest of this astonishing Theban group is found on the opposite side of the river, and consists of the temple of Medinet Habou, the Rhamsession, the temple of Gournou, and the temple of Thotmes and Amenophis, but of the last two little remains above ground. The river on whose bank they were directly built has played a double part in their destruction. The inundations have undermined and swept them away, and their neighborhood to the water has enabled boats to come and carry away their stone for building purposes. Our narrow limits utterly forbid any minute description of these buildings. Everything about them was huge. Their ground-plans were not only really extensive, but they were so subdivided as to make them seem much larger than they were. Court succeeded to court, room to room, until the sense of size and the sense of distance were wearied. The long avenues of sphinxes, the mighty columns supporting roofs of solid stone, the tower-like pylons that guarded the entrance, were all calculated to overawe the human spirit by the notions of vastness and the sense of power in the monarchs that could command the erection of such structures. Nor must we forget that the enormous size and extent of these palace-temples (for they contained within themselves the abodes of the kings as well as the shrines of the gods) were tempered by a noble sense of proportion, by sculpture of a grandeur of which we never weary, by the most delicate carving, and by a system of ornamentation alike perfect in form and color. Any notice of the Egyptian buildings of this period that should fail to hint at their beauty would leave an incomplete impression, but we too often find this praise forgotten in the wonder excited by their stupendous feats of building.

Still farther S., in passing from Thebes to the Second Cataract, we find the ruins of temples which, once reckoned coeval with the Pyramids, or even more ancient, are now known to be the most modern of the Egyptian buildings. Of these the best known are the temples at Edfou, Denderah, Philæ, and Kalabsche, but the shore on either side is scattered with ruins, and they differ from those of Thebes in being exclusively temples. Some of these buildings are of a grandeur of design and size that would have done credit to the time of the Pharaohs, and, as a rule, the inferiority of these temples, built under the dominion of the Ptolemies, is more apparent in the sculpture and painting that decorate them than in their architecture. In style and general arrangement the later buildings differ surprisingly little from the more ancient, but many of the buildings are better preserved; they make, for this reason, a clearer impression on the visitor, and while it would seem as if this fact should have militated against the idea of their greater antiquity, it was perhaps counteracted in its effect by their greater remoteness, by the difficulty of access to them, and the loneliness that invests them.

"A spirit of simplicity, grandeur, and solidity reigns throughout all the Egyptian temples, and every precaution seems to have been taken to make them eternal." Doubtless the ease with which large masses of stone were procured, and the fact that labor cost but little—for the laborer was a slave and the land was inexhaustibly fertile—had much to do with the peculiar massiveness of the style. Every original style of architecture, and even those derived styles, such as the Greek, which modified their model by the laws of a higher ideal in art and a purer taste, until it became almost an independent style,—all these genuine workers have been controlled in great measure by their material, or rather, let us say, have known how to take advantage of it. The Egyptian architecture is in thorough harmony with the physical characteristics of the country. The monotony of this flat valley is varied, and at the same time accented, if we may so express it, by these gigantic piles of masonry that suggest mountain forms. At the same time, in piling them up, their builders obeyed the laws of structure; they played no tricks with gravitation, as the Gothic and Renaissance builders did; and if man could have been restrained from violating the pyramids and the tombs, and from making quarries of the temples, time would have preserved them unharmed until to-day and for centuries to come. Acquainted with the arch, they rarely used it, as knowing doubtless that "an arch never sleeps," and they would employ no feature that would jeopard the durability of their work. Perfect sculptors, they knew how to subordinate their carving perfectly to the architecture it was to adorn, and as all their sculpture had an important meaning, they studied that reserve in its treatment that would best enable it to resist all accidents of time and human violence. Their buildings have been reproached with monotony, but it may be questioned whether any architecture has ever made so wide spread, so profound an impression, or has given such enduring pleasure. They would seem to have early discovered the best way of piling up enormous masses of stone, the best way of supporting their architraves and roofs, and the best way of ornamenting their work; and having found what they wanted, they rested in a sublime content, continuing to build for ages without the wish to change, and with no motive to attempt improvement in what seemed to them doubtless, as it seems to us, incapable of being improved.

Grecian Architecture.—What we shall have to say about Greek architecture will begin, properly, with the introduction into the peninsula of the Doric order. This, supposing the temple at Corinth to be the oldest example existing, does not carry us back very far, since its date is supposed to be only about 650 B. C. The Ionic order was no doubt introduced from Asia as early as this, or, it may be, earlier, but all the oldest examples have perished, and the few buildings in which it is now found in Greece itself are of a date far much more recent than the oldest Doric temples. There are a few buildings in Greece much older than the temple at Corinth, but they are in a ruinous condition, and with the exception of the tomb of Atreus (the so-called "treasury" of Atreus) at Mycenæ, and the Gate of Lions in the wall of the same city, they have little interest for any one but the antiquary; nor do they belong to the history of the development of Grecian architecture, properly so called. We shall not therefore stop to describe the tumuli of Mycenæ and Orchemenos, but shall pass at once to the consideration of the later buildings.

In Greece itself the most famous temples were all Doric. The temple at Corinth, that at Ægina, the temple of Theseus at Athens, with those of Jupiter at Olympia, of Minerva at Sunium, and finally the Parthenon at Athens, with many others, were all in this style, for which the Greeks had a peculiar liking, and which they treated with the most perfect skill and taste.

The Parthenon, indeed, stands in men's minds as the type of the perfection of Greek architecture. Even if we felt it necessary to admit—as we certainly do not—that the Greeks borrowed the Doric columns and every architectural idea and feature from the Egyptians and the Assyrians, we may assert that in the Parthenon they so perfected their model, and invested it with such poetic beauty, that they deserve to be called creators rather than copyists. We cannot understand the Doric order until we have studied it in the Parthenon. It united in itself all the beauties and refinements of which the style was capable, and it is perhaps the highest praise that can be given it if it be admitted that it gained little essentially by the addition of the sculptures of Pheidias. They were a glorious ornament, but the Parthenon was perfect as a building without them.

The Parthenon was the only temple in Greece that had eight columns in its end porticoes. It was a small building, being only 228 feet long by 101 feet wide, and it was built of the finest white marble. Like all the Doric temples, it was painted over its whole surface, internally as well as externally. The sculpture was relieved by a colored background, the coverings of the roof were certainly painted, and all the mouldings. This seems to be the general opinion of scholars and artists on this much-vexed question, but it is still disputed by some persons of authority. Fergusson in England, Viollet-le-Duc in France, and Semper in Germany maintain the affirmative, however, and their authority, singly or combined, is very great. The fact that color was used cannot be disputed, seeing that there are plenty of traces of it still existing. The question seems to be, How extensively was it used, and was it applied to the buildings when they were first erected or at a later date?

The Parthenon was built by Pericles about 440 B. C. The architects Ictinus and Callicrates were charged with the construction, and Pheidias was entrusted with the commission to fill the two pediments and the metopes with sculpture. Whatever may have been the origin of the Doric order, by the time the Parthenon came to be built Greek delicacy and perception had so ripened as to give the order that final grace which has made this celebrated temple a standard of architectural perfection to the whole civilized world. So delicate are the refining processes by which this final perfection was reached that it was long before they were discovered, and people wondered why the most careful and conscientious attempts made by skilful architects to reproduce the Parthenon always failed to please like the original. The truth is, that these refinements are too delicate to be detected except by the most accurate measurement; they were never intended to be discovered by the eye, since their only object was the correction in each instance of an optical illusion, and the error in which the refinement consisted was only meant to be sufficient to just counterbalance this delusion. The first of these refinements was the *entasis* or swelling of the columns, a peculiarity noticed by Vitruvius, and in our own time first verified by Mr. Allanson, though it is to Mr. Penrose's measurements and analyses that we owe our present knowledge on this subject, and indeed on all the minute points connected with the Athenian architecture. That the columns diminished from the bottom to the top was always known, and is evident enough to the eye, but it was long before it was proved that this diminishing was not regular, and that, owing to their swelling slightly out, they were bounded not by straight lines, but by a very delicate hyperbolic curve, only discoverable by the nicest measurement. When this was found out it explained why the modern columns made with such good faith and cleverness in close imitation of the Greek looked so stiff and lifeless. And yet we have never known how to profit by our knowledge. Modern Doric columns either have not enough entasis, and look as if the sides sank in, or they have too much, and look like bolsters set on end. The entasis of the columns of the Parthenon is $\frac{1}{550}$ of the whole height. By another refinement, the end-architraves in all the temples were curved upward, the middle of the line being higher than the ends. This curving of the end-architraves was common to all the temples, but in the Parthenon the stylobate and the architrave of the sides were also curved upward. The commonly accepted explanation of these refinements is, that they were designed to correct the error to which the eye is liable in looking at a long straight line. The same nicety of perception led to the curving upward of the roof-ridge, to the giving all the columns a slight inward inclination, and to the making the columns at the angles thicker than the others—in the case of the Parthenon by $\frac{1}{44}$ of the diameter, and in the case of the Theseum by $\frac{1}{28}$. All the curves are hyperbolas or parabolas, and in the adjustment of the parts one to another a system of proportions was adopted and elaborately carried out so recondite that by most persons it was long regarded as more fanciful than real. Now, however, the discoveries of Mr. Penrose are universally admitted, and it is seen that they explain the charm the Greek architecture has even for persons who have no scientific acquaintance with the subject.[1] We must not overlook in passing the theory that the Doric temple was an imitation in all its parts of a wooden original, the *columns* being the trunks of trees; the *architrave* the beam that was laid from post to post; the *triglyphs* the ends of the joists; and the *metopes* the spaces between them filled up with slabs of marble; that the *mutules* were the ends of the roof-rafters, and the *guttæ* the drops of rain that collect on the under side of horizontal beams. This theory might by this time, we think, be allowed to rest with the myths of Romulus and Remus or the story of William Tell and the apple. It has no foundation in fact, and deserves no consideration. It is all one with the story that the Doric column was designed to suggest the male figure, and the Ionic the female. The Doric temple was essentially a stone construction, the cella and the portico being covered with a wooden roof, and no part of the masonry was imitative of anything.

It seems to be admitted by those who have the most right to be heard on the subject that the Ionic order was in use as early in Greece as the Doric; that in Asia Minor it was in use even earlier; and that it was employed in many of the finest temples in that region, which were destroyed during the Persian war. The fact that the few existing buildings in Greece in which this Ionic order is found are of a much later date than the oldest Doric buildings led earlier writers on the subject to consider it as of much later introduction, but it is now admitted that the Ionic order was in use as early in Greece as the Doric order, and that in Asia Minor it was perhaps of greater antiquity. The famous temple of Diana at Ephesus, that of Apollo at Miletus, and others at Sardis, Prienè, and Teos, all of which have perished, were built in this style. On the other hand, the temple of Juno at Samos was originally of the Doric order, but was perhaps destroyed and rebuilt, since the ruins now found there are Ionic. Architectural forms often indicate changes in fashion or the prevalence of certain influences, as well as deeper-seated modifications of ideas. Thus, at Pompeii, immediately after the first great eruption of Vesuvius (63 B. C.), the Roman officials caused all the temples and public buildings to be either rebuilt or restored in the Corinthian order, which was as much a favorite at Rome as the Doric was in Greece, and the traces of this fashionable remodelling are evident enough to the most careless observers. In the so-called temple of Venus near the Forum the Doric capitals were changed into Corinthian by means of stucco, which to-day is falling off and shows the Doric marble underneath. This is only one instance of what has been going on in the practice of building since the earliest times. The Egyptians seem to have been the only Western people who never were influenced in their architecture by their conquerors or their allies. Their architecture does not show a single trace of foreign influence, but in Western Europe the history of architecture is only the history of modifications, many of them vital, it is true, like those produced by the use of the arch, of iron, and of painted glass, but many of them, also, due to fashion, to the influence of conquest, to the exigencies of climate, and to changes in political and social life. It is not easy to understand why the Ionic buildings should have suffered so much more than the Doric, but it is true that even in Greece there is but little left by which to judge of the progressive history of the Ionic order. We can trace the Doric from its clumsy beginnings in the temple of Corinth to the perfect beauty of the Parthenon, but when we first meet the Ionic in the Erectheium and the temple of the Wingless Victory, it is in full development; the stages by which it arrived at this point, in Greece at least, are all destroyed. The loss of these intermediate buildings is much to be regretted. Without them it is almost impossible to acknowledge the relationship between the stilted and awkward capitals of the Hall of Xerxes at Persepolis and the elegant capitals of the Erectheium at Athens.

The Corinthian order was not introduced into Greece until the age of Alexander the Great (B. C. 356–323), unless we are to accept what Pausanias says about the temple in Tegea, in Arcadia. According to this doubtful authority, that temple was rebuilt by Scopas, the celebrated architect of Paros, after its destruction by fire about 400 B. C. It was surrounded by an Ionic peristyle externally, but the internal peristyle was Doric, with a gallery above, with Corinthian columns supporting the roof. Supposing this to be trustworthy, this temple would mark a very important era in the history of Greek architecture, as showing the influx of new ideas and a definite departure from the older style. Nothing, however, remains in the presumed locality of the temple but shapeless ruins, and we must await regular explorations before we can know anything with certainty about the building. So far as we know, the oldest example of the Corinthian order in Greece is found in the Choragic Monument of Lysicrates (one remaining of many small structures erected as trophies of victory in the musical contests). This was built B. C. 335, and has long been considered a model of elegance. Much later in date, and by no means so beautiful, was the Tower of the Winds, a small octagonal building erected to contain a clepsydra or water-clock, and having a dial on one side and a vane at the top. This was built in the second century B. C. The only traces of the Corinthian order are found in the fragments discovered near it, out of which the archæologists have constructed two small porches, and it is most likely that they did originally belong to the building. The most important example in Athens of the Corinthian order was the temple of Jupiter Olympus, but this was not a Greek work, having been begun by Cosentius, a Roman architect, in the second century B. C., and finished by Hadrian in the second century of our era. The Greeks were not fortunate in their attempt with the Corinthian style. Strangely enough, it was left for the Romans to bring this order to perfection, though perhaps the Greek failure was due rather to the fact that the style was introduced at a time when the arts were in decay than to an inherent inability to deal with it. Judging from the earliest remains we have of the Corinthian as used in Asia Minor, the ancient examples may have been in purer taste than those that remain to us at Athens. In one of these older examples the capital has the acanthus leaf at the base, and the honeysuckle ornament above. Later, the volutes of the Ionic order were added, but in the Greek examples the union was never successfully accomplished. In the Monument of Lysicrates we have the best that Greek hands could do in this doubtful mingling of two styles. In the Tower of the Winds this was not attempted, nor is the spreading Asiatic base of the pillars in the Choragic Monument retained. The pillars of the Tower of the Winds, on the contrary, are without any base whatever. There is something not easily understood in this return to an older severity and purity.

Roman Architecture.—The Greeks were not great builders, but they were supreme architects. With the exception of a few small monuments of no great importance, they have left us nothing besides temples, but in these the system of the post-and-lintel architecture was made to show all the grace, elegance, and dignity of which it was capable, just as in the Egyptian temples and palaces it had reached the highest point of sublimity. The Romans were in general only middling architects, but the Egyptians alone could compare with them as builders. It is asserted of them that everything in their architecture was borrowed, but even if this were admitted, it must be admitted, on the other hand, that they were not slavish copyists: in many instances they made what they borrowed their own. If they inherited the round arch from the Etruscans, they made such an individual use of it that it has its name from them, and not from their neighbors and ancestors. To all intents and purposes they were the inventors of it. They borrowed, we believe, all the orders from the Greeks, and though they spoiled, or at least materially changed, the Doric and the Ionic, they made of the Corinthian a new creation far more beautiful and elegant than it had been in Greek hands. If they borrowed the amphitheatre from the Etruscans, its employment became so important in their society that it soon left its rock-excavated original far behind, and took on a characteristic and essentially new form. The Romans derived in their blood a love for the arch and the circular forms that spring from it and harmonize with it; but it is not perhaps necessary to look elsewhere for an explanation of the development of the arch and dome in Roman hands than to the differences in the climate of Greece and Italy, and in the social needs of the Greeks and Romans. As has been remarked, the only public buildings the Greeks have left us are their temples. They lived in the open air, and had no need of the roofs by which the Romans protected themselves from the excessive heats of their summers and the rigors of their damp and cold winters. Whether it were a simple climatic reason, or a something in the disposition of the people difficult to trace and analyze, as such things are and must be, we cannot tell. Only, here are the facts. The Greeks have left us only temples; the Romans have left us temples, baths, amphitheatres, bridges, aqueducts, triumphal arches, triumphal columns, market-places (*fora*), palaces, houses, and tombs. They took from the Greeks the plans of their rectangular temples, but the Greek temple was merely a wall admirably built and decorated, with a portico running about it; often this wall enclosed an uncovered court, or if the court were roofed it was generally roofed with wood, the wall and its portico being sufficient for the vertical pressure, which was all it had to sustain. Whatever led the Romans to desire plans in which a number of small rooms, or one large room, were to be covered with a roof, as we have said, does not appear, but they showed a marked determination to this sort of building, and of necessity were obliged to invent some stable and at the same time simple means of roofing these rooms. We confess we find something childish in the supposed necessity of finding out whence the Romans borrowed the great principle of the arch, and how they learned to make vaults. Is not man endowed with every faculty that is necessary to his well-being, and did not the Roman derive his skill in arch-building from the same source from which the Esquimaux derives his? Who played Etruscan to the Esquimaux? Nay, for that matter, who played Etruscan to the Etruscans themselves? The Romans, then, wanted roofs, and roofs that were to cover spaces much larger than could be covered by any wooden roofing without the aid of columns. The circular vault was the simplest, most natural device, and we are ready to believe that they came upon it in their own minds without the need of any ancestor from whom to borrow it.

The Roman buildings are imposing and magnificent from their mass, but in their details there is too often a lack of delicacy and proportion, while the ornamentation is almost always coarse in execution, though not unfrequently spirited in design. The Romans employed Greek workmen and artists to decorate their buildings—the structures themselves were of their own designing—and of necessity much fine sculpture and sculptured ornament was executed, not only in Rome, but in other cities in Italy and in the provinces. But, as always happens in cases where the employer has no knowledge of the work he is paying for, and little feeling for it or interest in it beyond a desire to get the most show he can for his money, the skill and taste of the Greek workman deteriorated under Roman employment, just as, if we may be allowed the comparison, the skill and taste of the French artist and workman deteriorate when they work for English and American employers.

If in this slight sketch we do not attempt to give an account of the more celebrated Roman buildings, it is because in point of architecture they have little originality; in nearly every case a Roman building was a skilful pile of masonry, with an external mask made up of details borrowed from Greece. Besides, few of their buildings proper are sufficiently well preserved to be described with accuracy. The Pantheon is the only temple in Rome that still retains its walls, its roof, and its portico; the Flavian Amphitheatre (the Colosseum) is in ruins though it still keeps the greater part of the mask of arches, columns, and entablatures that covered its masonry and concealed its true structure; the stupendous baths of Titus, of Diocletian, of Caracalla are heaps of nearly indistinguishable ruin; of the Forum nothing remains but a puzzle for the antiquaries, and the palace of the Cæsars is a vast desolation. But though these buildings were constructed with great solidity, and in many cases with admirable science, they showed in almost every instance a lamentable ignorance of the true principles of architectural design, coupled with a singular lack of invention. The Romans piled up mountains of stone, and thought they had showed themselves architects when they had concealed their masonry behind screens consisting of monotonous rows of columns and pilasters, arches, niches, architraves, and entablatures. Still, if we fix our eyes upon what the Romans did, rather than upon what they failed to do, we shall find we owe them a considerable debt. Their delight in building gave a stimulus to the art all over Western Europe, and if they were not architects themselves in the true sense of the term, they were at least the cause why others were architects, since they laid the broad and deep foundations on which the men of the Middle Ages built so well.

We know very little of the architecture of Rome during the republic: it was with the empire that the long line of Roman achievement in the art of building began. The Pantheon, the temples of the Forum, the Colosseum, the great aqueducts, the bridges, the baths, were all of late construction, and when the empire fell to pieces every place on the earth's surface that had been subject to it contained the proofs of that subjection in buildings that still remain, and that would still be in their original condition, so solidly were they built, if man had not destroyed them from wantonness or cupidity.

One class of buildings, however, owed a longer life than was granted to the rest to the fact that they easily fitted themselves to the new order of things that came in with the toleration of Christianity by the state, under Constantine. These were the basilicas or halls of justice. They were of several kinds—those that were roofed with stone vaults, and those that were roofed with wood—and they were either rectangular or circular in form. They were built wherever the Romans founded or took possession of cities and towns. The larger and more splendid basilicas of Trajan and Maxentius, of which the ruins still exist in Rome, were vaulted with stone, and splendidly if also somewhat barbarously coated with a false decoration of pillars and entablatures in costly marbles; but in the provinces, and later in Rome itself, these buildings were often small and roofed with wood, and when the Christians first began to look around them for places in which to worship, they either took possession of basilicas already erected or put up new ones modelled on the old, but smaller and less expensive. However, their inexpensiveness was not always the measure of their decoration, for they were in most cases built of the materials of older edifices, and adorned, and that often splendidly, with columns and slabs of rare and beautiful marble from the despoiled palaces and temples of imperial Rome. The arrangement of every Christian church that has a ritual is borrowed directly from the original arrangement of the basilicas, though this was considerably modified at an early period in the history of the Church as it changed from a democratic to an aristocratic organization. This will be easily seen by examining the plan of a Roman basilica, where will be found the quæstor's seat in the apse (which was afterwards occupied by the bishop), the altar in front of the apse where sacrifice was performed before commencing any important public business, and the rostra or pulpits at the sides where the clerks were placed. These last became the reading-desks and pulpits of the new occupants. Originally, the whole space in front of the apse was open to the public, who came and went as in a modern court-room; but with the change of ideas in the rulers of the Church, a separation was established between the clergy and the laity; the apse was railed off, and access forbidden; then a rectangular space was railed off in front of the apse for the inferior clergy, and little by little the present disposition of ritualistic churches was established. In passing, we may refer the reader to the highly interesting church of San Clemente at Rome, where abundant proofs of these early conditions may still be studied, and where the arrangement of the basilica as built by the Christians under the full influence of these aristocratic notions of church government are yet to be seen in perfect preservation. Historically and artistically, the church of San Clemente is much more interesting than St. Peter's, but it is only lately that it is getting to be known to the ordinary traveller.

As the world began to revive after the blasting influences of the downfall of the Roman empire were somewhat spent, the rapid growth of the new religion called for new churches everywhere, and not only churches, but monasteries and convents to house the thousands of men and women who thronged to fill the ranks of the monastic orders, then forming on all sides.

The Eastern Roman empire, having its seat at Byzantium, continued to erect buildings which, until the rise of the Mohammedan powers, showed the influence of the traditions of Rome, with features borrowed from the countries with which the Eastern empire came into more intimate relations. It is to this modification in the Eastern empire of the classic Roman by barbarian influences that the term *Byzantine* is strictly applicable. The similar modification that took place in the classic style in the Western empire, principally in the countries N. of the Alps, under the influence of the so-called Gothic races, is rightly distinguished as *Romanesque*. The period of greatest activity in the Byzantine style was that which is included between the removal of the empire to Byzantium and the death of Justinian (A. D. 328–565). Yet, though the styles of the East and the West became later so different, during this period the line of demarcation can hardly be perceived. Constantinople, Rome, and Ravenna were the chief cities of one great empire, and throughout the whole region whatever building was done was building for the same new uses out of the materials that had once done service for the old religion and the old society. But, as when a family is separated by one of its members leaving the old home and going to dwell in a distant region, while both he who goes and they who stay long continue to keep up the old traditions and to maintain the former ways of living, yet each is sure in time to be subjected to new influences, and so to become widely different from the other,—so each division of the Roman empire, subjected during this long period of nearly three hundred years to severe experiences, developed a new society, and of course a new phase of architecture. Before the age of Constantine one style pervaded the whole empire. Then came the period of transition, "during which the Western empire was in a state of decay, ending in a débâcle from which the Gothic style did not emerge until some four centuries later, while the Eastern empire, on the contrary, was during that time progressively forming itself, and did form a style of its own of singular beauty and perfection." This style culminated in the erection of the great church of Santa Sophia at Constantinople (A. D. 532–563), which the Turks afterwards converted to their own worship. After this glorious achievement the art gradually declined, but many buildings of great skill and beauty were erected all over the East, not only in Constantinople, but in Syria, Russia, Armenia, Asia Minor, and Greece.

Meanwhile, in Western Europe the story of architectural progress runs on almost without interruption from the grand days of the Roman empire down to the time of the great revival of learning which we call "the Renaissance" or "the Reformation." Christian architecture began in pagan Rome, and every Christian church edifice—parish church or cathedral—traces its ancestry back to the Roman basilica. While the countries N. of the Alps were yet struggling to create their new civilization on the ruins of the Roman empire, in Italy the state of society was undergoing a less violent transformation, and the old Roman forms were modified, but not overthrown nor outgrown. The one reason for this we have already noticed in the fact that the buildings erected in this period were either restored on the ruins of older structures, or were made of old materials, and adorned with the marble columns, capitals, friezes, and slabs that were found in such abundance in the Roman cities. The same thing was done in cities in France and Spain and England—principally in France, of course, though even there to a much less extent than in Italy; but in the North there were new exigencies of climate to be met, and there were the wants and tastes of a new society demanding new forms in which to enshrine themselves. But there was wanted the shock of a new crisis, the stir and emotion of a great conflict—not of bodies merely in battle, but of ideas; and the conquests of the Turks, which led to the final absorption and disappearance of the Byzantine style in Eastern Europe, had much to do with developing the Romanesque and the full splendor of the Gothic, by introducing into the society of Western Europe a new and powerful disturbing force, stimulating the old faith into new ardor, and bringing the whole population, directly or indirectly, into contact and conflict with the civilization of the East, through those enterprises in which religion and the trading spirit were so curiously yet so inextricably mingled, and which we call the Crusades. Gothic architecture was not derived from the East; no single feature of it can be traced to that source; it was the fruit of religious enthusiasm roused to fever-heat by the menace of a new persecution; of thought stimulated by adventure, discovery, and contact with new societies; of the wealth that poured into Europe with the rapidly increasing trade with the East.

While the new religion was getting itself established in Western Europe, it contented itself with working in the channel of Roman ideas, and wherever it could find them employing Roman materials. But not only did these materials give out before long, but, as the nations progressed more and more in their own development and got farther away from the Roman influence, and as the Northern ideas and sentiments ever grew stronger, it was inevitable that there should come a change over the style of building. For a very slight study of the subject will convince any one that of the history of the human race a large chapter at least is written in its buildings, and no great change ever came over the spirit of man without a corresponding change coming over the more important of the works of his hand; and none of his works have a more essential importance than the buildings in which he lives and worships and makes his laws.

It would, however, be a serious mistake if we should think that any new principle was discovered by which the architecture we call Christian was separated from the pagan Roman. It was only development, nothing more.

When the Romans neglected the architrave system—or, as it is better called, the post-and-lintel system—of the Greeks and Egyptians, and took up and developed the arch (known long before their time, but never used to any extent), they left nothing useful to be discovered in the field of architecture, and these two principles, used separately or in combination, are all that since their day men have found it necessary to employ. The pointed arch was developed as naturally, in obedience to man's needs, as the round arch had been; it was even, as it would appear, a local discovery, and was used in Provence in France while the rest of Western Europe was still building round arches under Roman influence. Mr. Fergusson shows that its use was very ancient, it having been employed by the Assyrians in the eighth century B. C., and by the Ethiopians in the seventh century B. C.; while the Ethiopians and early settlers in Greece (Pelasgi) used the form, though constructed with horizontal courses, twelve centuries B. C., and while, to come nearer to our own time, the Saracens adopted it in Cairo in the first century of the Hejira, and never apparently used a round arch after the erection of the mosque of Ebn Touloun (A. D. 885); yet, although he shows very clearly that its use by the builders of Provence in the time of Charlemagne was dictated by necessity, he finds it difficult to believe that they could have reinvented it for the purposes to which it was applied. But we are so far from being surprised at any such fact as this, and so unwilling to insist that an ancestor must be found for every achievement of man, that we see no reason to doubt that the people of Provence invented the form, nor should we be surprised to come upon it or the round arch in any land, if such remain to be discovered, as impossible to connect with any ancestry as Palenque or Japan.

The pointed arch was, then, merely a new and fortunate step in the march of architectural progress, but its introduction was gradual, and at first it was combined with the still lingering traces of Roman architecture, appearing like a new element in the buildings so well called Romanesque from the preponderance in them of Roman features. It would be impossible in our small space to so much as glance over the immense field covered by the buildings of the Gothic period. The Gothic architecture reached its culmination in the thirteenth century, when the most beautiful buildings were erected that the world has ever seen. "Not even the great Pharaonic era in Egypt, the age of Pericles in Greece, nor the great period of the Roman empire, will bear comparison," says Fergusson, "with the thirteenth century in France, whether we look to the extent of the buildings executed, their wonderful variety and constructive elegance, the daring imagination that conceived them, or the power of poetry and of lofty religious feeling that is expressed in every feature and in every part of them." The Gothic style is seen in its purity in France and in England, but even in Venice and some other cities of Northern Italy, where it is mingled with Byzantine and Roman features, there is a beauty about it, a poetic charm, which has of late years especially excited a high degree of admiration.

We have said that no new principle was introduced in the pointed architecture, but it is important to remember that the exigencies of the Northern climate, the less amount of sunlight, and the double necessity of admitting as much light as possible while excluding rain and snow, inevitably led to the development of the manufacture of glass and its employment in windows. The Greeks, Egyptians, and Romans were all well acquainted with glass, and manufactured and used it as freely in proportion to their population as we of to-day. They employed glass to close small window-openings, as well as mica, of both which materials large quantities have been found in Pompeii and Herculaneum; but in a southern climate the need of such protection from the weather must have been less frequent and for shorter periods than in the North. The builders of the Pantheon left an opening of twenty-six feet in diameter, making an area of thirty-two square feet, in the centre of the dome, through which the rain and snow are free to fall; but in the Roman climate no practical inconvenience is ever felt from this exposure. North of the Alps such freedom as this would be impossible, and man's old possession of glass was soon made to serve a new use. As it lent itself easily to staining with lovely color, the Gothic builders found a natural delight in using it, and they enlarged and multiplied the windows of their churches merely for the pleasure of filling them with painted glass. These windows are the glory and chief beauty of their buildings. Some of them—the Sainte Chapelle at Paris, for instance—are nothing but lovely tents or tabernacles of glass, incomparable in design and color. And so strong a hold did this new element of decoration take upon the minds of the people of that age that "after the middle of the twelfth century the principal and guiding motive in all the changes introduced into the architecture of the age was to obtain the greatest possible space and the best-arranged situations for its display."

The Gothic architecture, after crowding Europe with the beautiful or grand performances of its prime, and leaving to the world a heritage of wonder that is inexhaustible, was struck by decay, and died at last in the fifteenth century. Then, after a pause in which much interesting, much picturesque, and much very ugly building went on, there came slowly on with the dwindling of the old faith, with the vital change in society, with all the elements that made the sixteenth century a period of revolution, another great change in architecture, which is called the Classic Revival, the Renaissance. And just as in the growth of the Gothic style we saw the old Roman forms slowly displaced by new, so now we see the new forms as slowly displaced by the old elements that had once given place to them. The pointed arch was gradually dropped, the stained-glass windows faded out of sight, and the old architecture of Rome was revived in principle, though shorn of much of its grandeur, in these buildings crowned by domes and with their surfaces masked by the old screens of columns and entablatures.

Still, in the beginning, much that was magnificent in public buildings, in churches, town-halls, châteaux, and palaces, was accomplished by the architects of the Renaissance, and much that was picturesque and charming—if not always defensible—in domestic buildings. In Italy and France the architecture of the Renaissance produced its most splendid fruit, but there is much that is interesting in Germany, in Spain, and in England.

What the chapel of Henry VII. is to the Gothic architecture, the sign of its approaching death, the church of St. Peter at Rome was to the Renaissance; nor did it long survive that colossal blunder. The work of many years and many hands, one of the costliest buildings ever erected in modern times, and the product of the skill of the greatest architects and artists of the age, it is a building every way unsatisfactory, and one which the world has long ceased to regard with enthusiasm. But, in truth, the world had become wearied with building, and since that unfortunate experiment has only trifled with brick and stone. For times are changed, and the zeal that once burned to build churches for the glory of God, the love of art that delighted to adorn them, are grown cold, and stir men not any more. For nearly three hundred years not a single building has been erected in Europe or anywhere that has an original claim to admiration, or that would occasion the least regret by its loss except on grounds of convenience or utility. This could not have been said of any three centuries, nor of any one century, that elapsed between the building of the Pyramids and the close of the sixteenth century of our era. During all that unrolling of centuries architecture was a living art, employing man's highest skill and covering the earth with beautiful and stately buildings. It is often brought as a reproach that man has long ceased to take delight in architecture. But, while we may regret the fact, it is useless to mourn over it, and infidelity to man to argue from it that he is on the road to hopeless degradation. We are living in an era of revolution as striking and as momentous as the race has ever seen, and man's faculties are everywhere busy with the pressing needs of the time. It may be well to remember that the triumphs of architecture have been won in building churches for a worship that was suited to the infancy of our civilization; in building palaces for rulers who subjected their people's bodies as the Church subjected their minds; and in other structures suited to social and political conditions that have passed away, apparently for ever. The race is everywhere in fermentation, and when it has settled down into the new order which will surely come out of chaos, the building instinct and the delight in building which are a part of the nature of man will once more take up the task, and Architecture be born again. (For the styles of architecture contemporary with the European development of the art, but independent of it, see the special articles on Assyria and Chinese Architecture. Also for later modifications, see Renaissance Architecture.) The historical study of architecture is made easy in our day by a multitude of excellent books upon the subject, some dealing with it in the general, others in detail. For the English reader no book is more valuable than Fergusson's "History of Architecture, Ancient and Modern," beginning with the earliest times and coming down to our own day. The volume for 1873 contains also an account of the principal buildings in America, with criticisms upon them. Kügler's "Handbuch der Baukunst" is a complete and valuable dictionary for consultation. The invaluable "Dictionnaire de l'Architecture" of Viollet le Duc covers the architecture of France from the twelfth century to the Renaissance. (See Composite, Corinthian and Doric Orders, etc.) Clarence Cook.

Architecture of the American Aborigines. When America was first discovered in its several regions, the aborigines were found in two dissimilar conditions. First were the Village Indians, who depended almost exclusively upon horticulture for subsistence; such were the nations of New Mexico, Mexico, and Central America, and upon the plateau of the Andes. Second were the Non-horticultural Indians, who depended upon fish, bread-roots, and game; such were the Indians of the Valley of the Columbia, of the Hudson's Bay Territory, of parts of Canada, and of all other sections of North America where cultivation was unknown. Between these, and connecting the extremes by insensible gradations, were the partially Village and partially Horticultural Indians; such were the Iroquois, the New England and Virginia Indians, the Creeks, Cherokees, Mandans, Minnitarees, Shawnees, and Chichemecs of Mexico. The weapons, arts, usages, inventions, dances, architecture, and form of government of all alike bear the impress of a common mind, and reveal, through their wide range, the successive stages of development of the same original conceptions. Our first mistake consisted in overrating the comparative advancement of the Village Indians; and our second in underrating that of the Non-horticultural, and also that of the partially Village Indians; whence resulted a third, that of separating one from the other, and regarding them as different stocks. The evidence of their unity of origin has now accumulated to such a degree as to leave no reasonable ground for doubt upon the question, although this conclusion is not universally accepted. The latter classes always held the preponderating power, at least in North America, and furnished the migrating bands which replenished the continent with inhabitants.

It is a singular fact that the Village Indians, who first became possessed of corn, the great American cereal, and of the art of cultivation, did not rise to supremacy over the continent. With their increased and more stable means of subsistence it might reasonably have been expected that they would have extended their power, and spread their migrating populations over the most valuable areas, to the gradual displacement of the ruder nations. In this they signally failed. Their civilization, such as it was, did not enable them to advance, either in their weapons or in the art of war, beyond the more barbarous nations, except as a superior house-architecture rendered their habitations impregnable to Indian assault.

Besides this, their governmental institutions had not advanced beyond the *societas*, founded upon the gentes, and which created personal relations, into the *civitas*, founded upon territory and upon property. This argument, when extended, demonstrates the impossibility of potentates or privileged classes under their institutions, with power to enforce the labor of the people for the erection of houses or palaces for their individual use.

It should be further observed, with respect to their relative advancement, that the Non-horticultural Indians were, in general, without the art of pottery, and therefore in a state of savagery; that the partially Village Indians, who practised the ceramic art, were in the First Period of Barbarism; whilst the Village Indians, who, in addition, cultivated by irrigation, constructed houses of adobe bricks and stone, and a portion of whom, the Peruvians, had domesticated the llama as well as invented bronze, were in the Middle Period of Barbarism. It remained for them to invent the process of smelting iron ore to attain to the Closing Period of Barbarism; and beyond that, to invent a phonetic alphabet to reach the First Stage of Civilization.

The indigenous architecture of the Village Indians has given to them, more than aught else, their position in the estimation of mankind. The facts of their social condition, which unfortunately are obscure, have done much less in fixing their status than existing architectural remains. The Indian edifices of the period of the Conquest, from the materials used in their construction, from their palatial extent, and from the character of their ornamentation, may well excite surprise and even admiration; but, as we think it can be shown, a false interpretation has, from the first, been put upon this architecture, and inferences constantly drawn from it, with respect to the social condition and advancement of the people, both fallacious and deceptive, where the plain truth would have been more creditable to the aborigines themselves.

There is a common principle running through this architecture, from the "long house" of the Iroquois to the pueblo houses of New Mexico, and to the so-called "Palace" at Palenque and the "Governor's House" at Uxmal. It is the principle of *communism in living*, restricted, in the first instance, to groups of persons mutually related, and extended, finally, to all the inhabitants of a village or encampment by the *law of hospitality*. Hunger and destitution were not known at one end of an Indian village whilst abundance prevailed at the other. Communism in living and the general law of hospitality seem to have accompanied all the phases of Indian life. These great facts of their social condition embodied themselves in their architecture, and will contribute to its elucidation.

It will be the object of this article to present, briefly, some of the facts tending to show the practice of communism in living amongst the Non-horticultural and also the partially Village Indians, and after that to show its expression in their architecture; and, in the second place, to bring into notice the principal features of the architecture of the Village Indians of New and Old Mexico and Central America, from which the inference will be drawn that communism in living entered into and determined its character. Concerning the social condition of the latter our information is limited and defective.

Communism in living has its origin in a union of effort to procure subsistence, and to a great extent it was a necessary result of the mode of life of the aborigines. A few examples will illustrate the proposition. The Blackfeet, during the buffalo-hunt, follow the herds on horseback in large parties, composed of men, women, and children. When the pursuit of the herd is commenced the hunters leave the dead animals in the track of the chase, to be appropriated by the first persons who come up behind. This method of distribution is continued until all are supplied. All the nations who hunt upon the Plains observe the same custom, making a common stock of the capture. During the fishing-season in the Valley of the Columbia, where the fish are more abundant than in any other river on the earth, all the members of a band encamp together and make a common stock of the fish obtained. They are divided each day according to the number of women, giving to each an equal share. This makes a general distribution at the outset. When cured and packed they are removed to their homes. Among the Iroquois—and the same was substantially true of the principal Indian nations—each party made a common stock of the fish and game obtained on their hunting and fishing expeditions. This usage led to an equal participation in the means of subsistence, as well as an equal division of the surplus, which was cured and reserved for winter use. Those forming a common household who cultivated a garden-bed enjoyed the product in common. After gathering the harvest it was stored as a common stock in their dwelling. Each house, as will presently be shown, was constructed large enough to accommodate several families, among whom the communal principle was carried out, but it was limited to the household. The village did not make a common stock of their provisions, and thus offer a bounty to improvidence, but the principle of hospitality came in to relieve the consequences of destitution.

It should be observed that the family, consisting of a married pair and their children, was a weak organization in barbarous life, and still weaker in savagery, unable alone to cope with the hardships of their condition. It was made by pairing, with divorce at the option of either party. But the gens, in which the family practically was merged, was sufficiently powerful as an organism to face the difficulties of daily life. Accordingly, it will be found that the household, which formed a communal group, was mostly composed of members of the same gens.

The law of hospitality may be illustrated by Iroquois usages. If a man enters an Indian house in any village, it is the duty of the women therein to set food before him. An omission to do this would be a discourtesy amounting to an affront. If hungry, he ate; if not, courtesy required that he should taste the food and thank the giver. This would be repeated at every house he entered and at whatever hour in the day. As a custom it was upheld by a rigorous public sentiment, and seems to have been universal amongst the American aborigines. Lewis and Clarke refer to the same practice among the nations of the Missouri. "It is the custom," they remark, "of all the nations of the Missouri to offer every white man food and refreshment when he first enters their tents." (*Travels*, Longman's ed., 1814, p. 649.) This was simply applying their rules of hospitality among themselves to their white visitors. It tended, obviously, to equalize subsistence, and prevent destitution in any portion of an Indian community whilst any household possessed a surplus. Notwithstanding this generous custom, it is well known that the Northern Indians were fearfully pressed for the means of subsistence during a large portion of the year. From the intensity of the struggle to maintain existence it is not surprising that immense areas were entirely uninhabited, that other large areas were thinly peopled, and that dense populations were impossible.

Lands were universally held in common, but after tillage commenced a possessory right to cultivated tracts or gardens was recognized so long as used. When occupation ceased they reverted.

I. *Communal Houses of the Non-horticultural Indians.*—We are first to show that communism in living entered into and determined the character of the architecture of the Non-horticultural and also the partially Village Indians. If it can be shown that their houses were constructed on this principle, then, wherever houses obviously communal are found, although in ruins, and although the people who erected them have disappeared, a presumption will arise that this principle prevailed among them, and led to the construction of their houses in this form. The architecture of the ruder Indians is of but little importance, in itself considered, but as an outcome of their usages, and in its relations to the architecture of the Village Indians, it is highly significant.

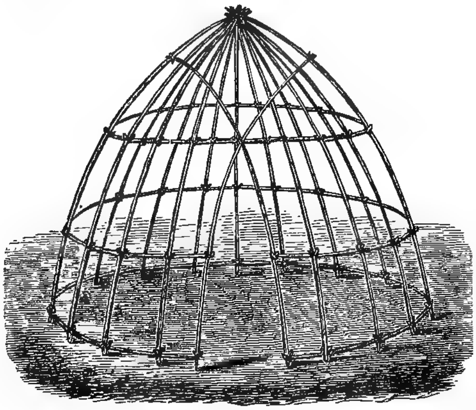

Fig. 1. Ojibwa Wig-e-wam.

The Non-horticultural Indians differed among themselves in the plan of the lodge. The figure, which is copied from Schoolcraft's work, shows the form of an Ojibwa cabin of the best class, as it is still seen on the S. shore of Lake Superior. Its mechanism is sufficiently explained by the figure. Over it is placed a covering of bark, usually the canoe birch, taken off in large pieces and attached with splints. Its size on the ground varied from ten to sixteen feet in diameter and from seven to ten in height. Twigs of spruce or hemlock were strewn around the inner border of the ground-floor, upon which blankets or skins were spread for beds. The fire-pit was in the centre of the floor, over which in the roof was an opening for the exit of the smoke. Such a lodge would accommodate two or three pairs, with their children. Several such lodges are usually found in a cluster, and the several households were made up of related persons, the principal portion being of the same gens. Carver, who visited a village of this nation on the Chippewa River in Wisconsin in 1767, observes: "This town contains about forty houses, and can send out upwards of 100 warriors, many of whom are fine stout young men." (*Travels*, Philadelphia ed., 1796, p. 65.) It would give a total of 500 persons, and an average of twelve persons to a lodge.

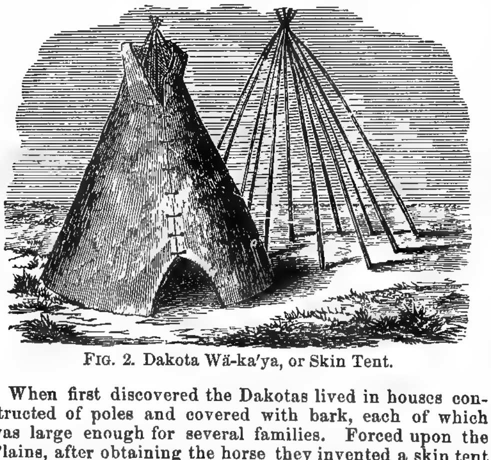

Fig. 2. Dakota Wă-ka'ya, or Skin Tent.

When first discovered the Dakotas lived in houses constructed of poles and covered with bark, each of which was large enough for several families. Forced upon the Plains, after obtaining the horse they invented a skin tent superior to any other in use among the aborigines, from its roominess, its portable character, and the facility with which it can be erected and struck. The frame consists of some twelve poles, from fifteen to eighteen feet in length, which, after being tied together at the small ends, are raised upright with a twist, so as to cross the poles above the fastening. They are then drawn apart at the large ends, and adjusted upon the ground in the rim of a circle which is usually ten feet in diameter. A number of unhaired, tanned buffalo skins, stitched together in a form adjustable to the frame, are drawn around it and lashed together as shown in the figure. The lower edges are secured to the ground with tent-pins. At the top there is an extra skin adjusted as a collar, so as to be open on the windward side to facilitate the exit of the smoke. A low opening is left for a door, which is covered with an extra skin, used as a drop. The fire-pit and arrangement for beds are the same as in the Ojibwa lodge. When their tents are struck the poles are attached to a horse, half on each side, like thills; the covering and scanty camp-furniture are packed upon other horses, and even upon their dogs, and are thus transported over the Plains. This tent is so well adapted to their mode of life that it has spread far and wide among the Indian tribes. We have seen it in use among seven or eight Dakota tribes, among the Iowas, Otoes, and Pawnees, and among the Blackfeet, Crows, Asiniboines, and Crees. A collection of fifty of these tents, which would accommodate 500 persons, makes a picturesque appearance.

The aborigines of the Valley of the Columbia were more or less Village Indians, but without horticulture. They found an abundant subsistence upon shell- and scale-fish, upon fruits and game, and upon the kamash and other bread-roots, which they cooked in ground ovens. When Lewis and Clarke visited this valley (1805–06) they found the Indians living in houses of a higher communal type than those previously described, and approaching the pueblo houses in New Mexico. They speak of a village of the Chopunish (Nez Perces) as follows: "The village of Tumachemootool is in fact only a single house, 150 feet long, built after the Chopunish fashion, with sticks, straw, and dried grass. It contains twenty-four fires, about double that number of families, and might perhaps muster 100 fighting men." (*Travels, loc. cit.*, p. 548.) This would give 500 people in a single house; and the fires probably indicate the number of groups, practising communism among themselves, into which they were subdivided, though it may have been general to the entire household.

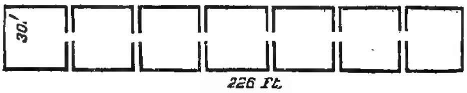

Fig. 3. Ground-Plan of Neerechokioo.

Another great house, Neerechokioo, is thus described: "This large building is 226 feet in front, entirely above ground, and may be considered a single house, because the whole is under one roof; otherwise it would seem more like a range of buildings, as it is divided into seven distinct apartments, each thirty feet square, by means of broad boards set up on end from the floor to the roof. The apartments are separated from each other by a passage or alley four feet wide, extending through the whole depth of the house, and the only entrance is from this alley through a small hole about twenty inches wide and not more than three feet high. The roof is formed of rafters and round poles laid on horizontally. The whole is covered with a double roof of bark of white cedar." (*Ib.*, p. 503.) The apartments indicate the number of groups. Elsewhere (p. 515), speaking of the houses of the Clahclellah, they remark: "These houses are uncommonly large; one of them measured 160 by 40 feet. . . . Most of the houses are built of boards and covered with bark, though some of the more inferior kind are constructed wholly of cedar bark."

These first explorers found the houses of the natives large enough to accommodate several families, with from twenty to thirty persons in each. They name the following villages together (*Ib.*, p. 428): "The Clamoitomish, of twelve houses and 260 souls; the Potoashees, of ten houses and 200 souls; the Pailsk, of ten houses and 200 souls; the Quinults, of sixty houses and 1000 souls; the Chillates, of eight houses and 140 souls," etc. The formation of large groups in single houses or in apartments of a house is thus fully shown. Our explorers do not speak of the practice of communism in these groups. When the usages of other nations, which are known, are presented, the inference of communism in living in these aboriginal houses in the Valley of the Columbia will be plain. The tendency to aggregation in groups, which is clearly shown in the numbers occupying each house, reveals the weakness as well as inability of the single family to cope with the hardships of savage, and even of barbarous, life. Communism in living, as elsewhere stated, was the law of their condition.

II. *Communal Houses of the Partially Village Indians.*—

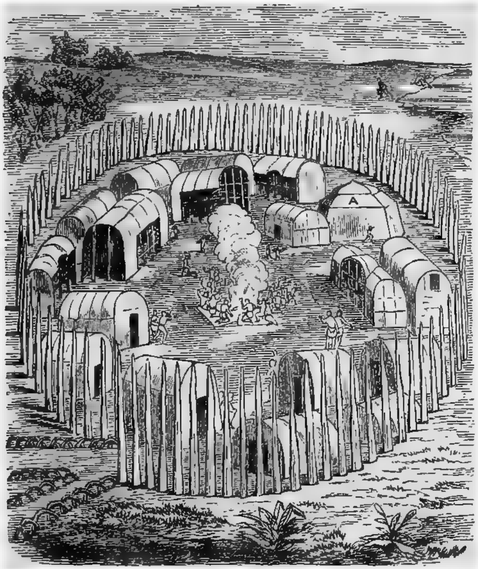

FIG. 4. Pomeiok.

The houses of this class are equally communal in character. Wythe, in his "Sketches of Virginia," first published in 1690, furnishes an engraving of the village of the Powhattan Indians, called Pomeiok, consisting of seventeen long houses, besides a council-house, arranged around an open central space and surrounded with a palisade. Here the Algonkin lodge gives place to round-roofed long houses, framed with poles, and covered with movable matting instead of bark, and large enough for several families. The suggestion of Wythe that "the buildings were mostly those of chiefs and men of rank" (*Sketches*, etc., Langley ed., 1841, pl. 21) embodies the precise error which has repeated itself, from the first, with respect to the architecture of the American aborigines. Because the house is large, as the Governor's House at Uxmal, therefore it must have been the exclusive residence of an Indian potentate—a conclusion opposed to the whole theory of Indian life and institutions. Indian chiefs were housed with the people, and no better than the poorest of them.

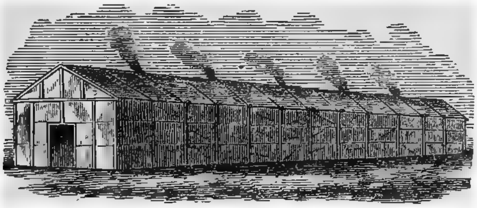

FIG. 5. Ho-de'no-sote of the Iroquois.

During the greater part of the year the Iroquois resided in villages. The size of the village was estimated by the number of houses, and the size of the house by the number of fires it contained. One of the largest villages of the Seneca-Iroquois, situated near Mendon in the county of Monroe, N. Y., is thus described by Mr. Greenhalgh, who visited it in 1677: "Tiotohatton is on the brink or edge of a hill, has not much cleared ground, is near the river Tiotohatton, which signifies *bending*. It lies to the westward of Canagora about thirty miles, contains about 120 houses, being the largest of all the houses we saw, the ordinary being fifty to sixty feet long, with twelve and thirteen fires in one house. They have a good store of corn growing to the northward of the town." (*Doc. Hist. N. Y.*, i. 13.)

The "long house" of the Iroquois, from which they called themselves, as one confederated people, *Ho-de'no-sau-nee* ("People of the Long House"), was from fifty to eighty, and sometimes more than 100 feet long. It consisted of a strong frame of upright poles set in the ground, strengthened with horizontal poles attached with withes, and covered with a triangular roof. It was covered over with large shingles of elm bark tied to the frame with strings or splints. An external frame of poles and rafters was then adjusted to hold the shingles between them, the two being tied together.

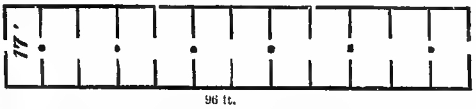

FIG. 6. Ground-Plan of Iroquois House.

The interior was comparted at intervals of six or eight feet, leaving each chamber entirely open, like a stall, upon the hall which passed through the centre from end to end, where were the only doors. Between each four apartments, two on a side, was a fire-pit in the centre of the hall, used in common by their occupants. Thus a house with five fires would contain twenty apartments and accommodate twenty families, unless some were reserved for storage. An elderly Seneca woman, now deceased, informed the writer that she remembered living in one of these houses of the ancient model when a child, which contained eight families and two fires. Raised bunks were constructed around the walls of each apartment for beds. From the roof-poles were suspended their strings of corn in the ear, braided by the husks, also their strings of dried squashes and melons. Spaces were left between the partitions here and there for storage. Each house was usually occupied by related families, the women and children belonging to the same gens. Whatever was taken in the hunt or raised by cultivation by any member of the household was for the common benefit. Provisions were made a common stock within the house.

It should be observed, further, that among the Iroquois there was but one regular meal each day, and that in the morning. At this time the cooking for the day was done, and the food was served to all within the household from wooden bowls, ladles, or platters, and without the use of tables. What remained was reserved for use during the day, each one partaking whenever hunger prompted. Hommony, which formed their usual lunch, was cooked at the close of the day. The separate fires were for convenience alone, all the stores within the house being common.

Here we find communism in living carried out in practical life, and an expression of the principle in the plan of the house itself. Having found it in one stock so well developed as the Iroquois, a presumption of its universality in the Ganowanian family at once arises, requiring proof of the negative in other cases for its rebuttal.

In 1790, Mr. Caleb Swan, under the direction of Gen. Knox, secretary of war, visited the Creek villages in Georgia and Alabama. Without describing their houses specially, he remarks in his report that "the smallest of their towns have from twenty to forty houses, and some of the largest contain from 150 to 200 that are tolerably compact. These houses stand in clusters of four, five, six, seven, and eight together, irregularly distributed up and down the banks of the rivers and small streams. Each cluster of houses contains a clan or family, who eat and live in common." (Schoolcraft, *History, etc. of Indian Tribes*, v., 262.) The cluster of houses among the Creeks was equivalent to one of the long houses of the Iroquois; and the clustered household of the former, who *ate and lived in common*, was made up of related families, as the large Iroquois household within a single house, the relationship being partly gentile and partly marital.

Carver, in describing the "great town of the Sawkees" on the Wisconsin River, remarks (*Travels, loc. cit.*, p. 29) that "it contains about ninety houses, each large enough for several families. They are built of hewn plank, neatly jointed, and covered with bark so completely as to keep out the most penetrating rain."

The Mandans and Minnitarees of the Upper Missouri constructed a timber-framed house superior in design and

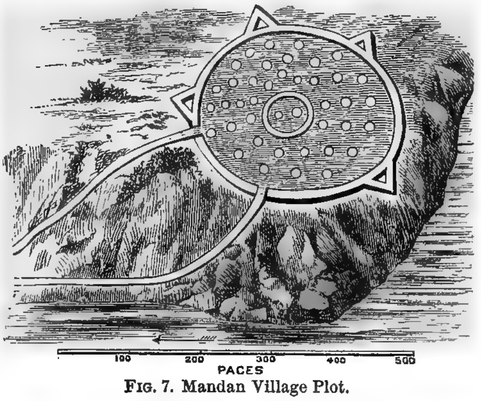

FIG. 7. Mandan Village Plot.

workmanship to those of any Indians N. of New Mexico. In 1862 the writer saw the remains of the old Mandan village shortly after its abandonment by the Arickarees, its last occupants. The houses, nearly all of which were of the same model, were falling into decay, but some of them were still perfect, and the plan of their structure easily made out. The annexed ground-plan of the village is taken from the work of Prince Maximilian, and the remaining illustrations from sketches and measurements of the author. The village was situated upon a bluff on the W. side of the Missouri, and at a bend in the river which formed an obtuse angle, and covered about five acres of land. It was surrounded with a stockade made of timbers set vertically in the ground, but then in a dilapidated state.

The houses were circular in external form, the walls being about five feet high and sloping upward from the ground, with an inclined roof, both exterior wall and roof being plastered over with earth a foot and a half thick.

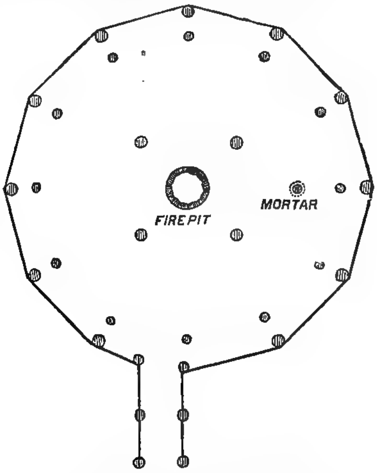

FIG. 8. Ground-Plan of Mandan House.

These houses are about forty feet in diameter, with the floor sunk a foot or more below the surface, six feet high on the inside at the line of the wall, and from twelve to fifteen feet high at the centre. Twelve posts, six or eight inches in diameter, are set in the ground at equal distances in the circumference of a circle, and rising about six feet above the level of the floor. String-pieces, resting on forks upon the top of each post, connect them with each other, thus forming a polygon at the base of the roof and also upon the ground floor. Against these, and opposite to each post, an equal number of braces are sunk in the ground about four feet distant, which, slanting upward, are adjusted by means of forks or depressions cut in the ends, so as to hold both the posts and the stringers firmly in their places. Slabs of wood or round timbers are then placed in the spaces between the braces, at the same inclination from the ground, and resting against the stringers, which when completed surrounded the lodge with a wooden wall. Four posts, each six or eight inches in diameter, are set at the four angles of a square in the centre, ten feet apart, and rising from twelve to fourteen feet above the floor. These are again connected by stringers resting in forks on their tops, upon which, and the external walls, the rafters rest.

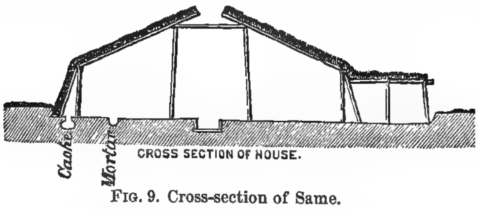

FIG. 9. Cross-section of Same.

The cross-section exhibits the framework as described. Poles three or four inches in diameter are placed as rafters from the external walls to the string-pieces upon the central posts, and near enough together to give the requisite strength to support the earth covering which formed the roof. These poles are first covered over with willow matting, upon which prairie grass was spread, and over this a deep covering of earth. An opening was left in the centre, about four feet in diameter, for the exit of the smoke and for the admission of light. The interior is spacious and tolerably well lighted, although the opening in the roof was the only one through which light could penetrate. There is but one entrance, and that protected by an Eskimo doorway; that is, by a passage five feet wide, ten or twelve feet long, and about six feet high, constructed with split timbers, roofed with poles and covered on the top with earth. Buffalo robes suspended both at the outer and inner entrances supply the place of doors. Each house, when occupied, was comparted by screens of willow matting or unhaired skins suspended from the rafters, with spaces between for storage. These slightly constructed apartments extended back to the wall and opened towards the centre, like stalls, thus defining an open central area which formed the gathering-place of the inmates of the lodge. The fire-pit was in the centre, about five feet in diameter and a foot deep, and encircled with flat stones set up edgeways. A hard smooth earthen floor completed the interior. Such a lodge would accommodate five or six families of related persons. In fact, it was a communal house, in accordance with the usage and institutions of the American aborigines, and growing naturally out of their customs and mode of life. We counted forty-eight of these houses which would average forty feet in diameter, besides several rectangular houses constructed of hewn logs at a more recent day.

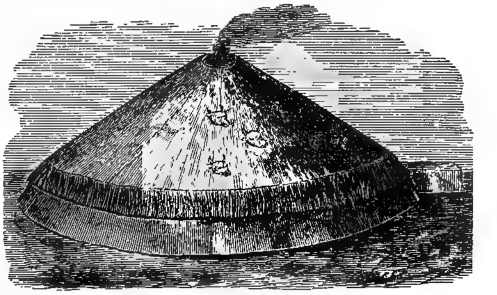

FIG. 10. Front Elevation of Same.

Not the least interesting fact connected with these creditable homes was the quantity of material required in their construction, and the amount of labor necessary for its transportation long distances down the river, and to fashion it with the aid of fire and stone implements into such a comfortable dwelling. To cut the timber without metallic inplements, and to transport it without animal power, indicate a degree of persevering industry highly creditable to a people who are generally regarded as averse to labor.

These houses were thickly studded together to economize the space within the stockade, so that in walking through the village you passed along semicircular footpaths. There is not only no street, but it was impossible to see in any direction except for short distances.

It is plain, from the facts thus far presented, that the Indian household was a group of related families united for subsistence upon the communal principle, which in turn found expression in their house-architecture.

A reference should be made to the Maricopas and Mohaves of the Colorado, who, although Village Indians, still live in ordinary communal houses of the northern type, which are thus described by Gen. Emory: "They [the Maricopas] occupy thatched cottages thirty or forty feet in diameter, made of twigs of cottonwood trees, interwoven with the straw of wheat, corn-stalks, and cane." (*Notes, etc. in N. M.*, p. 132; cf. Bartlett's *Pers. Nar.*, 230.) Those occupied by the Mohaves, as described by Capt. Sitgreaves, are similar in character. (*Expedition, etc. Zuñi and Colorado Rivers*, p. 19.) Although their antecedent history is not well known, they seem to be in the transitional stage, having passed into the horticultural and village condition, without being far enough advanced to imitate their near neighbors in the use of adobe brick and stone. They seem to be existing examples of that recurring advancement of ruder tribes in past ages, through which the Village Indians were constantly replenished from the more barbarous nations.

III. *Communal Houses of the New Mexicans.*—We are next to consider the architecture of the Village Indians, among whom it exhibits a higher development, with the use of durable materials, and with the defensive principle superadded. It will not be difficult, however, to discover and to follow the communal principle as the chief characteristic of this architecture—first, in the pueblo houses in New Mexico, and after that in those of Central America. The necessary limits of this article will prevent a full exposition of the subject, but it will be possible to present the controlling facts.

The Indians N. of New Mexico never constructed a house more than one story high, or of more durable materials than a wooden frame covered with matting or bark or coated over with earth. Chimneys were unknown, and also stairs, except in the form of ladders. In New Mexico, going southward, are met, for the first time, houses constructed of adobe brick and of stone, and four, five, even six stories high. Sun-dried brick must have come into use earlier than stone. The practice of the ceramic art would suggest the brick sooner or later. At all events, what are supposed to be the oldest remains of architecture in New Mexico, such as the *casas grandes* of the Gila and Salinas rivers, are of adobe brick. They also used rubble stone with mud mortar, and finally thin pieces of tabular sandstone, prepared by fracture, and giving a solid and durable stone wall. Some of the existing pueblo houses in New Mexico are as old as the expedition of Coronado (1540–42), as those at Acoma and Taos, and probably Zuñi, and those of the Moquis, whilst others, constructed since that event, and now occupied, are upon the aboriginal model. There are at present about twenty of these pueblos in New Mexico, inhabited by 7000 Indians, the descendants of those found there by Coronado. They are still living substantially under their ancient organization and usages. Besides, there are the seven Moqui pueblos near the Little Colorado, occupied by 4000 Indians, who have remained pure and undisturbed to the present time, and among whom the entire theory of Indian village life might be obtained if some adventurous ethnologist would seek their secluded homes and study the subject on the spot. These Village Indians represent, at the present moment, the type of village life found from Zuñi to Cuzco at the epoch of the Discovery, and, whilst they are not the highest, they are no unfit representatives of the entire class.

The Central Americans were, in their architecture, in advance of the remaining aborigines of North America. Next to them, probably, were the Aztecs and some few nations southward; and holding the third position, though not far behind, were the New Mexicans. All alike they depended upon horticulture for subsistence and cultivated by irrigation. Their houses, with those previously described, represent together an original, indigenous architecture, which, with its diversities, sprang out of their necessities. Its fundamental communal type, we repeat, is found not less plainly in the comparted long house of the Iroquois than in the so-called palace at Palenque. An examination of the plan of the structures in New Mexico and Central America will tend to establish this proposition.

New Mexico is a poor country for civilized man, but quite well adapted to Villago Indians. It possesses a number of narrow fertile valleys, which were occupied in 1540 by thirty or forty pueblo villages, containing possibly 50,000 or 60,000 Indians, and it is occupied now by their descendants in manner and form as it was then. Each pueblo consisted then, as now, either of a single great house or of three or four such houses grouped together; and, what is more significant, the New Mexican pueblo is a fair type of those found in ruins in Central America in general plan, in the mode of life it indicates, and in situation. All the people lived together in these great houses on terms of equality and also for security. Common tenements for common Indians around these structures were not found there by Coronado in 1541; neither have any been found there since. There is not the slightest ground for supposing that any such tenements ever existed around the ruined structures in Central America. This suggestion should be kept in mind.

This pueblo or village is composed of three or four structures of adobe brick grouped together, one of which is shown in the engraving. It is about 200 feet long, with two parallel rows of apartments on the ground, of which the front row is carried up one story and the back two, the flat roof of the first story forming a terrace in front of the second. The first story is closed up solid for defensive reasons, with the exception of small window-openings. The first terrace is reached by means of ladders from the ground; the rooms in the first story are entered through trap-doors in the terrace, and in the second through doors opening upon the terrace. This structure is typical of all the aboriginal houses in New Mexico. It shows two principal features: first, the terraced form of architecture, with the housetops as the ordinary gathering-places of the inmates; and second, a closed ground-story for safety. Every house, therefore, is a fortress. Lieut. Abert, from whose report the engraving is taken, remarks that "the upper story is narrower than the one below, so that there is a platform or landing along the whole length of the building. To enter, you ascend to this platform by means of ladders that could be easily removed; and, as there is a parapet wall extending along the platform, these houses could be converted into formidable forts." (*Ex. Doc.* No. 41, 1st Sess. 30th Congress, 1848, p. 462.) The number of apartments is not stated, but, judging from the window-openings, there may be thirty-eight on the first floor, of which half are dark, and nineteen in the second story. The different houses at that time were inhabited by 800 Indians. Chimneys now appear rising above the roof, the fire-place being at the angle of the chamber in front.

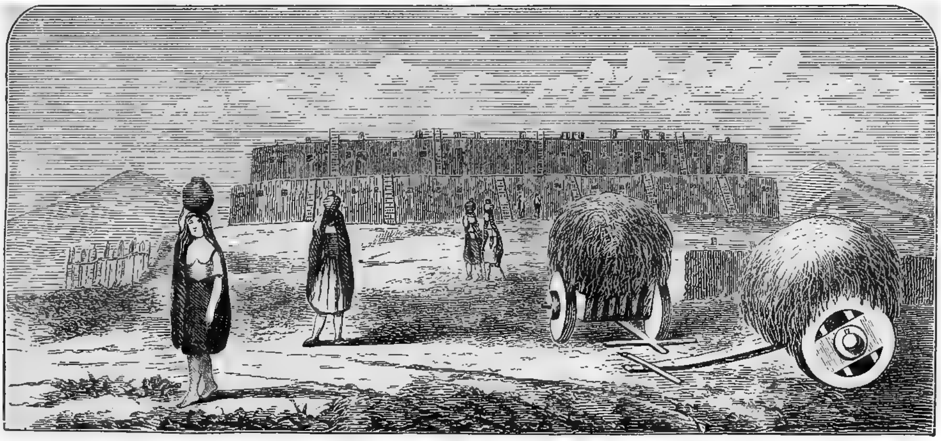

FIG. 11. Pueblo of Santo Domingo.

The defensive element, so prominent in this architecture, was not so much to protect the Village Indians from each other as from the attacks of the migrating bands flowing down upon them from the Valley of the Columbia. The pueblos now in ruins throughout the original area of New Mexico testify to the perpetual struggle of the former to maintain their ground, as well as prove the general insecurity in which they lived. It could be shown that the second and additional stories were suggested by the defensive principle.

Zuñi is the largest occupied pueblo in New Mexico at the present time. It once contained 5000 or 6000 inhabitants, but in 1851 they were reduced to 1500. The village consists of several structures, most of them accessible to each other from their terraced roofs. They are constructed of adobe brick, and of stone embedded in mud mortar, and plastered over. In the engraving, which is copied from Sitgreaves' report, a section of one of the principal structures is given, the left end being cut off by another building in front of it, and the right showing a series of angles. It shows three stories in the terraced form, with two square buildings standing apart on the summit, and forming a fourth, giving it the appearance somewhat of a temple, and perhaps suggesting an explanation of the application of this term by the Spanish invaders to so many of the buildings seen in and around the pueblos of Mexico.

The living-rooms, as shown by engravings in the same report, are about ten by fifteen feet, and ten feet high, with plastered walls, a hard earthen floor, and usually a single window-opening. To form a durable ceiling, round timbers about six inches in diameter are placed three or four feet apart from the outer to the inner wall. Upon these small poles are placed transversely in juxtaposition, over which is a deep covering of mud mortar, which forms the terrace roof in front and the floor of the rooms within. Water-jars of fine workmanship, and of capacity for several gallons, closely-woven osier baskets, blankets of cotton and wool woven by their own hand-looms are among the objects seen in these apartments. They are neatly kept, roomy and comfortable, and differ in no respect from those in use at the period of the Conquest.

It should be noticed that this architecture, and the necessities that gave it birth, led to a change in the mode of life from the open ground to the terraces or flat roofs of these communal houses. When not engaged in tillage, and during the morning and evening hours, the terraces were the gathering and living places of the people. They lived, practically, in the open air, to which the climate was adapted, and upon their house-tops, first for safety, and afterwards from habit.

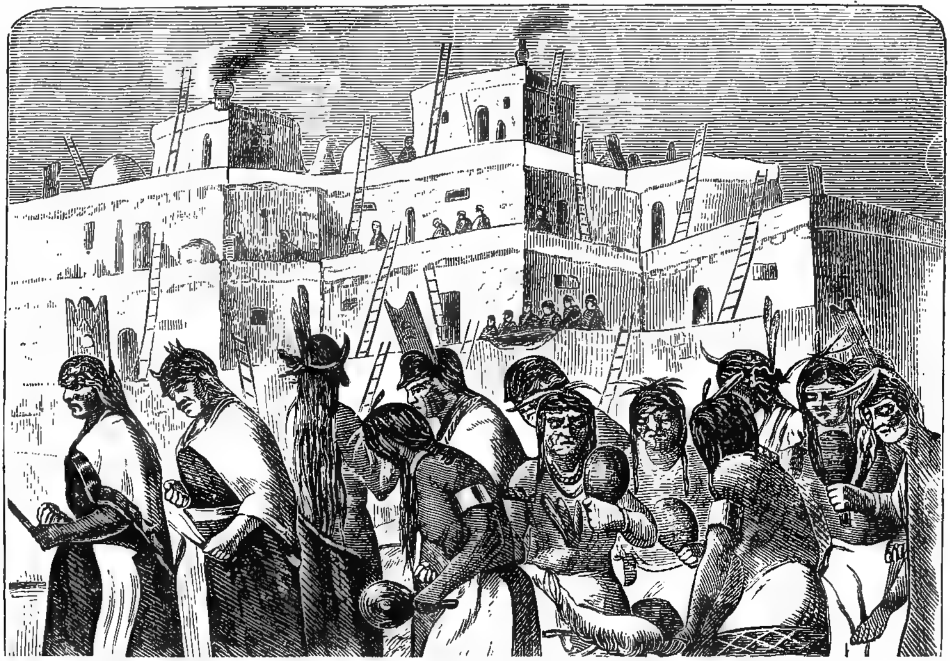

FIG. 12. Section of Pueblo House at Zuñi.

Elevations of the principal New Mexican pueblos have been published. They agree in general plan, but show considerable diversity in details. Rude but massive structures, they accommodated all the people of the village within their walls. Since most of them are of adobe brick, or of rubble stone embedded in mud mortar, our remaining illustrations will be taken from the pueblos in ruins in the valley of the Rio Chaco, which are constructed entirely of stone, are unquestionably as old as the epoch of the conquest of Mexico, and superior architecturally to those now occupied, showing that a decadence in the art commenced with European intrusion.

About 110 miles N. W. from Santo Domingo on the Rio Grande, there are seven great edifices, now in ruins, situated within an extent of ten miles in the valley of the Rio Chaco, an affluent of the Colorado. They were visited and described in 1849 by Lieutenant (now General) Simpson, with ground-plans and measurements. (*Report of James H. Simpson of an Expedition in the Navajo Country in* 1849, Ex. Doc. No. 64, 1st Sess. 31st Cong., pp. 55–139.) In an architectural point of view they are the most interesting and remarkable structures in New Mexico. The ground-plans, elevations, and the detailed particulars are taken from this report. They are probably the remains of the Seven Cities of Cibola, against which the expedition of Coronado was directed in 1540–42.

These great edifices were all constructed of the same materials, and upon the same general plan, but they differ in size upon the ground, in the number of rows of apartments, and consequently in the number of stories. They contained from 100 to 600 apartments each, and would severally accommodate from 1000 to 3000 or 4000 persons. Some of them are also the largest structures in ground dimensions and in the extent of their accommodations ever found in any part of North America. It may be remarked here that it is doubtful whether any single pueblo in New Mexico at its most prosperous period contained more than 5000 or 6000 inhabitants, and in such a case it would be made up of more than one of these structures, grouped together, as at Zuñi. This would probably hold true with the great majority of the ancient pueblos in Mexico and in Central America.

Ground-plans are furnished of five of the seven edifices. They all, save one, agree in being constructed on three sides of an open court, the fourth being protected by a low stone wall. The outer faces of the walls are constructed of thin pieces of tabular sandstone, prepared by fracture, and laid in courses without mortar, the inner faces being composed of rubble masonry with mud mortar. The walls are about three feet thick. There were no doors or openings to enter the buildings from the ground, but in the stories above the first are window-openings through the walls. General Simpson remarks that they are "built of tabular pieces of hard, fine-grained, compact, gray sandstone, to which the atmosphere has imparted a reddish tinge;" that "in the outer faces of the building there are no signs of mortar, the intervals between the beds being chinked with stones of minutest thinness;" and that the "filling and backing are done in rubble masonry, the mortar presenting no indications of the presence of lime." "So beautifully diminutive are the details of the structure as to cause it, at a little distance, to have all the appearance of a magnificent piece of mosaic work." (*Report*, p. 76.) The layers are not usually thicker than three inches, and sometimes as thin as one-fourth of an inch. Their ancient names are of course unknown. General Simpson adopted those given to him by his Spanish guide.

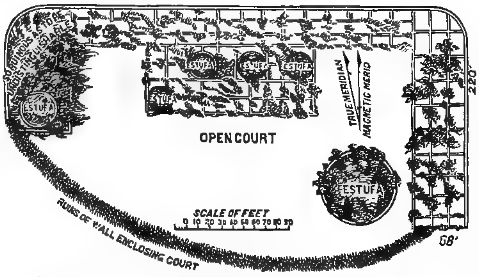

FIG. 13. Ground-Plan of Pueblo of Chettro Kettle.

The general plan of all the edifices on the Chaco will be made intelligible by the annexed ground-plan. The main building and the wings face the court, from which alone they are entered, and from which the several stories recede outward. Including the court, this great house has an exterior development of 1300 feet. The exterior wall of the main building measures 454 feet in length, and the longest of the wings 220 feet. At the centre, where four additional rows of apartments have been added on the inside, the structure is 110 feet deep, and for the remainder 44 feet. One of the wings is 50 and the other 58 feet deep, showing three rows of apartments in each, and consequently they were three stories high; the first row on the court side being carried up one story, the second two, and the third three, in the usual terrace form as before shown. If carried up in the same manner at the centre, it would be seven stories high on the back row.

From the measurement some impression may be formed of the extent of the accommodations such an edifice would afford, especially in Indian life, where more than one pair with their children are usually found in one lodge, and, it may be supposed here, in one apartment. The plan shows 124 rooms on the ground-floor, exclusive of the left wing, which was too ruinous to identify the number. Excluding one row of apartments for the terrace in front of the second story, and counting one row less for each successive story, there would be an aggregate in this single house of some 300 apartments, capable of accommodating 1500 or 2000 Indians.

The circular estufas, of which there are six, and five of which are incorporated in the body of the structure, were their council-houses. They were sunk below the surface, and carried up, in some cases, two and three stories. Similar estufas are still in use in New Mexican pueblos as places for holding councils. The number indicates a sub-organization analogous to the gens. It may be supposed, therefore, that each estufa was the council-house of a gens, or, if the gentes were numerous, then of a phratry composed of two or more gentes derived by subdivision from an original gens.

In the N. W. corner, Gen. Simpson remarks, "we found a room in an almost perfect state of preservation. This room is fourteen by seven and a half feet in plan, and ten feet in elevation. It has an outside doorway three and a half feet high by two and a quarter wide; and one at the W. end leading into an adjoining room. . . . The stone walls still have their plaster upon them in a tolerable state of preservation. . . . The ceiling showed two main beams, laid transversely; on these, longitudinally, were a number of smaller ones in juxtaposition, the ends being tied together by a species of wooden fibre, and the interstices chinked in with small stones; on these, again transversely, in close contact, was a kind of lathing of the odor and appearance of cedar, all in a good state of preservation. Depending from the ceiling were several pieces of short rope." (*Report*, p. 79.) This ceiling agrees in form with that at Zuñi, previously described. Elsewhere he says that these floor-beams are six inches in diameter, and were hacked off by means of some imperfect instrument, there being no evidence of the use of the metallic axe.

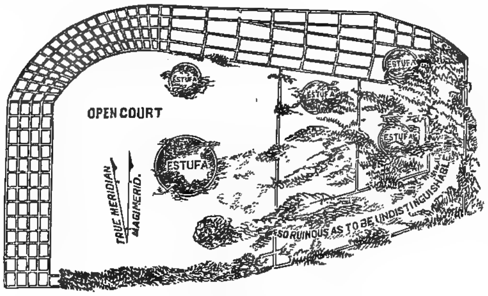

FIG. 14. Ground-Plan of Pueblo Bonito.

This edifice is the most interesting, in some respects, of the seven, as well as the best preserved in certain portions. In exterior development, including the court, it is 1300 feet. Its corners are rounded, and the E. wing, now the most ruinous part of the structure, appears to have had row upon row of apartments added until nearly one-third of the area of the court was covered. "Its present elevation," Simpson observes, "shows that it has had at least four stories of apartments. The number of rooms on the ground-floor is 139. In this enumeration, however, are not included the apartments which are not distinguishable in the E. portion of the pueblo, and which would swell the number to about 200. There, then, having been at least four stories of rooms, . . . there must be a reduction . . . of one range of rooms for every story after the first," which would increase "the number to 641." (*Ib.*, p. 81.) No single edifice of equal accommodations, it may here be repeated, has ever been found in any other part of North America. It would house 3000 Indians.

This room will compare, not unfavorably, with any of equal size to be found at Palenque or Uxmal, although, from the want of a vaulted ceiling, not equal in artistic design. The nice mechanical adjustment of the masonry and the finish of the ceiling are highly creditable to the taste and skill of the builders. "It is walled up," says Simpson, "with alternate beds of large and small stones, the regularity of the combination producing a very pleasing effect. The ceiling of this room is also more tasteful than any we have seen, the transverse beams being smaller and more numerous, and the longitudinal pieces which rest upon them only about an inch in diameter, and beautifully regular. These latter have somewhat the appearance of barked willow. The room has a doorway at each end, and one at the side, each of them leading into adjacent apartments. The light is let in by a window two feet by eight inches, on the N. side." (*Ib.*, p. 81.)

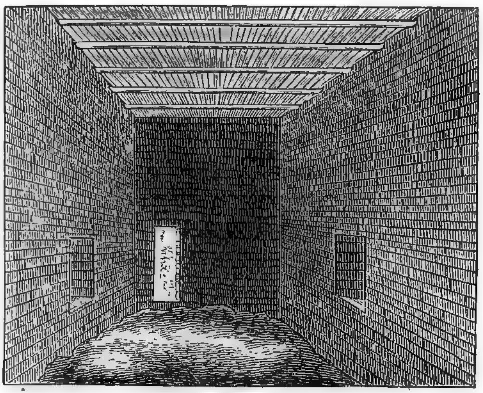

FIG. 15. Room in Same.

The largest of the seven pueblos is Peñasca Blanca, which has an exterior development of 1700 feet. "This," he further remarks, "differs from the others in the arrangement of the stones comprising its walls. The walls of the other pueblos are of one uniform character in the several beds composing them, but in this there is a regular alternation of large and small stones, the effect of which is both unique and beautiful. The largest stones, which are about a foot in length and half a foot in thickness,* form but a single bed, and then, alternating with these, are three or four beds of small stones, each about an inch in thickness. The ground-plan of the structure also differs from the others in approaching the form of a circle." (*Ib.*, p. 82.)

One of these remaining, Una Vida, seems to have been in process of construction, and designed, when completed, to have been the largest of the seven. The main building is 300 feet in length along the exterior wall, and 65 feet deep, showing four rows of apartments; and the wing is 290 feet long and but 16 feet deep, showing but a single row. It appears, however, from a projection near one end of the width of two apartments, that two more rows were to be constructed outside of the existing row, which were necessary to complete the wing according to its original design. Moreover, it seems to prove that these great houses were of slow construction by the process of addition from year to year with the increase of the people in numbers, and that the enlargement is by adding row to row and story to story until the edifice is several rooms deep and several stories high. Upon this theory of construction, the first row of the main building on the court side would first be completed one story high, and covered with a flat roof; after which, by adding one parallel wall, with partition walls at intervals, as many more apartments would be obtained; and by a third and fourth parallel wall, with partitions, as many more. The second row was carried up two stories, the third three, and the fourth four; the successive stories receding from the court side in the form of great steps or terraces, one rising above the other. The wings would be commenced and completed in the same manner. Further than this, it seems to be evident, from the present condition of this structure, that the main building was to be extended at least 200 feet, with a second wing like the first, to fill out the original design and produce a symmetrical edifice. If these inferences are warranted, the interesting fact is reached that these Indian architects commenced their great houses upon a definite plan, which was to be realized after years, and perhaps generations, had passed away.

The highest portion of the walls still standing are stated at fifteen feet in height at Una Vida, twenty-five feet in Wegegi, and thirty feet in Hungo Pavie. The rooms back of the front row in the first story, and the middle rooms in the second, were dark, except as they were dimly lighted from contiguous apartments.

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[*] Norman, speaking of the size of the stones used in the edifices in Yucatan, says: "The stones are *parallelopipeds* of about twelve inches in length and six in breadth."—*Rambles in Yucatan*, p. 127.

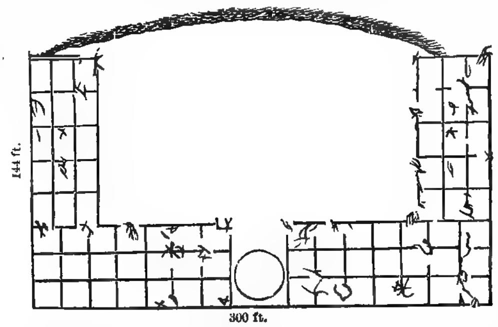

FIG. 16. Ground-Plan of Hungo Pavie.

This pueblo has been reserved to the last for the purpose of giving both a ground-plan and a front elevation. In exterior development, including the court, it is 872 feet, of which the back wall measures 300 and the side walls 144 feet each. It is of medium size, but symmetrical, and larger than any single structure in Central America in ground dimensions. There are seventy-two apartments in the first story, some of which are unusually large, being about thirteen by eighteen feet; and, with forty-eight in the second and twenty-four in the third, contained an aggregate of 146 apartments. It would accommodate from 1200 to 1500 Indians.

To complete the representation of the architectural design of these "great houses of stone" the annexed elevation is given. It is a restoration of the pueblo of Hungo Pavie, made by Mr. Kern, who accompanied Gen. Simpson as draughtsman, and copied from his engraving. We may recognize in this edifice, as it seems to the writer, a very satisfactory reproduction of the so-called palaces of Montezuma, which, like this, were constructed on three sides of a court which opened on a street or causeway, and in the terraced form. From the light which this architecture throws on that of the Aztecs, it appears extremely probable that these famous palaces, considered as exclusive residences of an Indian potentate, are purely fictitious, and that, on the contrary, they were neither more nor less than great communal houses of the aboriginal American model, and with common Indians crowding all their apartments. From what is known of the necessary constitution of society among the Village Indians, it scarcely admits of a doubt that the great house in which he lived was occupied on equal terms by a hundred other families in common with his own, all the individuals of which were joint proprietors of the establishment which their own hands had raised.

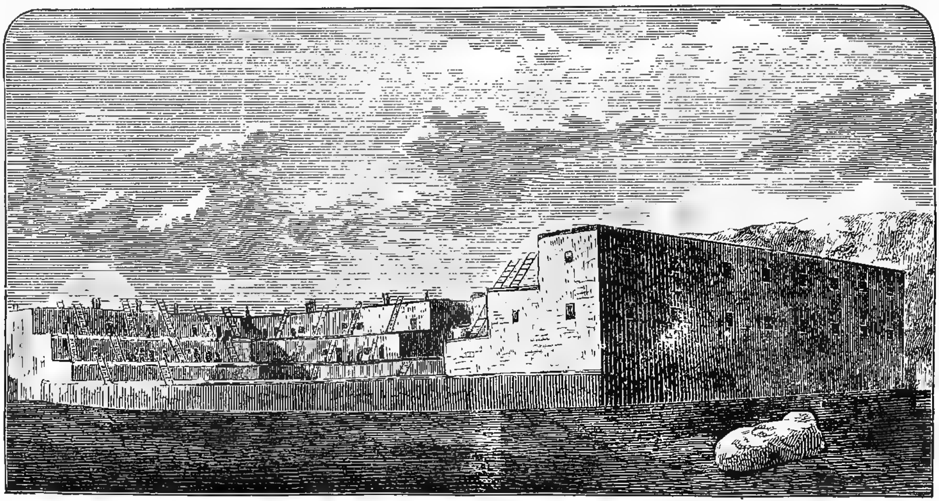

FIG. 17. Elevation of Hungo Pavie.

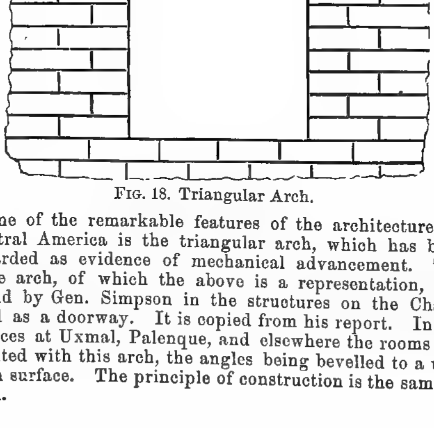

FIG. 18. Triangular Arch.

One of the remarkable features of the architecture of Central America is the triangular arch, which has been regarded as evidence of mechanical advancement. The same arch, of which the above is a representation, was found by Gen. Simpson in the structures on the Chaco, used as a doorway. It is copied from his report. In the edifices at Uxmal, Palenque, and elsewhere the rooms are vaulted with this arch, the angles being bevelled to a uniform surface. The principle of construction is the same in both.

After the capture of the "Seven Cities of Cibola," Coronado made a report to Mendozo, viceroy of Mexico, in which he expresses his disappointment in the following language: "And to be brief, I can assure your honor he [Friar Marcos de Niza] said the truth in nothing that he reported, but all was quite contrary, saving only the names of the cities and great houses of stone; for although they be not wrought with turquesces, nor with lime, nor bricks, yet they are very excellent good houses, of three or four or five lofts high, wherein are good lodgings and fair chambers, with ladders instead of stairs, and certain cellars [estufas] under ground, very good and paved. . . . The seven cities are seven small towns, all made with these kind of houses that I speak of; and they all stand within four leagues together, and they are all called the kingdom of Cibola, and every one of these have their particular name. . . . The people of this town seem unto me of a reasonable stature, and witty, yet they seem not to be such as they should be, of that judgment and wit, to build these houses in such sort as they are." Coronado further states that on the fourth day after the capture "they set in order all their goods and substance, their women and children, and fled to the hills, leaving their town as it were abandoned, wherein remained very few of them." (Hakluyt, *Coll. of Voyages*, London ed., 1600, iii., p. 377.)

No evidence has been adduced of the practice of communism by the present Pueblo Indians of New Mexico.* Information upon this and other questions concerning their organization and mode of life has not been sought by those who have visited this isolated country. The Moqui and Laguna Indians are organized in gentes, which raises a presumption of its universality among the Village Indians. Their arts, weapons, usages, implements and utensils, dances, and general characteristics, so far as they are known, are either precisely the same as those of the partially Village Indians of the North, or more advanced forms of the same original conceptions. The practice of communism must be deduced, for the present, from the structure of the houses themselves. Both in New Mexico and Central America they are strikingly adapted to communistic life. So much is this the case that their peculiar internal arrangement cannot be explained on any other hypothesis. In all the houses in Central America the rooms are usually in pairs, which have no connection with the remainder of the building. In some cases four, and in one six, apartments are found connected with each other by doorways. They are thus divided into sections adapted to groups, which are separated from each other by solid walls. The presumption arises that the houses in New Mexico are similarly constructed, although the fact has not been as yet ascertained.* The published engravings, however, show less than one-fourth as many chimneys as the inhabited houses contain apartments.

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* Since writing this article, Mr. David J. Miller of Santa Fé, N. M., has informed me by letter that the Pueblo Indians still hold their lands in common, with a possessory right in each to cultivated lands so long as the individual chooses to occupy it, but that he had not observed any evidence of the practice of communism in living among them.

IV. *Communal Houses of the Aztecs.*—The writers on the conquest of Mexico have alike failed to describe the Aztec house or the mode of life within it. All that can safely be said is, that the houses were large; that they were constructed of adobe brick and of stone embedded in mud mortar, in both cases plastered over with gypsum, which made them a brilliant white; and that some were constructed of a red porous stone. For working this stone, according to Clavigero, flint implements were used. (*Hist. Conq. Mex.*, Cullen's trans., 1817, ii., 238.) Some of these edifices were constructed on three sides of an open court, like those on the Chaco, but the court opening upon a street or causeway. In most cases they appear to have been two or more stories high, and built in the terraced form. All the roofs were flat. The situation of the pueblo of Mexico, partly on solid ground and partly in the waters of a shallow artificial pond, led to some diversities in its architecture; but the essential type of the latter was the same as that of New Mexico wherever its features distinctly appear. We are able to give one illustration in point. Cortez made his first entry into the pueblo, according to the statement of Bernal Diaz, with 450 Spaniards, accompanied by 1000 Tlascalan allies. (*Conq. of Mexico*, Keating's trans., London ed., 1803, i., 181 and 189.) They were lodged, Diaz naïvely tells us, in a vacant palace of the late father of Montezuma, remarking that "the whole of this palace was very light, airy, clean, and pleasant, the entry being through a great court." (*Ib.*, i., 191.) Suffice it to say, that one of the great houses of the Aztecs was sufficiently large to accommodate Cortez and his total number of 1450 men. One of the great houses then standing on the Rio Chaco would have accommodated twice that number.

It will be noticed that this Mexican house was entered from the court into the first story, in which respect it differed from the present and ancient houses in New Mexico. The reason is obvious. The pueblo could only be entered along its three causeways, which indicate the true places for its defence. The causeways had sluices through them, traversed by bridges that could be taken up.

It is quite plain, we think, that the house occupied by Cortez was constructed on three sides of a court, which opened on a causeway or street, the type of which is still found in New Mexico. When we are gravely told that Cortez and his followers are invited by Montezuma to occupy a vacant palace of his late royal father, we are much impressed with the surroundings of the Indian potentate thus introduced. But a glance at the contemporary edifices on the Chaco tends to unravel the marvel, and to show how it was that Cortez and his men could find ample acommodations in a single house constructed on the aboriginal American model; and when it is found to be wholly unnecessary to call it a *royal palace* in order to account for its size, an ungracious suspicion at once arises in the mind that one of the great communal houses of the Aztecs was emptied of its inhabitants to make room for the unwelcome intruders.

V. *Communal Houses in Central America.*—At the epoch of its discovery Central America was probably more thickly peopled than any other portion of North America of equal area, and its inhabitants more advanced than the remaining aborigines. Their pueblos were planted along the rivers and streams, often quite near each other, and presented the same picture of occupation and of village life found about the same time on the Rio Chaco and upon the Rio Grande and its tributaries. They consisted of a single great house, or of a cluster of houses forming one pueblo. In some cases four or more structures are grouped together upon the same elevated platform. But there is no reason for supposing, from any ruins yet found or from what is known of the people at the time, that any one pueblo contained, at most, more than 10,000 inhabitants. No one nation had risen to supremacy within this area by the consolidation of surrounding nations. They were, on the contrary, found in that state of subdivision and independence which invariably accompanies the gentile organization. Confederacies in all probability existed among such contiguous pueblos as spoke the same dialect or closely related dialects, as the Cibolans were probably confederated, as the Aztecs, the Tlascalan, and Michuacan tribes are known severally to have been. Such confederacies never reached beyond the language of the people confederated. Even the Aztec confederacy was surrounded on all sides except the S. by independent and hostile nations, living within 100 miles of the border of the Valley of Mexico; as witness the Tlascalans on the E., the Michuacans on the W., the Otomies on the N. W., and the Meztitlans and Huextecas on the N. E.

The tropical region of Central America, then as now, was undoubtedly covered with forest, except the limited clearings around the pueblos, and substantially uninhabited. Field agriculture was of course unknown, but the Indians cultivated corn, beans, squashes, pepper, cotton, and tobacco in garden-beds, which tended to localize them in villages. Herrera remarks of the Village Indians of Honduras that "they sow thrice a year, and they were wont to grub up great woods with hatchets made of flint." (*Hist. of America*, London ed., 1725, Stern's trans., iv., 133.) Without metallic implements to subdue the forest, or even with copper axes such as were found among the Aztecs, a very small portion of the country only would be brought under cultivation, and that would be confined mainly to the margins of the streams.

Las Casas, bishop of Chiapa, who was in Central America about 1539, after remarking of the people of Yucatan that they were "better civilized in morals and in what belongs to the good order of societies than the rest of the Indians," proceeds as follows: "The pretence of subjecting the Indians to the government of Spain is only made to carry on the design of subjecting them to the dominion of private men, who make them all their slaves." (*An Account of the First Voyages, etc. in America*, London ed., 1699, trans., p. 52.) And again he quotes from the letter of the bishop of St. Martha to the king, as follows: "To redress the grievances of this province, it ought to be delivered from the tyranny of those who ravage it, and committed to the care of persons of integrity, who will treat the inhabitants with more kindness and humanity; for if it be left to the mercy of the governors, who commit all sorts of outrages with impunity, the province will be destroyed in a very short time." (*Ib.*, p. 61.)

Two material questions which have been raised remain to be considered: First, whether the houses now in ruins in Central America were occupied at the time of the Spanish conquest; and second, whether the present Indians of the country are the descendants of the people who constructed them. There is no basis whatever for the negative of either proposition; but it is assumed by those who regard the palace at Palenque and the Governor's House at Uxmal as the ancient residences of Indian potentates, that great cities which once surrounded them have perished, and further, that these ruins have an antiquity reaching far back of the Spanish conquest.

Mr. Stephens commits himself to the conclusion "that at the time of the Conquest, and afterwards, the Indians were actually living in and occupied these very cities." (*Incidents of Travel in Yucatan*, ii., 348, and to the same effect, ii., 375.) He also regarded the present Indians of the country as the descendants of those in possession at the period of the Conquest. (*Ib.*, ii., 299.) He might have added that as the Maya was the language of the aborigines of Yucatan at the epoch of the Discovery, and is now the language of the greater part of the natives who have not lost their original speech, there was no ground for either supposition. Herrera remarks of the inhabitants of Yucatan that the "people were then found living together very politely in towns, kept very clean; . . . and the reason of their living so close together was because of the wars which exposed them to the danger of being taken, sold, and sacrificed; but the wars of the Spaniards made them disperse." (*Ib.*, *loc. cit.*, iv., 168.) Mr. Stephens, whose works and whose observations are in the main so valuable, is responsible to no small extent for the delusive inferences which have been drawn from the architecture of Central America. If he had repressed his imagination, and confined himself to what he found—namely, certain Indian pueblo villages built of dressed stone and in good architecture, which are sufficiently remarkable just as they are—and had omitted altogether such words as "palaces" and "great cities," his readers would have escaped the deceptive conclusions with respect to the actual condition of society which his mode of treatment and his terminology were certain to suggest.

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* Mr. Miller also informs me that the rooms generally are not connected with each other in the New Mexican pueblo house.

It is sufficiently ascertained that within a few years after the conquest of Mexico, Central America was overrun by military adventurers, whose rapacity and violence drove the harmless and timid Village Indians from their pueblos into the forests, thus destroying in a few years a higher culture than the Spaniards, then or since, substituted in its place. Nothing can be plainer, we think, than this additional fact: that all there ever was of Palenque, Uxmal, Copan, and other Indian pueblos in Central America, building for building and stone for stone, is now there in ruins.

One of the most extensive groups of ruins in Central America is that at Uxmal. The several structures are known as "The Governor's House;" the "House of the Nuns," which consists of four disconnected buildings, facing the four sides of a court; the "House of the Pigeons;" the "House of the Dwarf;" and the "House of the Old Woman"—in all eight, with some traces of smaller buildings of inconsiderable size. The dimensions of the largest will be given for comparison with those in New Mexico. They are situated in a cluster quite near each other, and evidently formed one Indian pueblo. They are constructed of stone laid in courses and dressed to a uniform surface, with the upper half of the exterior walls decorated with grotesque ornaments cut on the faces of the stones. Foster states that "these structures are composed of a soft coralline limestone of comparatively recent geological formation, probably of the tertiary period." (*Pre-historic Races of the United States*, p. 398.) Norman had previously described the material used as a "fine concrete limestone." (*Rambles, etc.*, p. 126.) Elsewhere, with respect to the nature of the tools for cutting this stone, he remarks that "flint was undoubtedly used." (*Ib.*, 184.) According to the same author, "the stones are cut in *parallelopipeds* of about twelve inches in length and six in breadth, the interstices filled up with the same materials of which the terraces are composed." (*Ib.*, 127.) This statement denies the use of mortar made of lime and sand. Stephens is equally explicit in stating that the mortar was of lime and sand; and he is perhaps the better authority, having taken the masonry apart. A soft coralline limestone could be easily worked when first taken from the quarry, and would harden after exposure to the air. The size and nature of the stones used is some evidence of limited advancement in solid stone architecture.[*]

These structures, as reproduced by Stephens and Catherwood, may well excite surprise and admiration for the taste, skill, and industry they display. When rightly understood they will enable us to estimate the material progress they had made, which was truly remarkable for a people still in barbarism, but well advanced in the middle period.

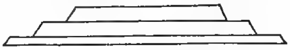

FIG. 19. Pyramidal Platforms.

We have seen that the style of architecture in New Mexico brought the Indians to the housetops as the common place of living, to which the flat roofs were adapted. At first suggested for security, it became in time a settled habit of life. The same want was met in Central America by a new expedient—namely, a pyramidal platform or elevation of earth, twenty, thirty, and forty feet high, and for small buildings still higher, upon the level summits of which their great houses were erected. Selecting, when practicable, a natural elevation, the top was levelled or raised by artificial means, the sides made rectangular and sloping, and faced with a dry stone wall; the ascent being made by a flight of stone steps. It was not uncommon to form two such platforms, and sometimes three, one above the other, as shown in the figure.

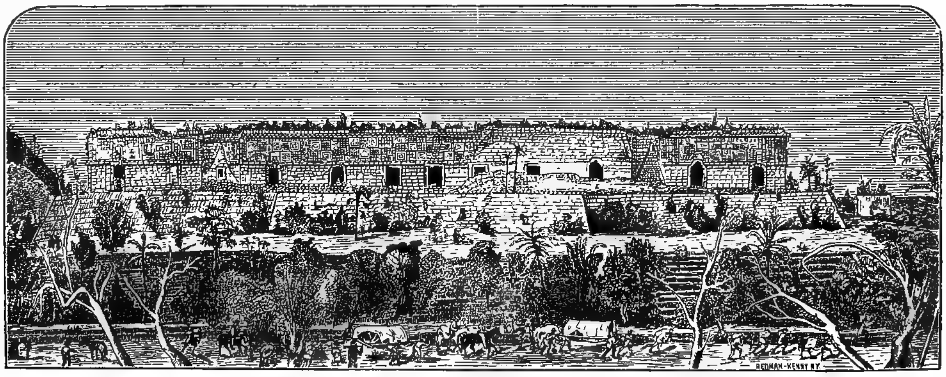
REDMAN-KENNY N.Y.

FIG. 20. The Governor's House at Uxmal.

These edifices are almost invariably but one story high, and but two rooms deep, the walls being carried up vertically to an equal height on all sides, and terminating in a flat roof. The doorways opened upon a platform-area, usually called the terrace, and the place was defended on the line or edge of the terrace-walls. Neither adobe brick nor rubble masonry nor timber roofs could withstand this tropical climate with its pouring rains during a portion of the year. Stone and a vaulted ceiling were indispensable to a permanent structure. Thus elevated, they enjoyed the same security as the Village Indians of New Mexico on their roof-tops and within their walls. They were also above the flight of the mosquitoes and other flies, the scourge of this tropical region. Considering the surrounding conditions, single-storied houses upon raised platforms was a natural suggestion, and harmonizes with this communal type of architecture as fully as the forms found in New Mexico.

For the details of this architecture reference must be made to published works which are easily accessible. The front elevation of the Governor's House, taken from Stephens's work, will answer as a sample of the whole. It stands upon the upper of three platforms, of which the lowest is 575 feet long, 15 feet broad to the base of the middle platform, and 3 feet high; the second, 545 feet long, 250 feet broad, and 20 feet high; and the third is 360 feet long, 30 feet broad, and 19 feet high. The upper platform is formed upon the back half of the middle one; of which last Stephens observes that "this great terrace was not entirely artificial. The substratum was a natural rock, and showed that advantage had been taken of a natural elevation so far as it went, and by this means some portion of the immense labor of constructing the terrace had been saved." (*Incidents of Travel, etc.*, i. 128.)

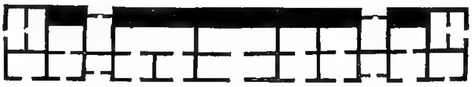

FIG. 21. Ground-Plan of Governor's House.

The house is symmetrical in structure—322 feet long, 39 feet deep, and about 30 feet high. It has eleven doorways, besides two small openings in front, and contains twenty-four apartments, two of which are each sixty feet long. The rear wall is solid, and in the central part nine feet thick. A parallel wall through the centre divides the interior into two rows of apartments, of which those in front are eleven feet six inches deep, and those back of them thirteen feet deep. Both inside and out the walls are of dressed stone, laid in courses.

This view of the interior of a room in the House of the Nuns shows the form of the triangular ceiling common to all the edifices at Uxmal, Palenque, and in Central America generally. It is a triangular arch without a key-stone, with the edges of the stones bevelled, and forming a perfect vault over each apartment, except a space a foot or more wide in the centre, which is carried up vertically about two feet and covered with a cap of stone. The mechanical principle is the same as in the New Mexican arch, but here applied on a more extended and more difficult scale. It is the most remarkable feature in this architecture, mechanically considered. But when we come to know that this vaulted ceiling was constructed over a core of solid masonry within the chamber, afterwards removed—which was the fact—it will be seen that these Indian masons and architects were still feeling their way towards a scientific knowledge of the art of arts. A projecting cornice is seen above the doorway, which balances somewhat the interior inward projection of the ceiling; and, as it is carried up flush with the cornice, the down-weight of the superincumbent mass sustained the masonry. The front rooms are twenty-three feet high to the top of the arch, and the back rooms twenty-two. Over the front doorways were originally wooden lintels, upon the decay of which a portion of the masonry had fallen. Those over the doorways through the partition walls were found in place. The proof of the comparatively modern date of these structures is conclusive from these facts alone.

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[*] The so-called *idols* at Copan are the largest stones worked by the Central Americans. They are about eleven feet high, by three feet wide and deep, each face being covered by sculptures and hieroglyphics. In a field near the ruins, and near each other, are nine of these elaborately ornamented statues. By the side of each is a so-called *altar*, about six feet square and four feet high, made of separate stones. They have been supposed to have some relation to their religious system, with human sacrifices in the background. From their position and character it may be conjectured that these idols are the grave-posts and the altars the graves of Copan chiefs. The type of both may still be seen in Nebraska in the grave-posts and grave-mounds by their side of Iowas and Otoes, and formerly in all parts of the country E. of the Mississippi. If Mr. Stephens had opened one of these altars, and this conjecture proved true, he would have found within or under it an Indian grave, and perhaps a skeleton, with the personal articles usually entombed beside the dead.

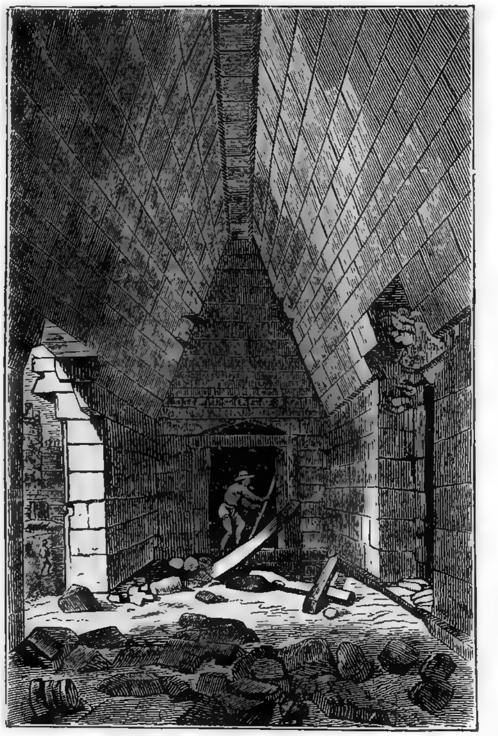


FIG. 22. Section of Interior of Room.

It will be noticed that there are six single apartments, which have no connection with the remainder of the building, and that the others are in pairs, a back room connecting with the one in front, and neither with any others. It seems to show very plainly, in the plan of the house itself, that it was designed to be occupied by distinct groups of families, each group a large household by itself. If the communal principle existed in fact among them, its expression in the interior arrangement of the house, and in this form, might have been expected. This striking and significant feature runs through all the structures in Central America of which ground-plans have been obtained.

"The House of the Nuns," says Mr. Stephens, "is quadrangular, with a courtyard in the centre. It stands on the highest of three terraces. The lowest is three feet high and twenty feet wide; the second, twelve feet high and forty-five feet wide; and the third, four feet high and five feet wide, extending the whole length of the front of the building. The front [building] is 279 feet long, and above the cornice, from one end to the other, is ornamented with sculpture. In the centre is a gateway ten feet eight inches wide, spanned by the triangular arch, and leading to the courtyard. On each side of this gateway are four doorways, with wooden lintels, opening to apartments averaging twenty-four feet long, ten feet wide, seventeen feet high to the top of the arch, but having no connection with each other. The building that forms the right or eastern side of the quadrangle measures 264 feet long; that on the left is 173 feet long; and the range opposite, or at the end of the quadrangle, measures 264 feet. These three ranges have no doorways outside, but the exterior of each is a dead wall, and above the cornice all are ornamented with the same rich and elaborate sculptures." (*Ib.*, i., 299.)

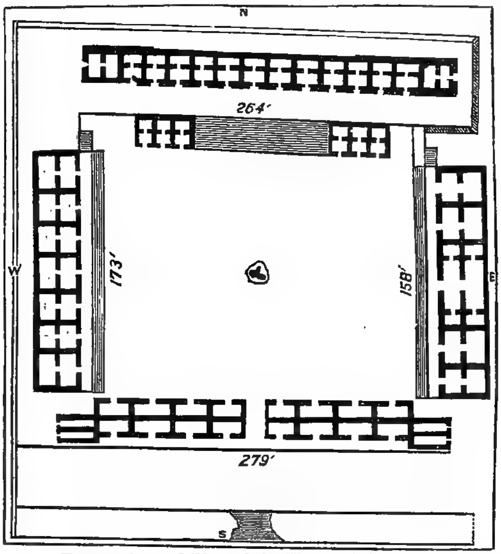


FIG. 23. Ground-Plan of the House of the Nuns.

The four buildings contain, in all, seventy-six apartments, which in size vary from ten to twelve feet wide and from twenty to thirty feet long. There are twenty single apartments and twenty-four pairs of apartments, half of which, as in the Governor's House, are dark, except as they are lighted by the doorways connecting with the rooms in front. In the structure on the right there are six rooms connecting with each other, which number is so unusual as to attract attention. Each of these great edifices would accommodate, after the fashion of Village Indians, from 600 to 1000 persons.

It should also be noticed that there is neither a fire-place nor a chimney in either of these houses; neither has one been found, so far as the writer is aware, in any ancient structure in Central America. Fires were not needed for warmth, but since they were for cooking, it shows that no cooking was done within these houses. A presumption at once arises that the inmates prepared their food in the open court or on the lower terraces by household groups, making a common stock of their provisions, and dividing from the earthen caldron. It may be presumed, also, that the Iroquois usage of but one daily meal prevailed among them. Fortunately, we are able to present some proofs bearing directly upon the question of the ancient practice of communism in these houses. It is found in the present usages of their descendants, which may reasonably be supposed to have been derived from their ancestors, although they may show a deteriorated form of those usages. At Nohcacab, a short distance E. of the ruins of Uxmal, there is a settlement of Maya Indians, whose communism in living was accidentally discovered by Mr. Stephens when among them to employ laborers. It will be remembered that Yucatan was inhabited by Maya Indians at the epoch of the Conquest. He remarks as follows: "Their community consists of a hundred labradores or working men; their lands are held in common, and the products are shared by all. Their food is prepared at one hut, and every family sends for its portion; which explains a singular spectacle we had seen on our arrival—a procession of women and children, each carrying an earthen bowl containing a quantity of smoking hot broth, all coming down the same road, and dispersing among the different huts. . . . From our ignorance of the language, and the number of other and more pressing matters claiming our attention, we could not learn all the details of their internal economy, but it seemed to approximate that improved state of association which is sometimes heard of among us; and as this has existed for an unknown length of time, and can no longer be considered experimental, Owen and Fourier might perhaps take lessons from them with advantage. . . . I never before regretted so much my ignorance of the Maya language." (*Ib.*, ii., 14.) A hundred working men indicate a total of five hundred persons who were then depending for their daily food upon a single fire, the provisions being supplied from common stores, and divided from the caldron. It is, not unlikely, a truthful picture of the mode of life in the House of the Nuns and in the Governor's House at the period of European discovery.

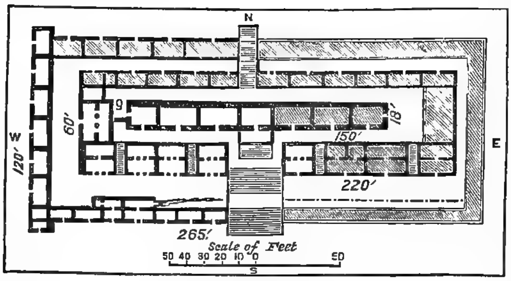


FIG. 24. Ground-Plan of Zayi.

Near Uxmal are the interesting ruins of Zayi, which present a new feature in Central American architecture. Upon a low eminence are three independent structures, one within and above the other, presenting the appearance, in the distance, of a single quadrangular edifice in three receding stories. But each stands on a separate terrace, and is built against the one immediately above it, except the inner one, which stands on the summit. The outer quadrangle stands upon the lowest terrace. The measurements of the several buildings are indicated on the plan. Together they contain eighty-seven apartments, assuming the part in ruins to have corresponded with the parts preserved. The rooms, as usual, are mostly single or in pairs. A staircase upon the front and rear sides interrupts the buildings on these sides from the lower terrace to the upper. The dots in the apertures indicate columns, which are found in this and several other structures.

Attention has been called to this pueblo—which would accommodate 2000 or more persons—for a special reason. It seems to furnish conclusive proof of the manner in which these great edifices were erected in order to make the peculiar triangular ceiling which is the striking characteristic of this architecture. The annexed cross-section of a single apartment shows the relations of the walls to the chamber and its ceiling. The chamber, with its ceiling, was constructed over a solid core of masonry, laid simultaneously with the walls, which was removed after the latter had become seasoned and settled. It tends to show that with small stones of the size used the triangular ceiling, as it projected towards the centre in rising, required the interior support of a core to ensure the possibility of construction by their methods. Once put together over such a core, and carried up several feet over the top of the arch, the down-weight of the superincumbent mass would articulate and hold the masonry together. It shows, further, that the essential feature of the arch is wanting in this contrivance.

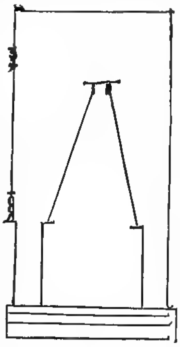


FIG. 25. Cross-Section through one Apartment.

The proof of this assertion is the actual presence of the unremoved core in one of these edifices in all of its apartments. Mr. Stephens found every room of the back building on the second terrace filled with masonry from bottom to top. He remarks that "the north side of the second range has a curious and unaccountable feature. It is called the *Casa Cerrada*, or 'closed house,' having ten doorways, all of which are blocked up on the inside with stone and mortar. . . . In front of several were piles of stones which they [his men] had worked out from the doorways, and under the lintels were holes through which we were able to crawl inside; and here we found ourselves in apartments finished with walls and ceilings like all the others, but filled up, except so far as they had been emptied by the Indians, with solid masses of mortar and stone. There were ten of these apartments in all, 220 feet long and 10 feet deep, which, thus being filled up, made the whole building a solid mass; and the strangest feature was, that the filling up of the apartments must have been simultaneous with the erection of the buildings, for, as the filling in rose above the tops of the doorways, the men who performed it never could have entered to their work through the doors. It must have been done as the walls were built, and the ceiling must have closed over a solid mass." (*Ib.*, ii., 22.)

It does not seem to have occurred to Mr. Stephens that the masonry within each room was a core, without which a vaulted chamber in this form could not have been constructed with their knowledge of the art of building. It shows the rudeness of their mechanical resources and the real condition of the art among them, but at the same time increases our estimate of their originality, ingenuity, and industry. They were working their way experimentally in architecture, as all other people have done; and they might well point with pride to these structures as extraordinary memorials of the progress they had made.

An important conclusion follows — namely, that this "closed house" was the last, in the order of time, erected, and had not been emptied of its core and brought into use when the Spanish irruption forced the people to abandon their pueblo. It would fix the period of its construction at or after 1520; thus settling the question of its modern date, and removing one of the delusions concerning the Central American ruins.

A brief reference to Palenque will conclude this article, already too long, but far from exhaustive of the facts. There are four or five pyramidal elevations at this pueblo, quite similar in form and relative situation to those at Uxmal. One is much the largest, and the structures upon it are called the "Palace." Several distinct buildings are here grouped upon one elevated terrace and are more or less connected. Altogether, they are 228 feet front and 180 deep, occupying not only the four sides of a quadrangle, but the greater part of what originally was, in all probability, an open court. Nearly all the edifices in Central America agree in one particular — namely, in being composed of three parallel walls with partition walls at intervals, giving two rows of apartments under one roof, usually, if not invariably, flat. Where several are grouped together on the same platform, as at Palenque, they are under independent roofs, and the spaces between, called courts, are simply open lanes or passage-ways between. The plan of the Palenque structures, like all the others in Central America, seems to show that they were designed to be occupied by groups of persons, consisting of a number of families, whose private boundaries were fixed by solid partition walls. They are exactly adapted to this mode of occupation; and this special adaptation, so plainly impressed upon all this architecture, leads irresistibly to the inference that they were occupied on the communal principle, and were consequently neither more nor less than communal houses, of a model which may be called, distinctively, that of the American aborigines. None of these edifices are as large as those on the Rio Chaco, and, besides, they have but a single story; but with the broad terraces which were their gathering-places, they would probably accommodate more persons, in equal spaces, than the former.

The structures upon each pyramidal elevation were also a fortress. It proves the insecurity in which they lived. An impression has been propagated that they were surrounded by dense populations living in temporary habitations, to which Stephens has given some countenance (*Central America, Chiapas, and Yucatan*, ii., 235), but the suggestion is preposterous. It does not even need refutation. It sprang from the assumed existence of a state of society far enough advanced to develop potentates and privileged classes, with power to enforce labor from the people for personal objects. There is no evidence whatever to support such an assumption. They were animated by the same spirit as the Cibolans in what related to personal independence. Rather than live in subjection to Spanish taskmasters, the very Indians who erected these houses with so much labor "set in order all their goods and substance, their women and children, and fled to the hills, leaving their towns as it were abandoned," preferring a return to a lower stage of barbarism rather than a loss of personal freedom.

American aboriginal history has been perverted, and even caricatured, in various ways, and among others by a false terminology, which of itself is able to vitiate the truth. When we have learned to substitute Indian confederacy for Indian empire, head-chief and chief for emperor, king, and prince, Indian villages for great cities, communal houses for palaces, together with a large number of similar substitutions of simple for deceptive as well as improper terms, the Indian of the past and present will be presented understandingly, and placed in his true position in the scale of human advancement. While the Aryan family has lost nearly all traces of its experiences anterior to the closing period of barbarism, the Indian family, in its different branches, offered to our investigation not only the state of savagery, but also that of both the first and of the middle period of barbarism. The facts of these several conditions, and particularly of the last, were more perfectly and strikingly exemplified among them than elsewhere upon the entire earth. It was because of their undisturbed development upon a great continent. Further than this, their organizations were living and their works existent. Through a study of their progressive development a rational knowledge of the experience of our own ancestors while in the same condition might have been recovered. But the rare opportunity has been wasted; and worse, for we have romance where we might have had the truth.

Finally, the following conclusions may be stated as reasonable from the facts presented: First, that all there ever was of Uxmal, Palenque, Copan, and other Central American pueblos, building for building and stone for stone, is there now in ruins. Secondly, that the inhabitants were Village Indians, living in single great houses of the communal type, or in several such houses grouped together and forming one pueblo. Thirdly, that they were probably organized in gentes, and as a consequence were broken up into independent nations or tribes, with confederacies here and there for mutual protection. Fourthly, that from the plan and interior arrangement of these houses the practice of communism may be inferred, and that it entered into and determined their character. Fifthly, nothing herein stated is inconsistent with the supposition that some of the structures in the Central American pueblos may have been devoted to religious uses. And lastly, that a common type runs through all the architecture of the American aborigines—that of communism in living, which in turn tends to show their common origin.

When we attempt to understand the Palace at Palenque or the Governor's House at Uxmal as the residences of Indian potentates, they are wholly unintelligible; but as communal houses, embodying the social, the defensive, and the communal principles, we can understand how they could have been erected and so elaborately and laboriously finished. It is evident that they were the work of the people, constructed for their own protection and enjoyment. Enforced labor never created them. On the contrary, it is the charm of all these edifices that they were raised by the Indians for their own use with willing hands, and occupied by them on terms of entire equality. And it is highly creditable to the Indian mind that while in the middle period of barbarism they had developed the capacity to plan, and the industry to rear, structures of such architectural design and imposing magnitude. Lewis H. Morgan.

Ar'chon [Gr. ἄρχων, from ἄρχω, to "be first"], the title of the highest magistrates or rulers of Athens. On the death of Codrus, king of Athens (1068 B. C.), the title of king was abolished, and Medon, the son of Codrus, became the first archon, with limited power. The office was at first hereditary and held for life, but in 752 B. C. the term of office was limited to ten years, and in 714 it ceased to be hereditary and became open to all patricians. In 683 the number of archons was increased to nine, who were elected annually. One of the nine was called archon *eponymus* (ἐπώνυμος), because his name was used to designate the year; the second, who was styled *king* (βασιλεύς), had charge of religious affairs; the third was called *polemarch* (commander-in-chief), and originally had the command of the army. The other six, who were styled *thesmothetæ* (θεσμοθέται), "law-givers," conducted criminal trials, and had power to ratify treaties with foreign states. In the latter period of Athenian history all citizens were eligible to the office of archon. The word archon (translated *ruler*) occurs in the New Testament as the title of several Jews, among whom was Nicodemus (John iii. 1).

Archy'tas ['Αρχύτας], a celebrated Greek philosopher, general, and mathematician, was born at Tarentum. He flourished about 400–350 B. C., was a Pythagorean in philosophy, and was an intimate friend of Plato, whose life he is said to have saved when the tyrant Dionysius was about to put him to death. As general of Tarentum, to which office he was elected seven times, he commanded with success in several campaigns. He was also employed in important civil affairs, for which he displayed excellent capacity. His virtue was as conspicuous as his ability. He is reputed the first that applied geometry to practical mechanics, and the first to solve the problem of the doubling of the cube. He was drowned on the coast of Apulia. Only fragments of his works are extant.

Arcis-sur-Aube, aʀ'se'süʀ-ōb, a town of France, in the department of Aube, and on the river Aube, 16 miles N. by E. of Troyes. It has manufactures of cotton hosiery. On the 20th and 21st of Mar., 1814, an indecisive battle was fought here between Napoleon and Prince Schwartzenburg, who commanded a portion of the allied army. Pop. in 1881, 2928.

Arco'la, a village of Northern Italy, on the Alpone, near its entrance into the Adige, 15 miles E. S. E. of Verona. Here Napoleon gained an important victory over the Austrian general Alvinzy. The French commenced the battle on the 14th of Nov., 1796, by an attempt to cross a bridge over the Alpone, but were repulsed. The action was renewed on the 16th, and ended on the 17th, when Alvinzy retreated. Pop. 2185.

Arcola, city on R. R., Douglas co., Ill. (see map of Illinois, ref. 6–F, for location of county), 158 miles S. of Chicago. Pop. in 1880, 1515.

Arcona. See Arkona.

Ar'cos de la Fronte'ra, a town of Spain, in Andalusia, on the right bank of the Gaudalete, 30 miles N. E. of Cadiz. It is called Arcos, because it is built in the form of a "bow." Its site is a high rock, which commands an extensive and beautiful prospect. Here are celebrated manufactures of tanned leather. This town was once strongly fortified. In 1519, Magelhaens started from here for the first circumnavigation of the globe. Pop. 15,378.

Arcot, or **Aruca'ti,** a city of British India, in the presidency of Madras, is situated in the Carnatic, on the river Palaur, 71 miles by rail W. S. W. of Madras; lat. 12° 54′ N., lon. 79° 23′ E. It was ceded to the British in 1801, before which it had been the capital of the Carnatic. Here are the ruins of the nawab's palace. It is one of the centres of the Protestant missions in India. Pop. in 1878, 53,474, mostly Mohammedans.

Arc'tic [Lat. *arc'ticus;* Gr. ἀρκτικός, "belonging to [the constellation of] the Bear" (ἄρκτος), which is near the North Pole], a term signifying "northern," or, rather, "far to the north," "near the North Pole."

Arctic Circle, a circle drawn around the North Pole of the earth, 23° 28′ from the Pole and 66° 32′ from the equator. It forms the boundary between the north temperate and the north frigid zone. Within this circle the sun does not set at the summer solstice nor rise at the winter solstice.

Arctic Current, so called because it is supposed to originate in the ice of the Arctic seas, whence it runs along the eastern shore of Greenland and round Cape Farewell to the western shore of Greenland, in N. lat. 66°, where it turns southward, forming the *Hudson's Bay Current.* Thence it passes near the Bank of Newfoundland, and, meeting the Gulf Stream, crosses it as an undercurrent, flowing into the Caribbean Sea. Another portion passes along the coast of North America, and reduces the temperature of the land. The Arctic Current, which is cold, replaces the warm water removed by the Gulf Stream.

Arctic Discovery. See the article on Polar Research.

Arc'tic O'cean, or **Sea,** the ocean which surrounds the North Pole, washes the northern shores of Europe, Asia, and America, and is nearly coextensive with the Arctic Circle. It communicates with the Pacific by Behring's Strait, and with the Atlantic by a wide passage between Greenland and Norway. The navigation of this ocean is obstructed by perpetual congelation, but it is supposed that a portion N. of 80° is an open polar sea. The Arctic Ocean encloses many large islands, and comprises large bays and gulfs, which deeply indent the adjacent continents, as Baffin's Bay, the White Sea, and the Gulf of Obi. The water of this ocean is extremely pure and clear, and the ice is remarkable for the beauty and variety of its tints. Those parts of this sea which have been explored are occupied by large fields of floating ice and icebergs in almost perpetual motion. Captain Ross measured an iceberg which rose 325 feet above the water in which it floated. There are masses that present a front of 200 feet in height, and fields from ten to forty feet thick sometimes extend over 100 miles. Icebergs often have a violent rotation, and are dashed against each other with a tremendous force. Fogs, storms, and almost endless night add to the dangers which beset the explorer. Among the navigators who have explored it in search of a north-west passage are Parry, Ross, Sir John Franklin, and Kane. Drs. Hayes and Hall, and various Scandinavian and Dutch navigators, are among the recent explorers. Parry in 1827 reached lat. 82° 45′ N., lon. 19° 25′ E., and found there floes of ice, with open water between. In 1854, Kane penetrated to lat. 81° 22′ in lon. 65° 35′ W. He argued that there is an open sea, not frozen, around the Pole, from the fact that "a gale from the N. E. of fifty-four hours' duration brought a heavy sea from that quarter, without disclosing any drift or other ice." There are valuable whale-fisheries in the Arctic Ocean.

Arctu'rus [from the Gr. ἄρκτος, a "bear," and οὐρά, a "tail"], a fixed star of the first magnitude in the constellation Bootes, so called because it is near the tail of the Great Bear. It is designated in catalogues as α Bootes.

Arcua'tion [from the Lat. *arcus*, a "bow"], a term formerly applied to a mode of propagating trees; the shoots of the trees, cut off near the ground, are bent over and partly covered with earth, which causes them to take root. It is generally called *inarching*.

Arcueil, a village of France, 3 miles S. of Paris, on the railway from that capital to Sceaux, has a fine aqueduct constructed by Marie de Médicis; also the remains of a Roman aqueduct built by the emperor Julian. It is a place of resort on holidays for the Parisians. Pop. in 1881, 6067.

Arcy, Grotto of, an ancient limestone quarry in France, in the department of Yonne, remarkable for its size and the beauty and extent of its stalactites and incrustations, which have almost completely obliterated all traces of the labor of man.

Ardabil′, or **Ardebil,** a town of Persia, in the province of Azerbijan, on the Kara-Soo, 90 miles E. by N. of Tabriz. It is visited by the trading caravans from Tiflis, Derbend, and Ispahan. Pop. estimated at about 10,000.

Ardèche, a river of France, rises among the mountains of Cevennes, flows south-eastward through the most magnificent and romantic scenery, and enters the Rhone 1 mile from Pont Saint Esprit, after a course of 45 miles. Near its mouth is a natural curiosity called the Bridge of Arc.

Ardèche, a mountainous department in the S. E. of France, is bounded on the N. by the department of Loire, on the E. by Drôme, on the S. by Gard, and on the W. by Lozère and Haute-Loire, and drained by the Ardèche. Area, 2134 square miles. The surface is diversified by extinct volcanic peaks, deep craters, ranges of basaltic columns, and romantic valleys, forming combinations of scenery which are highly magnificent and picturesque. The valleys near the Rhone produce good wine, olives, figs, almonds, and Spanish chestnuts, the annual crop of which latter is about 400,000 bushels. Mines of copper, iron, lead, antimony, and coal are worked in this department. It is subdivided into 3 arrondissements, 31 cantons, and 339 communes. Capital, Privas. Pop. in 1881, 376,867.

Ar′den (commonly written ARDENNES, which see), a forest in which Shakspeare places the scene of his play called "As You Like It." There was formerly a forest of this name on the western borders of Warwickshire, which is believed to have occupied a great part of the midland counties, and it is noteworthy as the maiden name of Shakspeare's mother.

Ardennes, or **Arden** (anc. *Arduen′na Syl′va*), a hilly and densely-wooded tract which includes a part of Belgium and of France, and is situated on both sides of the river Meuse. The forest of Ardennes in Cæsar's time was more extensive, and occupied nearly all the space between the Sambre, Moselle, and Rhine. The highest points of the Ardennes are about 2200 feet above the sea. The predominant rocks are clay-slate, grauwacke, and limestone. The channel of the Meuse presents rugged and precipitous rocks about 600 feet high. Many important military events have occurred among the Ardennes, at Rocroi, Sedan, Mézières, etc. Its chief wealth is in its minerals, wood, cattle, and sheep.

Ardennes, a department in the N. E. of France, bounded on the N. by Belgium, on the E. by the department of Meuse, on the S. by Marne, and on the W. by Aisne, was part of the old province of Champagne. Area, 2020 square miles. It is intersected by the Meuse, which flows northward, and by the Aisne, which flows westward. The surface is partly hilly, and covered with the forest of Ardennes. The valley of the Aisne is fertile and produces much grain. Among the mineral resources of this department are iron, lead, marble, and slate. The canal of Ardennes, connecting the Meuse and the Aisne, affords facilities for trade. Here are manufactures of glass, metallic wares, woollen cloths, shawls, firearms, earthenware, etc. It is subdivided into 5 arrondissements, 31 cantons, and 478 communes. Capital, Mézières. Pop. in 1881, 333,675.

Ar′doch, a small village of Scotland, in the county of Perth, 8 miles S. S. W. of Crieff. Here is an ancient Roman camp, the most entire now in Britain. The intrenched works form a rectangle 500 by 430 feet, the north and east sides of which are protected by five ditches and six ramparts.

Ar′dor [from *ar′deo*, to "burn"], a Latin word signifying heat, fervor of passion, zeal, intensity of feeling. In medicine it denotes an intense or morbidly-increased sensation of heat, as *ar′dor febri′lis*, "feverish heat."

Ardoye, a town of Belgium, in the province of West Flanders, 6 miles N. W. of Courtray. Pop. 6253.

Ardshîr′, or **Ardsheer′** (BÂBEGAN), a king of Persia, the founder of the dynasty of the Sassanides, was a man of obscure origin. He raised himself by his courage and energy, and revolted against Artabanus (or Ardovan), king of Persia, whom he defeated and killed. He extended the boundaries of Persia by conquests, and afterwards reigned in peace for many years. He was celebrated as a sage and a legislator, and was the author of maxims which are still preserved by the Persians. The Greeks called him Artaxerxes. He died about 260 A. D., and was succeeded by his son Shapur (or Sapor).

Are [Fr., from the Lat. *area*, a "space of ground"]. In the metric system of weights and measures the are is the unit of measure of surface. It is the square of ten mètres = 119.60332 square yards. The are is not practically employed, the hectare = 100 ares, or 2.47114 English acres, the deciare (one-tenth of an are), and the centiare (one-hundredth of an are), being the only agrarian measures practically used in this system.

A′rea [a Latin word signifying, originally, an "open space," a "courtyard," a "threshing-floor"], any plane surface. In geometry it means quantity of surface, the surface included within any given lines. The calculation of areas is one of the ultimate objects of geometry, and the measuring units employed are a square inch, a square foot, etc. The area of a rectangle is equal to the product of the length and breadth. That of a circle is found by multiplying the square of the diameter by the decimal .7854.

Are′ca, a genus of palm trees having pinnate leaves and double spathes, a fruit which is a one-seeded drupe, or nut with an outer fibrous husk. The *Areca Cătechu*, called pinang palm or betel-nut palm, is a native of the East Indies, and grows to the height of forty or fifty feet. It bears a fruit called areca-nut or betel-nut, which is astringent and tonic, and is extensively used in the East as a masticatory. (See BETEL.) It also yields a part of the catechu of commerce. The *Areca oleracea* (the cabbage-palm) grows in the West Indies, and is more than 100 feet high, but has a very slender stem. The terminal leaf-bud is nutritious, and is used for food. It also bears nuts, the kernel of which is sweet.

A′remberg′, or **Arenberg,** the name of a noble family of Germany, which adhered to the Roman Catholic Church and to Philip II. of Spain. They own large estates in Hanover and Prussia.

A′remberg (LEOPOLD PHILIPP KARL JOSEPH VON LIGNE), DUKE OF, was born at Mons, Belgium, in 1690; became a field-marshal in the Austrian army and commander-in-chief in Flanders in 1737; distinguished himself at the battle of Malplaquet in 1709, and at that of Belgrade in 1717. Died in 1754.

Are′na, a Latin word signifying "sand," was anciently applied to an open space of ground strewed with sand on which athletes and pugilists contended for mastery, and to the open central part of the amphitheatre where gladiators and wild beasts fought. This was usually covered with sand. In modern language, *arena* signifies any scene of contest or field of intellectual exertion; any public place in which men display their talents or contend in debate.

Arena′ceous [Lat. *arena′ceus*, from *are′na*, "sand"], sandy, of the nature of sand; a geological term applied to strata which are entirely or chiefly composed of grains of sand. Such are the beds of loose sand which occur in the tertiary or more recent formations. The arenaceous rocks of the carboniferous and Devonian ages are composed of grains of sand cemented together, and are called sandstone. When the sandstone is coarse-grained it is called *grit*, or if the particles are as large as pebbles, it is termed *conglomerate* or "pudding-stone."

Ar′endal, a city of Norway, 41 miles N. E. of Christiansand, on the Cattegat, in lat. 58° 23′ N., lon. 8° 53′ E. It is built partly on the mainland and partly on islands, giving it the name of "Little Venice," and has considerable trade in iron and timber. Pop. 1876, 4107.

Arenic′ola [literally, an "inhabitant of the sand," from *are′na*, "sand," and *co′lo*, to "till," to "inhabit"], the lug-worm, *Arenic′ola piscato′rium* (*i. e.* "of fishermen"), found in the sand of the seashore, is much used by fishermen as a bait. It bores in the sand, and forms for itself a tube in which it moves with perfect freedom. When touched, the lug-worm throws out a quantity of yellow fluid that stains the hand.

Areoi. See ARREOY.

Areom′eter, or **Aræometer** [from the Gr. ἀραιός, "thin," and μέτρον, a "measure"], an instrument used to measure the specific gravity of fluids and ascertain the strength of spirituous liquors, usually called HYDROMETER (which see).

Areop′agus [Gr. Ἄρειος πάγος], (*i. e.* "hill of Mars"), a hill in Athens W. of the Acropolis; also a celebrated court of justice which held its sessions on the same spot in ancient times. This court or council was remarkable for its high character and great antiquity, having been organized before the first Messenian war, the date of which was 740 B. C. It was merely a criminal tribunal before the time of Solon, who made important changes in its constitution, and extended its jurisdiction to political and moral affairs. He ordained that this court should be composed of those archons who had performed their official duties faithfully, and who had passed with credit the scrutiny to which all archons were subjected at the expiration of their term of office. Its influence was conservative, and tended to restrain the excesses or the progress of democracy. The political power of this court was much reduced by Pericles about 458 B. C., but it maintained a high reputation long after that date. The name of the Areopagus occurs in the history of the apostle Paul, who uttered a memorable discourse on Mars' Hill. (See Acts xvii. 22–31.)

Arequi'pa, a department of Peru, bordering on the Pacific Ocean, is bounded on the N. by Ayacucho and Cuzco, on the E. by Cuzco and Puno, on the S. by Moquega, and on the W. by the ocean. Area, estimated at 201,000 square miles. The eastern part is mountainous. The soil is fertile, and produces chiefly wine. Gold, silver, zinc, lead, and coal are found here. Capital, Arequipa. Pop. 160,282.

Arequipa, a city of Peru, capital of the above department, is finely situated about 40 miles from the Pacific Ocean, on the river Chili and on the plain of Quilca, 7850 feet above the level of the sea; lat. 16° 24' 28" S., lon. 71° 37' 30" W. It is reputed one of the best built and most beautiful towns of South America. It is the seat of a bishop, and has a cathedral, a college, and several convents. The public edifices and private houses are built of stone, one or two stories high. It has been ruined by earthquakes several times. It has an active trade, facilitated by a railroad which extends to Mollendo on the Pacific. Gold and silver are found in the vicinity. The adjacent country is fertile. Here occurred a great earthquake, Aug. 13 and 14, 1868, destroying property worth more than $12,000,000, and said to have caused the death of more than 500 persons. Pop. 29,237.

Arequipa, Volcano of, a celebrated volcanic peak of the Peruvian Andes, is about 14 miles E. of the city of Arequipa. It rises to the height of 20,300 feet above the level of the sea, and has the form of a regular truncated cone, with a deep crater, from which ashes and vapor continually issue.

A'res ['Αρης], the god of war in the Greek mythology, corresponded to the Roman Mars (which see).

Aretæ'us [Gr. 'Αρεταῖος], an able Greek medical writer of Cappadocia, is supposed to have lived between 50 and 150 A. D. The events of his life are not known, but he is considered by some persons to rank next to Hippocrates. He wrote a work in eight books on the causes, symptoms, and cure of acute and chronic diseases, which is still extant and is highly esteemed. The style is singularly elegant and concise. The Greek text has often been printed, and has been translated into English by T. F. Reynolds (1837), Greek with English translation by Dr. F. Adams, 1856.

Arethu'sa [Gr. 'Αρέθουσα], in classic mythology, one of the Nereids, of whom Alpheus was enamored. Also the name of a fountain situated near Syracuse, into which it is said she was transformed. (See Alpheus.) Arethusa was invoked by Virgil as a source of inspiration in his tenth eclogue.

Aretin'ian Syl'lables are *ut, re, mi, fa, sol, la,* which Guido d'Arezzo used to designate his notes in his musical system of hexachords.

Areti'no (Pietro), [Lat. *Areti'nus*], a satirical and licentious Italian writer, born at Arezzo in 1492. He was a man of low birth, and was not liberally educated. He became a resident of Venice in 1527, and found several powerful patrons, among whom were the emperor Charles V. and Francis I. Among his numerous works were comedies, dialogues, sonnets, and letters (6 vols., 1538–57). He gained by his writings great applause and large sums of money. His satires, which were personal and bitter, procured for him the surname of the Scourge of Princes. His habits were extremely licentious. Died in Venice in 1557. (See Berni, "Vita di P. Aretino," 1537; Dujardin, "Vie de Pierre Arêtin," 1750; Mazzuchelli, "Vita di Pietro Aretino," 1763.)

Aretino (Spinello), a skilful Italian painter, born at Arezzo about 1315. He painted frescoes at Florence, Arezzo, and other towns, and acquired a high reputation. Some frescoes which he painted in San Miniato, near Florence, are still preserved. His invention and coloring are highly commended. The best of his extant works is a "History of Pope Alexander III.," painted in the town-hall of Sienna. Vasari considers him superior to Giotto. Died about 1400.

Are'zzo, a province of Central Italy, is bounded on the N. by Florence, on the E. and S. by Perugia, and on the W. by Sienna. Area, 1279 square miles. The country is chiefly mountainous, and is traversed by the Arno and Chiano. Chief town, Arezzo. Pop. in 1881, 238,707.

Arezzo (anc. *Arre'tium*), a city of Italy, capital of the province of its own name, is on the Chiana, 55 miles by rail S. E. of Florence. It is a very ancient town, having been founded by the Etruscans several centuries before the Christian era. Its walls are evidently Etruscan. It has two colleges, a seminary, a lyceum, a school of technology, an academy of sciences and arts, and many silk, cloth, iron, and other factories. Among the public edifices are a cathedral, several churches rich in works of art, a museum, and the famous *Loggie* of Vasari. Arezzo is remarkable for the great number of eminent men who were born in it—namely, Mæcenas, Petrarch, Vasari, Pietro Aretino, Guy d'Arezzo, Redi the physiologist, and Cesalpino. Pop. in 1881, 38,950. Ancient Arretium was celebrated for the manufacture of terra-cotta vases. The cathedral contains rich sculptures by Giovanni Pisano, and some of the finest glass windows in Italy.

Argæ'us, Mount [Turk. *Arjish-Dagh*], the highest mountain in Asia Minor, is in the pashalic of Karamania, about 12 miles S. of Kaisariyeh, and is connected with a branch of Mount Taurus. It rises 13,100 feet.

Argali.

Argali (*Capro'vis ar'gali,* the *O'vis am'mon* of some writers), the large wild sheep of Central Asia and Siberia. Another variety or species is found in North America W. of the Rocky Mountains (*O'vis Monta'na*). It is sometimes called Big-horn or Rocky Mountain sheep, and has enormous horns about four feet long and from eighteen to twenty inches in circumference. It is about four feet high, has coarse hair, and moves with great agility.

Ar'gall (Sir Samuel), born at Bristol, England, in 1572, was deputy-governor of Virginia (1617–19), and was detested by the colonists for his tyranny and rapacity. Died in 1639.

Argand (Aimé), a Swiss chemist, born at Geneva about 1750, is noted as the inventor of the Argand Lamp (which see). He lived in England, and produced the model of the lamp in 1782. It appears that he derived little profit from the invention. Died in 1803.

Argand Lamp, a lamp invented in 1782 by A. Argand, noticed above, was designed for burning oil. He invented a wick in the form of a hollow cylinder, through which a current of air ascends, so that the supply of oxygen is increased. This contrivance prevented the waste of carbon, which in the old lamps escaped in the form of smoke, and it greatly increased the amount of light. He also added the glass chimney, by which a draft is created and the flame is rendered more steady. This lamp was patented in 1787.

Ar'gelan'der (Friedrich Wilhelm August), a distinguished German astronomer, born at Memel March 22, 1799, was a pupil of Bessel. He became in 1823 director of the observatory at Åbo, in Finland, and commenced observations on the fixed stars which have a perceptible proper motion. In 1832 he became professor at Helsingfors. In 1837 he was appointed professor of astronomy at Bonn. Published a celestial atlas entitled "Uranometria Nova" (1843), and "Astronomical Observations" (1846), which gives the positions of 22,000 stars and a later catalogue of more than 200,000 stars. He demonstrated that the solar system has motion in space, and studied the variable stars with great care. Died Feb. 17, 1875.

Argemo'ne, a genus of plants of the natural order Papaveraceæ. The *Argemone Mexicana* is an annual herbaceous plant, with yellow flowers and sinuated spiny leaves, a native of Mexico and the U. S., now naturalized in India, Africa, South America, etc. It has seeds which are emetic and purgative, and have been used as a substitute for ipecacuanha.

Argens, d' (Jean Baptiste de Boyer), Marquis, a French writer, born at Aix, in Provence, June 24, 1704. He served in the army in his youth, and gained distinction by his "Jewish Letters" ("Lettres Juives," 6 vols., 1738–42), and "Chinese Letters" (6 vols., 1739–42). These procured for him the favor of the crown prince of Prussia, afterwards Frederick the Great. He went to Berlin, and became an associate of that prince, who after his accession appointed him director of the Academy of Fine Arts. Among his works is "Histoire de l'Esprit Humain," 14 vols., 1765–68. Died at Toulon Jan. 11, 1771.

Argenso'la, de (Bartolomé Leonardo), an eminent Spanish poet, born at Barbastro, in Aragon, in 1566. Having entered the Church, he became a canon of Saragossa, and historiographer of Aragon. He published a number of poems and a "History of the Conquest of the Moluccas" (1609). He and his brother were called the Horaces of Spain. Died Feb. 26, 1631.

Argensola, de (Lupercio Leonardo), a popular poet, born at Barbastro in 1565, was a brother of the preceding. He was appointed historiographer of Aragon by Philip III., and secretary of state by the viceroy of Naples in 1610. He produced tragedies, entitled "Filis," "Isabela," and "Alejandra;" also lyric poems which were very successful. The poems of these two brothers display much similarity. Died in 1613. Bouterwek commends his true poetic feeling, and recognizes in his works an imagination more plastic than creative. (See Ticknor, "History of Spanish Literature;" N. Antonio, "Bibliotheca Hispana Nova.")

Argenson, d', a French family which has produced many men eminent in letters and in public affairs.—Marc René de Voyer d'Argenson (1652–1721) was a prominent academician and public officer.—His son René Louis, marquis d'Argenson (1694–1757), was a foreign minister and an author of distinction.—Marc Pierre, count d'Argenson (1696–1764), a brother of the foregoing, was an able statesman and a patron of letters.—Marc Antoine René de Paulmy d'Argenson (1722–87), a son of the marquis René Louis, was an academician and the collector of a famous library.—Marc René, born in Paris Sept. 10, 1771, served as the adjutant of General La Fayette, and fought afterwards for the republic. Throughout his life he was a prominent leader of the ultra-republicans. Died Aug. 2, 1842.

Argenson, d' (Pierre de Voyer), Viscount, born in France in 1626, was governor of Canada in 1657–61, and made some discoveries near Lake Superior and Hudson's Bay. He was of noble ancestry, served honorably at the siege of Bordeaux and the battle of Sens, and was afterward reeve of Touraine. Died in France about 1709.

Argentan [Lat. *Argen'uæ*], a town in the N. W. of France, in the department of Orne, on a railway which connects Alençon with Caen, 16½ miles by rail N. N. W. of the former. It is well built, and has a fine Gothic church and a college; also manufactures of linen, and lace called *point d'Argentan*. Pop. in 1881, 5725.

Argenteuil [Lat. *Argento'lium*], a town of France, in the department of Seine-et-Oise, on the Seine, 11¾ miles by rail from Paris. Here was a convent to which the celebrated Héloise retired about 1120. It is now in ruins. Pop. in 1881, 11,849.

Argen'teus Co'dex, an old uncial manuscript of the Four Gospels, written in the Mœso-Gothic dialect on vellum, is so called because the letters are formed of silver, except the initials. It is supposed that it was written in the sixth century. It is a copy of the translation made by Ulphilas, bishop of the Mœso-Goths, and was found in the abbey of Werden, Westphalia, in 1597.

Ar'gentine (*Scopelus*), a genus of small fishes of the family Salmonidæ, found in the Mediterranean and the Atlantic. They derive their name from the silvery lustre of their scales, and are valuable for the *nacre* which is obtained from the outside of their air-bladders. One or more species occur in the U. S. waters, but no commercial use is made of them.

Argentine [from the Lat. *argen'tum*, "silver"], a variety of carbonate of lime, having a silvery-white lustre and a slaty or curved lamellar structure.

Argentine Republic, or **Confederation** [Sp. *La Republica Argentina*, named from the *Rio de la Plata*, *i. e.* the "river of silver," *argentum*], a South American federal republic, is bounded on the N. by Bolivia and Paraguay, on the E. by Brazil, Paraguay, Uruguay, and the Atlantic Ocean, on the S. by the Atlantic Ocean, and on the W. by the Andes, which separates it from Chili. It extends from lat. 22° to 56° S., and lon. 53° 30' to 72° W. The area, including additions, in 1881, of most of Patagonia and a small part of Terra del Fuego, is over 1,200,000 square miles. The population, including additions, in 1881, from Patagonia, etc., has been officially estimated at 2,942,000, and consists of 2,121,000 natives, 154,000 Italians, 73,200 Spaniards, 69,400 French, 23,000 English and Irish, and also of Uruguayans, Chilians, Swiss, Germans, Bolivians, Brazilians, Paraguayans, Portuguese, Asiatics, Africans, Oceanians, etc., in numbers of from 18,300 to about 2000 each. The area and population of the fourteen states or provinces into which the republic is divided are, according to the latest official reports, as follows:

Provinces.	Area in sq. miles.	Pop. in 1882.	Capitals.	Population.
1. Buenos Ayres..	82,900	612,000	Buenos Ayres...	295,000
2. Santa Fé........	24,000	187,000	Santa Fé..........	10,670
3. Entre Rios......	47,900	188,000	Concepcion.......	6,513
4. Corrientes.......	70,100	204,000	Corrientes.........	11,218
5. La Rioja.........	42,500	87,000	La Rioja...........	4,489
6. Catamarca......	42,500	102,000	Catamarca.........	5,718
7. San Juan........	39,300	91,000	San Juan..........	8,353
8. Mendoza.........	71,600	99,000	Mendoza	8,124
9. Cordova	71,600	320,000	Cordova	39,651
10. San Luis..........	23,700	76,000	San Luis...........	3,748
11. Santiago.........	42,500	158,000	Santiago............	7,775
12. Tucuman........	15,900	178,000	Tucuman..........	24,237
13. Salta..............	59,500	167,000	Salta................	11,716
14. Jujuy.............	36,100	66,000	Jujuy	3,071
Army in Paraguay.......		6,276		
Gran Chaco..................		45,291		
Missiones......................		3,000		
Pampas Argentinas......		21,000		
Patagonia......................		24,000		
In foreign countries.....		41,000		

Physical Geography.—The country, which has the form of an elongated quadrilateral, can be divided with regard to the formation of the ground into four regions: 1st, the regions of the Andes, which run along the western boundary; 2d, "the Argentine Mesopotamia," between the Uruguay and the Parana; 3d, the Pampas or southern plains; 4th, the northern or interior plains, which extend into the Gran Chaco far into Bolivia. The characteristic feature of the country, excepting the region of the Andes, is the plain. The true Pampas are situated between the Rio Negro and the Rio Salado. About the mouth of the Rio Negro, beyond Buenos Ayres and some distance up the Parana, the ground consists of a fine deposit of sand and clay, which have been washed down from the mountains in the course of time. For hundreds of miles S. and W. of Buenos Ayres not a stone is to be found. In the Pampas the principal vegetation consists of grasses, which serve as food for the numerous herds of cattle. In the interior cacti and thorny mimosæ are frequent. Timber trees are not met with. Towards the N. the vegetation becomes extremely varied; along the rivers it becomes luxuriant; the trees, however, are not extraordinarily high. Land capable of being cultivated is found only along the rivers. The strip of country between the eastern branches of the Andes and the Parana is more or less sterile and deserted, and even the western states are partly separated from each other by deserts. Large tracts in the interior are covered by volcanic ashes and pumice-stone. The southern plains are broken by several ranges of hills, some of which stretch 150 miles to the S. and S. W. of Buenos Ayres, and run from S. E. to N. W. Their elevation above the plain never exceeds 300 feet. Parallel to these are the Ventana Mountains, whose highest point is 3500 feet above the level of the plain. These ranges mostly consist of granite, which in some parts is covered by quartz. In the lower diluvian strata many fossil remains of marine animals occur, which are also found occasionally in the mountains at a height of 14,000 feet. The next higher stratum to the one last mentioned is rich in fossil remains of extinct mammals of an enormous size, which have a striking resemblance to the present mammals of South America and Africa (*e. g.* the large armadillo, the giant sloth, the mastodon, fossil horses). The mountains, especially the Aconquija Cordilleras, which separate Tucuman from Catamarca, are rich in valuable metals, especially gold, silver, and copper. In the Famatina range, in the province of Rioja, much iron ore is found. In the Gran Chaco it was ascertained by the expedition of Porter Cornelius Bliss in 1863 that the ground is covered for miles around with iron, which contains about 10 per cent. of nickel. A piece of this was brought to the British Museum weighing about 1400 pounds. Up to the present time, however, the republic imports the iron it uses from Europe. In the south-western provinces extensive coal-fields have been discovered, while sulphur, alum, etc. are found in large quantities in the Andes.

Rivers, Lakes, and Swamps.—Almost all the rivers which come down from the Andes, the southern slope of the central Brazilian ranges, and the heights forming the watershed of Buenos Ayres, unite to form the Rio de la Plata, which has a wider mouth than any other river on the globe. Between the capes San Antonio and St. Mary it has a width of 170 miles; 50 miles farther up-stream, at Montevideo, it has narrowed down to 75 miles, and the water becomes fresh. At Buenos Ayres, 150 miles farther up, the low shores cannot be seen from the middle of the river. The current can be noticed as far as 100 to 200 miles out in the ocean, although the depth of the river is not very great. Above Montevideo, which is the only good port on it, its navigable channels are so obstructed by sand-banks that vessels of light draught, which go to Buenos Ayres, are compelled to anchor from six to nine miles from the city. Even small boats have such difficulty in getting ashore that the passengers are generally landed by means of wagons with very high wheels. The chief branches of which the La Plata is formed are the Parana (with its affluent, the Paraguay) and Uruguay, which are respectively navigable for steamers for 1000 and 250 miles. Many of the eastern tributaries, especially the Rio Vermejo and the Rio Salado, are navigable for smaller vessels for 400 or 500 miles. The smaller tributaries coming from the E. are generally unsuited to navigation by reason of their strong currents. Those coming from the Andes, however, slowly wend their way through the endless plains, and are of the greatest importance for commerce. The rivers of the interior which do not belong to the system of the La Plata are mostly unimportant, as they are lost in swamps or temporary lakes, or entirely dry up in summer. These temporary lakes, lagoons, and swamps are found in great number, and are sometimes of considerable extent. Those to the E. of the Paraguay and Parana generally contain fresh water, while those W. of these rivers are brackish, almost without exception. Among the former the lake of Ybera in the province of Corrientes is the most important. Those to the W. of the great rivers usually dry up at the end of the rainy season, and leave the ground covered with a crust of saline matter several inches in thickness. The salts are of different kinds. In the plain around Fort Melincue, W. S. W. of Buenos Ayres, sulphates of magnesia are found which yield a profitable article of commerce. Good cooking-salt is found in large quantities S. of Buenos Ayres and in the neighborhood of San Luis.

Climate.—The most prominent characteristic of the climate of the Argentine Confederation is extreme dryness. Although the territory W. of the Parana has plenty of rain, still the plains in the interior suffer extremely from drought, because the S. W. winds, being stopped by the Andes, discharge their rain in Chili, and the eastern equatorial winds have already exhausted their rain at the tropic. Buenos Ayres and the country immediately surrounding are often exposed to warm N. winds, which come down the valley of the Parana loaded with vapor. The mean temperature of Buenos Ayres is 64° F.; the mean for the summer 72°, for the winter 52°. In many places a warm and a cool season can be distinguished, the former lasting from October to May, the latter from May to September. The time of the change from one to the other is the chief rainy season. The heavy thunder-storms, sometimes accompanied by hail-storms, often produce very sudden changes of temperature. Nevertheless, the climate is very healthy. This is partly due to the Pampero, a strong S. W. wind coming from the Andes. Also the nights, which are cool throughout the year, and which tend to make the heat of the day less felt, contribute much towards this end. In the plains of the interior the hot Zonda, the strong and lasting N. wind, is very much dreaded.

Animal and Plant Life—Products.—With very few exceptions, the animals of the present day have the same characteristics as the gigantic fossils found in the country, except that they are considerably smaller. The animal peculiar to the plains is the llama. The vicuña, related to the llama, is hunted in the W. Of other wild animals are found the puma, the tapir, the capibara, and the ounce. Among the birds the birds of prey, as the condor and the Caracara vulture, are especially numerous. The American ostrich and different kinds of humming-birds and parrots are also often met with. The vegetation of the plains of the La Plata is poor. Even in Entre Rios the lack of wood is often seriously felt. To the S. clumps of willows are found here and there. But the shores of the Parana are covered with beautiful forests, and both towards the tropics and the Cordilleras the vegetation becomes varied and luxuriant. The most characteristic plants of the Gran Chaco, as well as of the Pampas, are mimosas and cacti, and not until the foot of the Cordilleras in Salta and Mendoza is reached are palms and the other ornaments of tropical forests met with. The native plants and animals of these regions are, however, mostly superseded by naturalized species. The apple tree, which at the present day forms large woods in the S. of Chili and towards the sources of the Rio Negro, has been transplanted by the Indians farther N. on the eastern slopes of the Cordilleras. The peach tree is largely cultivated on the islands at the mouth of the Parana. A wild species of artichoke and impenetrable thickets of thistles cover the ground for miles to the W. and N. W. of Buenos Ayres. Wine is extensively grown in Mendoza and La Rioja.

Agriculture, Industry, Trade.—Only during the last fifteen years has agriculture been generally introduced, especially in the coast provinces. In the region of the Andes, where the ground is more easily irrigated, considerable wheat, wine, and fruits of all kinds have been produced for a long time. At present, wheat, corn, oats, and other grain and vegetables are cultivated on a large scale. Sugar-cane, tobacco (especially in Corrientes and Tucuman, but also in Salta and Catamarca), cotton, peanuts, and flax are also cultivated, although these plants have only been lately introduced. Labor, instruction, and inclination are sadly wanting. Even now the raising of cattle, the old national occupation, is much more important than agriculture. The natives had at the time of the discovery no other domestic animal than the llama or guanaco. Mendoza introduced the horse in 1536; in 1550 goats and sheep were brought from Peru; in 1553 the ox was brought from the coast of Brazil. From these importations have descended the millions of cattle which now roam over the plains of the republic. The breeds are almost all good. The sheep have been greatly improved. In recent times the breeders of cattle have suffered considerable losses, as, in consequence of the high tariff of the U. S., they have no market for their products. Wild cattle are no longer to be found. All are enclosed, though often in very large ranges. The large *estancias* of former times are becoming a thing of the past, and they are cut up more and more into smaller estates. While the price of land has risen considerably (in some places it has doubled within twenty years), the increase of the cattle has been so large that the supply exceeds the demand largely, and manure is made of the unsold meat. About 3,000,000 hides of cattle are exported annually, and in the large slaughter-houses (*saladeros*) 60,000 cattle are killed annually. The herds of horses seem to diminish gradually, but are still so large that 250,000 horse-hides are annually exported. The Pampa horse is small and of coarse build, but excels in fleetness and endurance. It roams about in herds of 6000 or 8000, and is caught by the Gauchos with the lasso or the bolas. Mules are raised in large numbers, and are exported to Peru and other places. General industry and manufactures are unimportant in the La Plata states. The manufacture and export of "Liebig's extract of meat" is extensive. Besides this, tanning and the soap manufacture are carried on on a large scale. Valuable embroidered cloths, wearing apparel, gorgeous blankets, and ponchos are made of the finest wool. The Indian women of the S. also make wonderfully fine quilted ponchos, belts, horse-blankets, and harness. A laborer is paid from $1 to $3 in gold per day.

The commerce with the interior is unimportant; that with Chili and Bolivia is of more consequence. To these countries oxen, mules, and asses are exported in large numbers. The commerce by sea is about twenty times as large as that by land. It is limited almost entirely to Buenos Ayres and Rosario. The river-ports, Santa Fé, Parana, Corrientes, Gualeguay, Concepcion, and Concordia, supply themselves from Buenos Ayres. The inland trade is to a great extent carried on by caravans of thirty or forty wagons. The articles of export are, besides those obtained from the herds of cattle, horses, and sheep, chiefly ostrich feathers, Patagonian and artificial guano, furs, honey, copper, gold and silver bars. The development, however, of the vast resources of the country can as yet hardly be said to have commenced. Its greatest wealth is still represented by the herds of cattle and sheep which graze upon its plains. The manufactures and luxuries imported into the country are paid for with the proceeds from the flocks. The total exports amounted in 1882 to $58,441,000, and the imports to $59,270,000. In 1881, 3397 vessels, of 413,419 tons, entered, and 2489 vessels, of 321,168 tons, cleared from all the ports of the Confederation. About one-half of the exports are hides and three-eighths wool.

In 1880, 7,063,687 letters were transmitted. In 1882, 1617 miles of railroad were in operation, and 165 miles in construction; 8466 miles of telegraph were in operation in 1882. A submarine telegraph from Buenos Ayres to Montevideo has been in operation since 1866. Buenos Ayres has now complete communication with Europe by telegraph.

Inhabitants.—The native tribes are divided into three different groups: 1st, the Araucanians, who roam as far N. as the Rio Salado; 2d, the Quichuas, who were formerly subject to the incas of Peru, and live E. of the Cordilleras as far as Santiago; 3d, the Guaranis, who formerly ruled from the Gulf of Mexico to the Rio de la Plata, and from the Atlantic to the Andes. These races are uncivilized to the present day. But the most of the Guaranis, Quichuas, and some of the Araucanians, have been blended together with the Spaniards, and this mixed race constitutes the larger part of the population of the republic. The number of the foreign-born population is very large, and is increasing rapidly. The immigration from 1858 to 1862 amounted to 28,066, and from 1863 to 1867 to 65,599 souls. The following table presents the immigration of each year (1863–67), arranged according to nationalities:

	1863.	1864.	1865.	1866.	1867.
Italians	4,494	5,435	5,001	4,245(?)	8,455
Frenchmen	2,334	2,736	2,282	2,870	3,671
Spaniards..........	1,377	1,586	1,701	954(?)	1,258
British..............	883	1,015	1,583	1,370	1,672
Swiss................	567	329	502	958	933
Germans	527	289	363	274	436
Other nations ...	216	192	335	3,025(?)	597
Total	10,398	11,582	11,767	13,696	17,022

In 1868 the number of immigrants amounted to 29,384; in 1869, to 37,934; in 1870, to 39,667; in 1871, to 31,614; in 1877, 28,708; in 1878, 35,876; in 1879, 50,205; in 1880, 41,615; in 1881, 47,489. Most of the immigrants are from Italy, France, and Spain. In recent years the increase of population has been mostly from immigration.

Manners and Customs.—In Buenos Ayres, where the foreign population gains the ascendency more and more, European dress and manners have been rapidly naturalized. The lower classes, which are chiefly mestizoes and half-breeds, combine the inclination of the higher classes for gaming and a dissolute life with the plain and rough mode of living of the Gaucho of the Pampas. The Gaucho wears a jacket of coarse cloth or sheepskin, and pantaloons of the same stuff, which are open from the knee down. His poncho is a square piece of cloth with an opening in the middle for the head. His ornaments consist of spurs with large silver rowels, and a large knife, with the handle inlaid with silver, which is carried in the belt. The women are dressed almost exactly like the men, only they have the neck and arms bare. The rancho or hut of the Gaucho consists of a trellis-work of brushwood, which is covered with mud. The roof is covered with straw or cow-hides, and in the place of a door is a horse-hide. The food of the Gaucho consists almost entirely of meat and water. From 1850 to 1860 there was one marriage for every 140 inhabitants, 1 birth for every 22, 1 death for every 44, and 5 children for every family; one-fifth of all the children are illegitimate. The mean length of life in the country and the smaller cities is 40 years. Since 1780 the population has almost quadrupled itself. The predominating religion is the Roman Catholic; Protestants are only found among the immigrants. Under the archbishop of Buenos Ayres are the bishop of the Littoral (with his seat in Parana), of Cordova, of Cuyo (San Juan), and of Salta. There are very few monasteries, but a large number of nunneries. There are missions on the Indian frontier, where several hundred have been converted. Popular education until recently has been very poor. Only 28,000 persons can write. But since the accession of President Sarmiento much has been done to improve the education of the people. Universities have been established at Buenos Ayres and Cordova, while colleges exist in those two cities and in Concepcion, and several others are in course of erection. Of the forty-three printing establishments, Buenos Ayres has sixteen, and of the thirty-seven newspapers published in the republic, it has sixteen. In 1869, Congress passed a law that the new civil code (*codigo civil*) compiled by Dr. Sarsfield, at that time minister of the interior, was to be introduced throughout the whole republic on Jan. 1, 1871.

Constitution.—The constitution was adopted May 11, 1853, and was revised in 1860 and 1862. At the head of the republic is a president, elected for a term of six years by 133 representatives of the provinces. The congress consists of a house of representatives with fifty-four members, and a senate with two members for each state. In 1862, Congress transferred the seat of government to Buenos Ayres, and introduced several clauses into the constitution with regard to the relations of the city to the confederation. The province of Buenos Ayres elects its own governor, but the city is under the direct jurisdiction of the president and congress. The judiciary is entirely independent. There is a supreme court and tribunals in every state. The freedom of the press, of religion, of association, of education, and free disposition of property, as well as equality before the law, is guaranteed to everybody.

Army, Navy, and Finances.—The army consisted in 1882 of 7362 men, of which 3710 were infantry, 2647 cavalry, and 1005 artillery, exclusive of the national guard, which comprises 297,384 men. The navy in 1882 consisted of 25 steamers and 2 sailing-vessels, with 2000 sailors and 900 marines; total, 88 guns. Total debt, Jan. 1, 1884, of all kinds, $225,000,000, exclusive of state, provincial, or city debts. Income annually less than expenditure. Each province has its own budget.

History.—The La Plata was discovered by Juan Diaz de Solis in 1516, who took possession of the country for the crown of Spain. Buenos Ayres was founded by Don Pedro de Mendoza, who became governor in 1535. The city was not, however, firmly established against the attacks of the Indians until after its third rebuilding in 1580, and after Santa Fé, Mendoza, and other cities in the interior had been founded. The government of the countries of the La Plata was subject to the viceroy of Peru until 1778, in which year a viceroyalty was formed of the provinces of Rio de la Plata, Paraguay, Uruguay, and Bolivia, with Buenos Ayres as its capital. After 1806–07, Buenos Ayres and Montevideo were for a short time in the hands of the British, who, however, were not able to hold them. Soon after liberal ideas began to gain ground. The viceroy was expelled, and on May 25, 1810, a *junta gubernativa* was installed. Cordova, Paraguay, and Uruguay, however, did not recognize this junta, and a long succession of civil wars ensued. Soon after the districts in the interior also joined the Confederation. In 1813 a constituent assembly met in Buenos Ayres, the Spanish flag was given up, and the republic issued its own coin. In the previous year Montevideo, which had remained longest connected with Spain, had been taken. In 1816 the representatives of all the provinces assembled in congress at Tucuman, declared the La Plata states independent, and appointed General Pueyrredon dictator of the republic. The Spanish troops were severely defeated at Chacabuco in 1817, and at Maypu in 1818. The last and decisive victory was gained in 1821. In the mean while the republic was the scene of serious encounters between several ambitious leaders. In 1825 the "Unitarians" (who favored a strong central government) succeeded in restoring unity and established a new constitution. But Rivadiva was their only president. Juan Manuel de Rosas, the leader of the Gauchos, in connection with other malcontents, forced him to resign, and caused Dorrego to be elected governor of Buenos Ayres. After a counter-revolution under Lavalle, which was for a time successful, Rosas was elected governor in 1826, in which position he remained for six years. In 1835 he declined a re-election, but accepted the position of dictator of the republic with unlimited powers, which he held until 1852. During this entire period Congress did not assemble. The civil wars nevertheless continued uninterruptedly. The independence of Uruguay, which had assumed the title of "Republica Oriental del Uruguay," had been recognized in 1828. But Rosas did not relinquish his plans. He assisted Governor Oribe, while France took sides with his rival, Rivera. Peace was concluded in 1840, but in 1845 new difficulties arose, which led to an armed intervention of France and England. They blockaded Buenos Ayres and occupied the island Martin Garcia, but were compelled to recall their fleets the next year. The provinces of Corrientes and Entre Rios seceded from Rosas soon after, and on Feb. 3, 1852, he was defeated by the united forces of Brazil, Uruguay, Paraguay, and Urquiza, the head of the opposition, in the battle of Monte Caseras, in consequence of which he was compelled to fly to England. After a short administration of Vincente Lopez, Urquiza declared himself president, and recognized on June 23, 1852, the independence of Paraguay. In September another revolution took place, and Buenos Ayres resolved to secede from the Confederation. In the mean while, Congress had adopted a new constitution (May, 1853), and Urquiza was elected president. Buenos Ayres remained independent, but consented to the conclusion of two treaties in Dec., 1854, and Jan., 1855. The attempts at a reunion were not suspended, but several difficulties caused the suspension of the treaties. A war followed, and Buenos Ayres was defeated. Urquiza gained a victory at Cepada on Oct. 23, 1859, and by the treaty of peace of San José de Flores of Nov. 10, 1859, and the union of Parana, Buenos Ayres again entered the Confederation. In 1861 new difficulties arose on account of taxation, and General Mitré completely defeated the federal troops on the Pavon (a small tributary of the Parana) on Sept. 17, 1861. The president, Santiago Derqui, resigned in consequence of this, and General Mitré was appointed president *pro tem.*, with the direction to call a congress on May 25, 1862, at Buenos Ayres. Mitré was elected president of the reunited Confederation on Dec. 14 of the same year. In 1866 great dissatisfaction arose in several provinces in consequence of the war with PARAGUAY (which see). In several places, as Mendoza and Catamarca, serious disturbances arose, which were secretly encouraged by Peru, Chili, and Bolivia. In 1867 the disturbance, under the command of Videla, began to assume serious proportions in Mendoza, and even extended to La Rioja and San Juan. General Pannero, although not till Mitré had joined him with 4000 men, completely defeated the insurgents, and triumphantly entered Mendoza on May 14. Both houses of Congress passed a resolution to transfer the seat of government to Rosario, which was, however, vetoed by the president. In 1868, Sarmiento was elected president for a term of six years. Since that time the country has been rapidly increasing in prosperity. In 1870 a rebellion broke out in Entre Rios, at the head of which was General Lopez Jordan, a son-in-law of Urquiza. This old patriot was murdered by the rebels in his palace at San José. The rebellion, although rapidly gaining, was opposed by almost all the other states. On Sept. 23, Jordan was completely routed at Santa Rosa, and lost all his infantry and artillery. In April, 1871, he was again completely defeated, and the rebellion was suppressed. In Mar. and April, 1871, the city of Buenos Ayres was visited by the yellow fever, and suffered terribly from its ravages. The citizens and the government did their utmost to prevent its spread, but still the total of its victims was found to be 13,403—a figure which, although large, was still considerably below the estimate made by the press. In Feb., 1872, a revolution broke out in Corrientes, which, however, was soon ended. In Entre Rios, Lopez still continued to agitate in secret, but without success. On Jan. 1, 1872, a band of Gauchos, under a Bolivian fanatic calling himself a *Dios medico* (God physician), entered the town of Tandil, and crying "Death to the Masons and Gringos!" massacred thirty-five persons. They were afterwards captured; fourteen were put to death, fifteen imprisoned for fifteen years, and the Dios medico was shot by the populace.

In April, 1872, Gail Jordan was reported to be on the frontier of Brazil, at the head of 2000, intending to revive the dream of Artigas and Urquiza concerning the establishment of an independent republic, to consist of the Argentine provinces of Corrientes and Entre Rios and the republic of Uruguay. At the beginning of the year the border provinces had to suffer from a new invasion of the Araucanian Indians under their chief Calfucura, who are reported to hold more than 3000 Argentine citizens as prisoners. In May, 1873, the province of Entre Rios was once more invaded by Lopez Jordan. Dr. Avellaneda became president in 1874, and served six years; in Sept., 1880, Gen. Roca was elected president after another rebellion. By treaty with Chili in 1881 all the country E. of the eastern crest of the Andes, including most of Patagonia and a small part of Terra del Fuego, was conceded to the Argentine Confederation.

Literature.—Compare, besides the works of Nuñez, King, Mansfield, and Page, ANDRÉE, "Buenos Ayres und die Argentinischen Provinzen" (1856); MANNEQUIN, "Les provinces argentines et Buenos Ayres" (1856); DE MUSSY, "Description géographique et statistique de la Confederation Argentine" (1861 and 1864); BURMEISTER, "Reise durch die La Plata Staaten" (1861); FORD, "La Republique Argentine" (1867); TRELLES, "Registro Estadistico" (1867); L. BECK BERNHARD, "Le Rio Parana, etc." (1865); MOUCHEZ, "Nouveau Manuel de la navigation dans le Rio de la Plata, etc." (1865); SCHNEPP, "Mission Scientifique dans l'Amerique du Sud" (1864); the "Annales del Museo publico de Buenos Ayres," published yearly by Burmeister since 1864; DOMINGUEZ, "History of the Argentine Republic," translated by G. Williams (1866); M. G. and E. T. MULHALL, "Handbook of the River Platte" (1869); WAPPÄUS, "Argentinische Republik," in Stein and Hörschelmann's "Handbuch der Geographie und Statistik" (7th ed. 1863–70). A. J. SCHEM.

Argenton-sur-Creuse (anc. *Argentom'agus*), a town of France, in the department of Indre, on the river Creuse, 19 miles by rail S. W. of Châteauroux. It has ruins of an old castle, and manufactures of woollen cloth. Pop. in 1881, 5909.

Ar'ges, a genus of small fishes of the family Siluridæ, which are often thrown out by some of the South American volcanoes with torrents of hot and muddy water. This remarkable fact was noticed and published by Humboldt, who described one species, now called *Arges cyclopum.* They are ejected near Quito in such quantities that fevers are caused by their putrefaction. It is supposed that they come from lakes in the caverns of the mountains. The craters from which they are ejected are 16,000 feet or more above the level of the sea.

Ar'gil [from the Lat. *argil'la,* "white clay"], a term sometimes applied to clay or potter's clay, and, in a technical sense, to pure clay or to alumina.

-**Argilla'ceous** [from the Lat. *argil'la,* "clay"], clayey; having the properties of clay, or partly composed of clay. Limestones are called argillaceous if they contain as much as 10 per cent. of clay. A conchoidal fracture usually indicates the presence of clay in a mineral.

ARGILLACEOUS ROCKS. This term is generally applied to rocks or strata of which clay is the principal ingredient. Pure clay, called *kaolin* or porcelain clay, is a hydrated silicate of alumina, and is derived from the decomposition of felspar. Common clay contains also sand and other impurities. Among the argillaceous rocks are shales and slates. Clay which has been indurated and metamorphosed is called clay-slate. Plastic clays fit for pottery occur in the tertiary formation and more recent deposits. The argillaceous rocks may be distinguished by the odor which they emit when a person breathes on them.

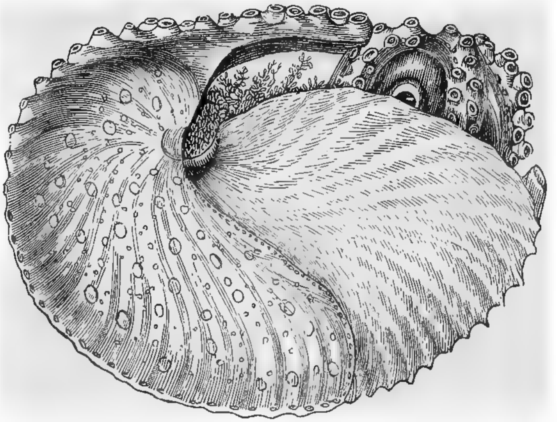
Ar'gives, or **Argi'vi,** the inhabitants of Argos and of Argolis, a state of ancient Greece. During the Trojan war Agamemnon was king of the Argives, who were then the most powerful or prominent among the Greek tribes. The name Argives was used by Homer and other ancient authors as a generic appellation for all the Greeks.

Ar'go, an extensive southern constellation, so called from the mythical ship of the Argonautæ. It is usually divided into four: Argo, Argo in Carina (in the keel), Argo in Puppi (in the stern), and Argo in Velis (in the sails). Canopus, a star of the first magnitude, belongs to this constellation, part of which is invisible in our latitude.

Ar'gol, crude tartar, a salt which is deposited by wine in crystalline crusts on the interior of vats, barrels, and bottles. Being less soluble in alcohol than in water, the increasing proportion of alcohol during fermentation causes it to separate. It consists chiefly of potassic bitartrate, $KHC_4H_4O_6$, but contains also variable quantities of calcic tartrate, coloring and mucilaginous matter. It is purified by solution in hot water, clarification by the addition of clay, and recrystallization. By repeating the process it becomes white, and is then sold under the name of *cream* of tartar, and extensively used in connection with sodic bicarbonate for raising bread. Cream of tartar is shamefully adulterated with gypsum, flour, etc., many samples containing two-thirds or more of such fraudulent admixtures. Argol is used for the preparation of tartaric acid, Rochelle salt, and potassic carbonate, the latter being often called *salt of tartar.*

Ar'golis ['Αργολίς], a state of ancient Greece, in the N. E. part of the Peloponnesus (Morea), bordering on the sea. It consists partly of a peninsula between the *Saronicus Sinus* (Gulf of Ægina) and the *Argolicus Sinus* (Gulf of Nauplia). It was bounded on the S. by Laconia and on the W. by Arcadia. The surface is diversified by mountains which are about 5000 feet high. Near the sea is the large plain of Argos, which is rendered unhealthy by marshes. Argolis was one of the most famous and powerful states of ancient Greece, and was the scene of many memorable events or myths in the heroic ages. Here Hercules was born, and the descendants of Pelops reigned. The inhabitants were called Argives (Argivi). The chief towns were Argos, Mycenæ, Epidaurus, Hermione, Sicyon, and Trœzene, each of which was a separate kingdom. The Argives were skilful musicians, and cultivated the fine arts with success, but were never distinguished as poets or philosophers.

ARGOLIS AND CORINTH is the name of a nomarchy of modern Greece. Area, 1447 square miles. Pop. in 1879, 136,081. Capital, Nauplia.



Argonaut within its shell.

Ar'gonaut (*Argonau'ta*), a genus of mollusks of the class Cephalopoda, is commonly called "paper nautilus." The latter name is derived from the fragile nature of the boat-like shell in which the argonaut floats on the surface of tranquil seas. The shell is not chambered like that of the true nautilus, but has one spiral cavity, into which the animal can retire and be completely hidden. There is no muscular attachment of this animal to the shell, which is said to be peculiar to the female, who uses it for incubation as a nest. Several species are known. They have eight arms, two of which are expanded into broad membranaceous disks, which were formerly believed to be sails, and the other arms were regarded as oars; but, though the fable is perpetuated by the poets, it has long been known that the animal really propels itself by ejecting water from its funnel. When it desires, it folds its arms, retires within its shell and sinks to the bottom.

Ar'gonau'tæ [Gr. 'Αργοναῦται, *i. e.* "the sailors of the Argo"], in English **Ar'gonauts,** the famous Greek heroes who, according to tradition, lived before the Trojan war, and acquired celebrity by an adventurous navigation of unknown seas. This is the most ancient voyage of discovery mentioned by classic poets or historians. They derived their name from the ship Argo, in which, under the command of Jason, they performed the expedition to Colchis, on the Euxine, in order to recover the Golden Fleece, which was guarded by a sleepless dragon. Among the Argonauts were Hercules, Theseus, Castor, Pollux, and Orpheus. In the course of the voyage they landed at several points and passed through many perilous adventures. Among the obstacles which they encountered were the enmity and treachery of Æetes, king of Colchis, but they were aided by his daughter Medea, a powerful sorceress, and finally carried off the Golden Fleece.

Ar'gos [Ἄργος], an important city of ancient Greece, situated in Argolis, about 3 miles from the *Argolicus Sinus*, or Gulf of Nauplia. It was considered the oldest city of Greece, and was supposed to have been founded by Inachus, the father of Io, about 1500 B. C. It was a famous city in the heroic age, and at the time of Trojan was the capital of Diomede. Argos was the head of a league of Doric cities before Sparta acquired the supremacy in the Peloponnesus. Its site is occupied by a modern town of the same name, 6 miles N. N. W. of Nauplia. Pop. 9861. Here are remains of ancient cyclopean structures, among them those of the theatre and an extensive aqueduct.

Argos'toli, a seaport-town of Greece, the capital of Cephalonia, one of the Ionian islands, is on the S. W. coast. It has a good haven. Pop. 7871.

Argot, a word of uncertain derivation, applied in France to a peculiar language or gibberish invented for purposes of concealment by those whose pursuits make them dread the arm of the law. In all the countries of Europe a language of this kind prevails, and has prevailed perhaps to some extent from immemorial time. In England it is called "thieves' Latin," "St. Giles's Greek," "peddler's French," "flash," and other names; in Italian, "zergo" (or "gergo") and "furbesco" (from *furbo*, a "rogue"); in Spanish, "Germania;" in German, "rothwelsch" (or "rothwälsch"). An able French writer, M. Nodier, remarks that "Argot, a language invented by thieves, often sparkles with imagination and wit." The following examples may serve to illustrate the truth of the foregoing remark: *Apôtre* ("apostle") applied to the fingers, because they are "sent forth." *Sans feuille* ("without leaf"), the "leafless" tree—that is, the "gallows." *Epouser la veuve* (to "marry the widow"), to "be hung;" implying that those who had previously been joined in the same marriage were deceased. *Aspic* (an "asp," or poisonous serpent), a "slanderer." *Sancho Panza*, "justice of the peace," in allusion to Sancho Panza having been under Don Quixote magistrate of the Isle of Barataria. *Sanglier* (a "boar," an animal having long teeth), applied to priests, in allusion to their frequent fasting; the phrase "having long teeth" was equivalent to "being very hungry." Sometimes the principle on which the word (in argot) is formed is a mere resemblance of sound: thus, *arsenic* is used for "arsenal." In a somewhat similar manner *solir* is used for *ventre* ("belly"), because *sollir*, "to sell," in argot signifies the same as *vendre*, which resembles *ventre* in sound. Considerable attention has of late years been paid to the study of argot. Francisque Michel has written a large volume on argot (Paris, 1856), which is said to be by far the most complete work on the subject. Several distinguished novelists, including Bulwer, Dickens, and Victor Hugo, have introduced frequent specimens of this language into their works; it may suffice to refer the reader to "Pelham," "Paul Clifford," "Oliver Twist," and "Les Misérables."

Argout, d' (Antoine Maurice Apollinaire), Count, born in Isère in 1782. He became prefect of Gard in 1817, and a peer of France in 1819. In July, 1830, during the revolution, he negotiated between the popular party and the king, from whom he obtained concessions, but it was then too late. He was appointed minister of commerce in 1831, minister of the interior in 1833, and governor of the Bank of France in 1834. He retained that office many years. Died in 1858.

Argue'lles (Augustin), a liberal Spanish statesman, born in the Asturias in 1775. He was elected to the Cortes, and was a member of the committee which produced the liberal constitution of 1812. He gained distinction as an orator, and became very popular with the liberal party. On the restoration of Ferdinand VII., in 1814, he was imprisoned for several years, but was released by the revolution of 1820. He was minister of the interior for several months in that year, and was an exile from 1823 to 1832. After that date he was a leader of the moderate party in the Cortes, and in 1841 was appointed tutor to the young queen Isabel. Died in 1844. (See Evaristo San Miguel, "Vida de D. A. Arguelles," 1850.)

Ar'gument [Lat. *argumen'tum*, from *ar'guo*, to "make clear"], a reason offered for or against a proposition, opinion, etc.; a series of reasonings; a debate or disputation. In logic, an expression in which, from something laid down as granted (*i. e.* the premises), something else (*i. e.* the conclusion) is to be deduced. "Socrates," says Addison, "introduced a catechetical method of arguing. He would ask his adversary question upon question, until he had convinced him out of his own mouth that his opinions were wrong. . . . Aristotle changed this method of attack, and invented a great variety of little weapons called syllogisms. As in the Socratic way of dispute you agree to everything which your opponent advances, in the Aristotelic you are still denying and contradicting some part or other of what he says. Socrates conquers you by stratagem, Aristotle by force. . . . When our universities found there was no end of wrangling this way, they invented a kind of argument which is not reducible to any mode or figure in Aristotle. It was called the *argumentum basilinum* (others write it *bacilinum* or *baculinum*), which is pretty well expressed in our English word *club-law*. When they were not able to confute their antagonist, they knocked him down." (*Spectator*, No. 239.) In the tables used in the exact sciences, the term *argument* signifies the leading numbers, or quantities, arranged in order at the top or sides to guide to the tabular number sought.

Argumen'tum ad Hom'inem (*i. e.* an "argument [applied] to [the particular] man" whom you are addressing), an argument derived from the principles or conduct of an antagonist, or an appeal to the prepossessions or prejudices of a person to whom the argument is addressed.

Ar'gus [Gr. Ἄργος], a fabulous personage who, according to an ancient Greek legend, had a hundred eyes, some of which were always awake. Having been employed by Juno to guard the heifer into which Io was transformed, he was killed by Mercury. Juno is said to have transferred his eyes to the tail of her favorite bird, the peacock. Another mythical Argus was king of Argos, and a son of Jupiter and Niobe.

Argus [named in allusion to the Argus of the Greek mythology, having a hundred eyes; for a more particular explanation see above], a genus of gallinaceous birds remarkable for rich and brilliant plumage. The only known species is the *Argus giganteus*, formerly called *Phasianus Argus*, and now commonly called argus pheasant. It is a native of Sumatra and other parts of the East Indies, and is about equal in size to a common barndoor fowl. Two of the tail-feathers of the male are about four feet long. The name argus is given in reference to the beautiful circular, eye-like markings which adorn the plumage of the male, especially on the secondaries of the wings.

Argyle, N. Y. See Appendix.

Argyle, or **Argyll,** Dukes of, marquesses of Lorne and Kintyre, earls of Campbell and Cowal, viscounts of Lochow and Glenilla, barons of Inverary, Mull, Morven, and Tiry (1701), earls of Argyll (1457), barons Campbell (1445), barons of Lorne (1470, in Scotland), Lords Sundridge and Hamilton (1766, in Great Britain).

Argyle (Archibald **Campbell**), Marquis of, a Scottish peer, born in 1598, was a son of the seventh earl of Argyle. In the civil war he fought against Charles I., and was a leader of the Scottish Covenanters. He was defeated in battle by Montrose in 1644. An adherent of Charles II., he took arms for him against Cromwell in 1651. After the restoration of 1660 he was convicted of submission to the usurpation of Cromwell, and was beheaded May 27, 1661.

Argyle (Archibald **Campbell**), ninth Earl of, was the eldest son of the preceding. He was noted for his loyalty to the royal family, notwithstanding the fact that his father was a leader of the Covenanters. He fought for Charles II. at Dunbar in 1650, and when the Commonwealth was established he was imprisoned and was carefully watched till the Restoration. The estate of his father was restored to him, with the title of earl, in 1663. When he took the test-oath which was exacted in 1681, he added the phrase, "So far as is consistent with the Protestant faith." For this offence he was imprisoned, tried for high treason, and condemned to death. The execution of the sentence being suspended, he escaped from prison, and after remaining concealed for a while in London fled to Holland, where he remained until the close of the reign of Charles II. He returned with a small body of armed men to Scotland on the accession of James II. to aid in the rising of the duke of Monmouth, and was captured, and executed June 30, 1685.

Argyle, or **Argȳll′** (George Douglas **Campbell**), the eighth duke of, born April 30, 1823, succeeded his father, the seventh duke, in 1847, before which he was styled the marquis of Lorne. He published in 1848 "Presbytery Examined," in which he defends the Presbyterian system against prelacy. Having entered the House of Lords, he supported the liberal party, and distinguished himself by his oratorical ability and soundness of judgment. He became lord privy seal in 1852, and postmaster-general in 1855. When the Tories obtained power in 1858, he resigned office, but he was reappointed postmaster-general and lord privy seal in 1860. In 1866 he published a philosophical work called "The Reign of Law," one of the ablest of recent works advocating a theistic view of creation. He resigned with his colleagues in June, 1866, but was secretary for India 1868–74. He married Elizabeth Gower, daughter of the late and sister of the present duke of Sutherland. His son, the marquis of Lorne, married H. R. H. the princess Louise, daughter of Queen Victoria, and was governor-general of Canada, 1879–83.

Argyle′shire, a large county of Scotland, bordering on the Atlantic Ocean. It is bounded on the N. by Inverness-shire, on the E. by Perthshire and Dumbarton, on the S. and W. by the sea. It includes the islands of Mull, Islay, Jura, Tiree, Coll, Iona, Lismore, Colonsay, etc. Area, 3255 square miles. The surface is rugged and mountainous, and presents some of the grandest and most picturesque scenery in Scotland. The highest peaks are Bedanambran, 3760 feet, and Ben Cruachan, 3668 feet. The rocks which predominate here are granite, mica-slate, trap, limestone, and quartz. Long arms of the sea, called Loch Linnhe and Loch Fyne, extend into this county, which also contains Loch Awe, a fresh-water lake. The chief occupation of the farmers is the raising of cattle and sheep. The land is owned by a few proprietors, among whom are the duke of Argyle and the marquis of Breadalbane. Inverary and Campbellton are chief towns. Pop. in 1881, 76,468.

Ar′gyro-Cas′tro (modern Gr. *Arguron-Kastron;* Turk. *Ergree-Kastree*), a town of Albania, on the river Deropuli, 50 miles N. W. of Yánina. It is built on the steep declivity of a mountain. The best Turkish snuff is manufactured here. Pop. estimated at 8000.

Argyropulos (Johannes). See Appendix.

A′ria ("air"), in music, a rhythmical song, a tune, a measured lyrical piece for one or several voices; commonly applied to a song introduced into a cantata, opera, or oratorio, and intended for one voice supported by instruments.

Ariad′ne [Gr. Ἀριάδνη], a daughter of Minos, king of Crete, became the lover of Theseus when he visited Crete. She gave him a clue of thread by which he was enabled to find his way out of the Cretan labyrinth. Her mythus is not uniform, but, according to one account, she was abandoned by Theseus at Naxos, and subsequently became the wife of Bacchus. Others say that Diana slew her at Naxos with her arrows. She bore twin sons to Theseus. Her name is given to the forty-third asteroid. (See Theseus.)

Arial′dus, a deacon of the church of Milan, noted for his zeal against the marriage of priests, was born in Lombardy. His preaching led to a schism in the Church, attended with violent tumults. Arialdus was killed June 28. 1066. (See Muratori, "Annali d'Italia.")

Arian (nations). See Arya.

Aria′na, the ancient name of a region in the W. central part of Asia, inhabited by the Aryan or Arian race. It probably comprised ancient Persia and Bactriana. "The latest and most vigorous offshoot of these branches" [the Semitic and Iranian], says Bunsen, "the glorious Arian tribe, has outgrown all the rest, as it is the Arian races that have given a new turn to the wheel of history and remodelled the earth." (See Arya or Aryan.)

Aria′no, a town of Italy, in Avellino, among the Apennines, 23 miles N. E. of Avellino. It is the seat of a bishop. It has a mountain-fortress, a fine cathedral, several churches, a gymnasium, a normal school, and considerable manufacture of silk. Wine and butter are exported. Pop. in 1881, 14,398.

Arians. See Arius.

A′rias Monta′nus (Benedictus), [Sp. *Beni′to A′rias Monta′no*], an eminent Spanish biblical scholar and Orientalist, born in Estremadura in 1527. He was a member of the Council of Trent in 1562, and under the auspices of Philip II. edited a Polyglot Bible, which was published at Antwerp (1568–72), and is highly commended. He wrote, besides other works, "Jewish Antiquities" (1593). Died at Seville in 1598. (See Loumyer, "Vie de B. A. Montano," 1842; N. Antonio, "Bibliotheca Hispana Nova.")

Ari′ca, a maritime town of Peru, in Moquega, on the Pacific Ocean, 239 miles S. W. of La Paz. It was once more important than it is now. It is the principal shipping-place of the exports of Bolivia, which are copper, silver, alpaca-wool, and guano. Pop. about 4000.

Arichat, a seaport-town, capital of Richmond county, Nova Scotia, situated on the S. coast of Madame Island, near the Gut of Canso, and on a small bay or inlet of the Atlantic; lat. 45° 28′ N., lon. 61° W. It owes its importance to fisheries. It is the seat of a Roman Catholic bishop. Pop., including West Arichat, 2496.

Ariç′ia, an ancient and celebrated city of Latium, on the Appian Way, at the foot of Mons Albanus, 16 miles S. E. of Rome. It was an important town in the reign of Tarquin the Proud. The Aricians took part in a war of the Latins against Rome, which ended in their defeat at Lake Regillus, 498 B. C. Cicero speaks of it as in his time a wealthy and flourishing *municipium.* Here was a celebrated temple of Diana, and here is a beautiful lake called Lago di Nemi. The modern town, *La Riccia,* is on or near the site of the ancient Aricia.

Ar′icine, Cincho′natine, Cusco′nine, or **Quin′-onine,** an alkaloid found in the white cinchona-bark from Arica. Its salts are easily soluble and crystalline. Its formula is $C_{20}H_{26}N_2O_4$. It is useless in medicine.

Ariége, a river of France, rises in the Pyrenees, flows nearly northward through the department of its own name, passing by Foix and Pamiers, and enters the Garonne a few miles S. of Toulouse. Length, about 90 miles.

Ariége, a department in the S. of France, is bounded on the N. and W. by Haut-Garonne, on the E. by Aude and Busillon, and on the S. by Spain, from which it is separated by the Pyrenees. Area, 1889 square miles. The surface is mostly mountainous, the highest mountains being in the southern part. Among the highest summits are Montcalm, about 10,600 feet, and Serrère, 9592 feet high. It is drained by the rivers Ariége and Salat. The soil of the lower lands is fertile. Here are rich iron-mines, which furnish the chief article of export. It is subdivided into 3 arrondissements, 20 cantons, and 335 communes. Capital, Foix. Pop. in 1881, 240,601.

A′riel, a word signifying "lion of God" or "ark of God," was sometimes applied to the city of Jerusalem. Among the Jews of a more recent date the name was given to a water-spirit.—Ariel is also the name of one of the principal characters in Shakspeare's drama of "The Tempest," where he is represented as a spirit of air.

Ariel Gazelle (*Gazella dorcas,* var. *Arab′ica*) is the gazelle of Western Asia, the true gazelle belonging to Northern Africa. The ariel gazelle is one of the most beautiful of antelopes, is twenty-one inches high at the shoulder, of a dark-fawn color, the belly white, with a black or brown band running along the flanks. It is a variety of the species to which the African gazelle belongs. It is hunted both for sport (by falconry) and for its flesh and skin, both highly prized. Gazelles are often hunted in *battue,* for they cannot be successfully followed in the chase, their speed excelling that of the greyhound. They are great favorites in the East when tamed, and the beauty of their eyes is proverbial.

A′ries [the Latin of "ram"] is the name of a sign of the Zodiac; that is, the first thirty degrees of the Zodiac measured from the point at which the equator intersects the ecliptic—*i. e.* the vernal equinox. Longitudes (celestial) are reckoned from this point. Aries is also the name of a constellation of the Zodiac which once coincided with that sign, but which now occupies the same place as the sign *Pisces.* Among the ancient Romans, *aries* was the name of a battering-ram—a machine with an iron head used to batter down the walls of besieged towns or forts. In its most effective form, it was suspended from a covered frame mounted on wheels, was often 100 feet long, or more, impelled by many men, and was very destructive.

Ar′il [Lat. *aril′lus*], a botanical term applied to a membrane or peculiar covering of some seeds, formed by an expansion of the *funiculus* or of the placenta. Mace, for example, is the *aril* of the nutmeg. The aril never appears until after the seed is fertilized.

Ari′on [Ἀρίων], an ancient Greek musician and poet, a native of Lesbos, lived probably about 700 B. C. Herodotus has preserved a curious legend, according to which he was returning from Sicily to Corinth by sea with much treasure, to get which the mariners resolved to kill him. Having obtained permission to play one tune, he threw himself into the sea, and was received on the back of a dolphin, which had been charmed by the music, and carried him to land. This dolphin is supposed to be the same as that which figures among the stars.

Arios'to (Lodovico), a celebrated Italian poet, was born at Reggio, near Módena, Sept. 8, 1474. He was educated at the College of Ferrara, and afterwards, in compliance with the wish of his father, studied law, which he disliked and soon abandoned. After the death of his father, who left many children younger than Lodovico, he devoted much time to the support and education of his brothers and sisters. His early lyrical poems procured for him the patronage of Cardinal Ippolito d'Este, whose service he entered in 1503. He was employed by this cardinal, and his brother, the duke of Ferrara, in embassies to several Italian courts. In the intervals of his busy life he meditated and matured his great romantic and fantastic poem, "Orlando Furioso," which was published in 1516, and soon acquired universal popularity. More than sixty editions of it were issued in the sixteenth century. The subject of this imaginative epic is the chivalrous adventures of the paladins of the age of Charlemagne. The best English translations of it are those of Harrington and William Stuart Rose. In 1517 he entered the service of Alfonso, duke of Ferrara, in whom he found a liberal patron. He is said to have been a favorite associate of that prince, and to have enjoyed some ecclesiastical revenues. In 1521 he was appointed governor or commissary of Garfagnana, where he was required to enforce order among a turbulent and rude population addicted to brigandage and violence. In the latter part of his life he married privately a widow named Alessandra Benucci. He had continued to polish and revise his "Orlando Furioso," of which he published an enlarged edition in 1532, in forty-six cantos. He also produced, in Italian, five comedies in verse, seven satires formed on the Horatian model, a number of sonnets, and some Latin poems. He died at Ferrara June 6, 1533, leaving two natural sons. "Ariosto," says Hallam, "has been, after Homer, the favorite poet of Europe. His grace and facility, his clear and rapid stream of language, his variety and beauty of invention, his very transitions of subject, so frequently censured by critics, but artfully devised to spare the tediousness that hangs on a protracted story, left him no rival in general popularity. . . . The 'Orlando Furioso,' as a great single poem, has been very rarely surpassed in the living records of poetry. He must yield to three, and only three, of his predecessors. He has not the force, simplicity, and truth to nature of Homer, the exquisite style and sustained majesty of Virgil, nor the originality and boldness of Dante." (See Harrington, "Life of Ariosto," 1634; Giuniore, "La Vita di Lodovico Ariosto," 1807; Barotti, "Vita di L. Ariosto," 4 vols., 1766; Fabroni, "Elogi di Dante, di Poliziano, di Ariosto, e di Tasso," 1800; Carl L. Fernow, "Lebenslauf L. Ariosto's des Göttlichen," 1809.) William Jacobs.

Ariovis'tus [Ger. *Ariovist* or *Ehrenvest*], a chief of the ancient Suevi or Marcomanni, was a German. Solicited by the Sequani to aid them in a war against the Ædui, he marched (72 B. C.) with an army into Gaul, and took possession of that part which was afterwards Burgundy. The Gauls then applied to the Romans to liberate them from their new master. Ariovistus was defeated by Cæsar near Vesontium (modern city of Besançon, France) in 58 B. C. and fled across the Rhine.

Aris'ta (Mariano), a Mexican general, born July 16, 1802, entered the army in his youth. Having served in several civil wars, he was made general of brigade in 1833, and was banished in that year by Santa Anna. He returned in 1835, became a general of division in 1841, and commanded the army which was defeated by General Taylor at Palo Alto in May, 1846. In June, 1848, he was appointed minister of war, and in 1850 was elected president of Mexico. Under his administration Mexico was disturbed by the usual chronic revolts and anarchy, and Arista was driven from power by Santa Anna early in 1853. He died in Spain Aug. 9, 1855.

Aristæn'etus [Ἀρισταίνετος], a Greek rhetorician of Bithynia, was a friend of Libanius. He was killed by an earthquake at Nicomedia in 358 A. D. He, or another of that name, is the reputed author of some fifty fictitious erotic letters (edited by Boissonade, 1822).

Aristæ'us [Gr. Ἀρισταῖος], a personage of classic mythology, represented as a son of Apollo and Cyrene. He married Autonoë, a daughter of Cadmus, was the father of Actæon, and a lover of Eurydice. He was worshipped as a divinity who presided over flocks and herds, and taught men the art of raising or managing bees. (See Vergil, "Georgics," book iv.)

Aristar'chus [Gr. Ἀρίσταρχος] **of Samos,** an eminent Greek astronomer, supposed to have flourished about 275 B. C. The events of his life are unknown. Archimedes, in one of his works, states that "Aristarchus of Samos supposes that the earth revolves about the sun in the circumference of a circle." All of his writings are lost except a short treatise "On the Magnitudes and Distances of the Sun and Moon." He calculated that the sun is twenty times farther than the moon from the earth. (See Fortia d'Urban, "Histoire d'Aristarque de Samos," 1810.)

Aristarchus, a Greek grammarian, educator, and critic, born in Samothrace, was a pupil of Aristophanes of Byzantium. He flourished about 150 B. C., and founded a school of grammar at Alexandria, in Egypt, where he passed the greater part of his life. He educated the sons of Ptolemy Philopator. His life was chiefly devoted to the critical study, explanation, and restoration of the works of Homer and other Greek poets. He is regarded by some persons as the greatest critic and philologist of antiquity; and it is generally agreed that as a commentator and critic of Homer he was more successful and meritorious than any other. He wrote commentaries on various poets, and some works on grammar, of which only fragments are extant. Died at the age of seventy-two. (See C. L. Matthesius, "Disputatio de Aristarcho Grammatico," 1725; K. Lehrs, "De Aristarchi Studiis Homericis," 1833.)

Aristi'des, or **Aristei'des** [Gr. Ἀριστείδης], surnamed the Just, an eminent Athenian statesman, a son of Lysimachus, was born in Alopeke, a demos of Attica. His political tendencies were conservative or aristocratic. He was one of the ten generals who had the command of the army when the Persians invaded Greece in 490 B. C. Each general had a right to the chief command for one day, but Aristides persuaded his colleagues to resign or waive their claims, so that Miltiades commanded at Marathon when it was not his turn. Aristides became chief archon in 489, and a political adversary of Themistocles, the leader of the democracy. On the pretext that his influence was dangerous to the public interest, he was ostracised in 483 B. C. On this occasion a citizen who was personally a stranger to him, and who could not write, requested him to write *Aristides* on a shell to be used in voting. He asked this voter if Aristides had injured him. "No," replied the citizen, "but I am tired of hearing him always called Aristides the Just." When Xerxes, king of Persia, invaded Greece with a mighty army in 480 B. C., Aristides sought an interview with Themistocles, took a prominent part in the battle of Salamis, and recovered his popularity. He commanded the Athenian troops, which, aided by other Greeks, defeated the Persians at Platæa in 479. Aristides and Cimon were appointed in 477 B. C. commanders of the Athenian forces which co-operated with other Greek armies against the Persians. Pausanias the Spartan had the chief command of the allied army, but he offended the allies by his arrogance, while Aristides by mildness and prudence gained general favor, and promoted the supremacy or predominance of Athens among the states of Greece. He died poor in 467 B. C., leaving a son and two daughters, who received dowries from the public treasury. Few statesmen have left so pure and honorable a reputation as Aristides. (See Plutarch, "Life of Aristides;" Cornelius Nepos, "Life of Aristides.") William Jacobs.

Aristides (Ælius), a Greek Sophist and rhetorician, born in Bithynia about 124 A. D., was a pupil of Polemon and Herodes Atticus. He acquired a high reputation for eloquence, and produced many orations and panegyrics, which display a brilliant style and skill in the choice and arrangement of words. He resided at Smyrna when that city was ruined by an earthquake in 178 A. D., and persuaded the emperor Marcus Aurelius to rebuild it. Died in 189 A. D. About fifty-five of his orations and treatises are extant. These were published by Dindorf in 3 vols., 1829.

Aristides of Thebes, an eminent Greek painter who lived about 350 B. C., and was a contemporary of Apelles. He had a brother, Nicomachus, who was a skilful painter. According to Pliny, Aristides was the first who expressed on the countenance the passions and movements of the soul. He painted a battle between the Greeks and Persians, which the Roman consul seized among the spoils of war and took to Rome.

Aristip'pus [Gr. Ἀρίστιππος], a Greek philosopher, the founder of the Cyrenaic school, was born at Cyrene, in Africa, about 425 B. C. He was a pupil of Socrates, but did not adopt his principles or imitate his mode of life. He travelled extensively, indulged freely in sensual pleasure, was intimate with the courtesan Lais at Corinth, and flourished as a courtier and philosophic voluptuary at Syracuse in the reign of Dionysius the Elder. Though he recognized pleasure as a proper subject of pursuit, he appears to have observed some moderation in that pursuit, and to have been remarkable for self-control and equanimity as well as versatility, and a faculty of adapting himself to the vicissitudes of fortune. Plato is reported to have said that "Aristippus was the only man he knew who could wear with equal grace fine clothes and rags." He was celebrated for his witty sayings and repartees, some of which are recorded by Diogenes Laertius. His works, if he wrote any, have not come down to us. He despised or neglected mathematics and physical sciences. He died after 366 B. C., and left a daughter, Arete, who was distinguished as a philosopher. Wieland wrote in German a romance of "Aristippus and his Contemporaries" (4 vols., 1800–02). (See G. H. LEWES, "Biographical History of Philosophy;" F. MENTZ, "Aristippus Philosophus Socraticus, sive de ejus Vita," 1719; RITTER, "History of Philosophy.")

Aris'to or **Aris'ton** [Gr. 'Αρίστων] **of Chios,** surnamed THE SIREN, a Stoic philosopher who lived about 275 B. C., was a disciple of Zeno. He taught at Athens, and confined his attention to moral philosophy. He maintained that the chief good consists in indifference to everything except virtue and vice.

Aristobu'lus [Gr. 'Αριστόβουλος], a Greek historian who accompanied Alexander the Great in his expedition against Persia, about 332 B. C., and wrote a history of the same, which is not extant. It was highly esteemed by the ancients.

Aristobulus, a Jew and philosopher who lived at Alexandria about 175–150 B. C. He was the reputed author of a Commentary on the Books of Moses, the aim of which was to show that the ancient Greek writers had borrowed much from the sacred books of the Hebrews.

Aristobulus I., high priest of the Jews, was a son of Joannes Hyrcanus. He assumed the title of king in 107 B. C., and died in 105, when he was succeeded by his brother, Alexander Jannæus.

Aristobulus II., a nephew of Aristobulus I., and a son of Alexander Jannæus, became king of the Jews about 70 B. C. Jerusalem was taken in 63 by Pompey, who gave the throne to Hyrcanus, a brother of Aristobulus, and carried the latter as a captive to Rome. Died about 48 B. C.

Aristoc'racy [Gr. ἀριστοκρατία, from ἄριστος, the "best," and κρατέω, to "govern"] signifies ideally a form of government controlled and administered by the best or noblest citizens. It is enumerated by Aristotle among the principal forms of government. Aristocracy is of very ancient origin, and in some countries of ancient times it prevailed as subsidiary to monarchy. The word may be defined as a government controlled by the nobility or privileged class, or a government in which a minority of adult males constitutes the ruling class. Such was the republic of Venice. The aristocratic element also predominated originally in the republic of ancient Rome, which was governed by patricians, whose power was hereditary. The feudal system of the Middle Ages favored the formation of powerful aristocracies. Among modern nations England is perhaps that in which the aristocracy is most influential and respectable. A title of nobility is the great prize for which British statesmen and soldiers compete, and the ranks of the ancient noble families are often reinforced by men of genius, who are raised to the peerage. There is probably no country where rank is more highly prized and ardently coveted, although the political power of the aristoracy has been reduced by the Reform Bill of 1867. In modern language, this word is used to denote nobility, or the higher class of society, without reference to government.

Aristogi'ton, or **Aristogeiton** [Gr. 'Αριστογείτων], an Athenian conspirator, an accomplice of Harmodius in the assassination of Hipparchus. He was put to death by Hippias in 514 B. C. He was regarded as a patriot by the Athenians, who erected statues to him and to Harmodius.

Aristolo'chia [from the Gr. ἄριστος, the "best," and λοχεία or λόχια, "childbirth"], a genus of plants of the natural order Aristolochiaceæ, are mostly natives of tropical countries, and have twining stems. The genus is characterized by a tubular oblique perianth, and by stamens adherent to the style. Some of the species climb to the tops of high trees and have handsome flowers. The *Aristolochia serpentaria*, or Virginian snakeroot, is a native of the U. S., possesses stimulant and tonic properties, and was once supposed to be a remedy for the bite of serpents. Similar virtues are ascribed to various species in different parts of the world. The root of this plant is exported from the U. S. to Europe, and is highly esteemed as a remedy in certain fevers. The *Aristolochia Clematitis* (birthwort) is a native of Europe, a perennial plant, with cordate leaves, erect stem, and grows in waste places, hedges, and among rubbish. The roots of these and many other species, which possess powerfully stimulating properties, have been used in medicine.

Aristolochia'ceæ, an order of exogenous plants, of which *Aristolochia* is the type. It comprises more than 130 species, mostly herbaceous plants or climbing shrubs, natives of warm climates, and particularly abundant in South America. The leaves are alternate, simple, and petiolate; the flowers are tubular perianths, axillary and solitary, and the stamens are epigynous. Several species are cultivated in hot-houses, and prized for the beauty of their flowers. The *Aristolochia Sipho* (pipe-vine or Dutchman's pipe), a native of the U. S., and a climbing shrub, is planted in Europe to form shady bowers. The U. S. have several other species.

Aristom'enes [Gr. 'Αριστομένης], a famous Messenian general who commanded the army of his state in the Second Messenian war. He was renowned for personal valor and daring enterprises. Having been finally defeated in 668 B. C., he went with his daughter and son-in-law to Rhodes. (See JOURDAN, "Histoire d'Aristomène," 1749.)

Aristoph'anes [Gr. 'Αριστοφάνης], the greatest comic poet of Greece, was born about 444 B. C., and is supposed to have been a native of Athens. Considering his celebrity, the materials for writing his biography are surprisingly meagre. His first work was "The Feasters" (427 B. C.), which is not extant. In 426 he produced "The Babylonians," the aim of which was to satirize the demagogue Cleon, who was his personal enemy. His "Acharnians" obtained the first prize in 425, and is still extant. Among his most admired dramas is "The Knights" (424 B. C.), in which he attacked and caricatured Cleon with great wit and virulence. In the performance of this play, which gained the first prize, the author acted the part of Cleon, as no other actor would venture to incur the resentment of that powerful popular favorite. Aristophanes was a conservative, and opposed innovations in politics, religion, and the social order. He was more distinguished for his ability to expose the depravity of human nature than for his capacity to appreciate its noble attributes and manifestations. Among his masterpieces is "The Clouds" (423 B. C.), an ingenious and powerful satire directed against the Sophists, of whom he represented Socrates as the head and master-spirit. He ridiculed and vilified Socrates, and excited the popular prejudice against him as a skeptic and corrupter of youth. He composed about fifty-four comedies, of which only eleven are extant, viz.: "The Acharnians" (425); "The Knights" (424); "The Clouds" (423); "The Wasps," which gained the prize in 422; "The Peace" (419); "The Birds" (414); "Lysistrata" (411); "Thesmophoriazusæ" (411); "Plutus" (408); "The Frogs" (405); "Ecclesiazusæ" (392 B. C.). These plays belong to the old comedy. His wit is so involved in allusions to local events that modern readers find it difficult to appreciate or enjoy it. The purity of his style is greatly admired, and is said to be the only thing pure about his works. He died about 380 B. C. "The Acharnians," "The Knights," "The Birds," and "The Frogs" have been translated into English by J. Hookham Frere. (See H. T. RÖTSCHER, "Aristophanes und sein Zeitalter," 1827; H. POL, "Dissertatio de Aristophane," 1834; C. F. RANKE, "Commentatio de Aristophanis Vita," 1845.) WILLIAM JACOBS.

Ar'istotle was born at Stagira, a city of Thrace, but a Grecian colony, in the first year of the 99th Olympiad, or 384 B. C. His father was Nicomachus, a physician and friend of Amyntas, king of Macedon and father of Philip. The family of Aristotle was distinguished by the hereditary profession of medicine, and was wont to trace its origin to Machaon, son of Æsculapius. Left an orphan at an early age, he was brought up by Proxenus of Atarneus, in Mysia, to whose guardianship he seems to have been entrusted by his father, and whose memory Aristotle held so dear in after life that he erected a statue to him, and both instructed his son Nicanor in the liberal arts and adopted him as his heir. In his seventeenth year he went to Athens, and became a pupil of Plato, with whom he continued twenty years, and by whom he was called the reader and the intellect of the school, and likened, in his ardor and restiveness, to a colt, which needed the bit more than the spur. Upon the death of Plato (348 B. C.) he accepted an invitation of Hermeas, tyrant of Atarneus, his former fellow-pupil in the school of Plato, to take up his residence with him. Here Aristotle spent the three following years of his life, when Hermeas, conquered by a Persian invader, was sent a prisoner to Persia, where he was put to death by Artaxerxes. To avoid a like fate, Aristotle fled to Mitylene, taking with him Pythias, whom he married, and who is variously described as the mistress, the sister, and the niece of Hermeas. After her death he married his concubine Herpyllis, the mother of his son Nicomachus.

When Alexander of Macedon was born, Philip, his father, is said to have sent this letter to Aristotle: "Be it known unto you that I have a son, and that I am thankful to the gods, not so much for his birth as that he was born in your time. For if you will but take the charge of his education, I assure myself that he will become worthy of his father and of his future kingdom." The philosopher accepted the commission of the king, and there is evidence that he gave early directions respecting the care and culture of the infant prince. When Alexander was fifteen, Aristotle assumed the personal oversight of his instruction, taking up his residence at the court, and continuing there during the lifetime of Philip, and for two years after his pupil had ascended the throne. When the conquest of the East was undertaken, Aristotle returned to Athens, and taught philosophy in the Lyceum, a temple dedicated to the Lycian Apollo, with walks ornamented by trees, fountains, and colonnades. From these shady walks (περίπατοι) his school received the name of Peripatetic. He here abode and taught thirteen years, when, after the death of Alexander, he was accused by the Athenians of impiety, and fled to Chalcis in Eubœa, the present Negropont, in order to escape the fate of Socrates, or, as he said, that Athens might not have the opportunity to sin against philosophy again. Here he died (B. C. 322), in his sixty-third year.

His Character.—Aristotle's was one of the most highly gifted intellects of all the ages. All agree that his wealth of scientific knowledge, his unbiassed judgment, his constructive power, and his depth and breadth of speculative insight are unsurpassed in ancient or modern times. But the verdict is not so unanimous respecting his moral traits. By some of the ancients he is extolled for his patriotism, his reverence, his modesty, his moderation, his love of truth, and his attachment to his friends, while others hold him up as selfish, ungrateful, sordid, gluttonous, and impious. It must be owned, however, that few of the stories told in proof of either of these sides will bear a sharp look. They rest on frail grounds. But while we have little direct showing that can be trusted respecting the personal character of Aristotle, some points seem clear. The regard in which he ever held the memory of Proxenus, and the beautiful hymn to virtue which he composed in honor of Hermeas, and which we still have, show that he was not incapable of gratitude or of love to his friends. The charge often made that he was jealous of Plato does not hang with the fact of Aristotle's continued intimacy with Xenocrates, Plato's devoted disciple and successor, nor with an elegy, some verses of which have come down to us, in which Aristotle calls Plato one whom the bad might not even praise, and who first taught the world how a man could be at the same time good and happy. In his will he shows not only a judicious care, but an affectionate solicitude, for his family, while in his writings a lofty moral tone appears and a winning frankness and sincerity seem to shine.

His Writings.—These were very numerous, though only a small part, perhaps a fourth, remain, all of which probably differ more or less from the state in which Aristotle left them. Incompetent editors and ignorant transcribers have made almost as much mischief as the mould and mildew by which some of the original manuscripts are said to have been sadly injured, and some destroyed. But while the fragmentary and skeleton-like form which many of the so-called Aristotelian writings possess, joined to the evident omissions and the repetitions and contradictions which they contain, show the work of some other hands than those of the great master, there remains a solid nucleus of considerable size, whose purity of style and depth of speculative content bring us into the unmistakable presence of Aristotle himself.

His Philosophy.—Aristotle's method is exactly the reverse of Plato's, which he does not tire of making manifest. The attention which Plato had given to the unity of all being, Aristotle directs to the manifoldness of the phenomenal world. He is as analytic and discursive as Plato is synthetic and intuitive. While Plato finds in the universal the only light in which the particular can be seen, Aristotle sees the particular to be necessary in order that we may have any knowledge of the universal. So he gathers particulars from all quarters. History, the human mind, and all departments of nature furnish him contributions. He has no rival in the variety and extent of the facts which he has collected, and has never been surpassed in the patient industry of his investigations. But it is a great mistake, though one easily and often made, to judge thereby that Aristotle sought for nothing beyond experience, or that he and Plato represented only the opposite extremes of empiricism and idealism. The idea was as truly the object of Aristotle's search as it was of Plato's. Both Plato and Aristotle also agreed that the reality or the essence of individual things was in the idea. Aristotle also held as strongly as Plato to the objective existence of the idea. The doctrine of the Nominalists in the Middle Ages, that the idea or the universal is only a subjective product in which objects are represented, and by which they are named, though often ascribed to Aristotle, is but little less foreign to him than to Plato. But while to Plato the idea had an objective existence independent of the individual object which participated in it, to Aristotle the idea was immanent in the individual, and had no being separate from it. This accounts for the prodigious attention which Aristotle gave to individual facts. He collected these in such vast measure, not because they had any interest in themselves, and not because their collection and classification could give a satisfying science, but only for the sake of the idea which was immanent in them, and which was the only proper object in scientific inquiry, since it was the only object which could be truly known.

This immanence of the idea in the individual shows what was the most essential difference between Plato and Aristotle, and also what was the most characteristic and important doctrine in the Aristotelian philosophy. Aristotle criticises Plato because the Platonic ideas, being separate from and independent of phenomena, could not explain the existence of the phenomenal world. They are, in the Aristotelian view of Plato's doctrine, only potential, not actual, sources of individual things. But to the idea as universal Aristotle ascribes an activity which individualizes, but this individualization is not a change to anything without, nor because of anything without, but is wholly within the universal itself; it is a change thus into a difference which is at the same time an identity, a determining which is a self-determining, wherein the universal or the idea realizes or actualizes itself. This self-realizing of the idea is conformity to an end which is at the same time a self-end, a true Final Cause, wherein is the living principle and rational explanation of individual things. This doctrine of the final cause, or sufficient reason, which it is the immeasurable merit of Aristotle to have introduced into philosophy, carries us back to a principle deeper than that of efficient causation, and brings us from the world of necessity to that of freedom. Our modern physicists would gain a profounder view of nature and a more successful pursuit of science if they could know this principle as Aristotle taught it. They would find him, as the ancients called him, "the father of those who know." (See Stahr, "Aristotelia;" Lewes, "Aristotle;" Grant, "Ethics of Aristotle;" Trendelenburg, "Comm. ad 'De Anima;'" Hegel, "Geschichte der Philosophie;" Ritter, Ueberweg, and Schwegler, ditto.) J. H. Seelye.

Aristox'enus [Gr. 'Αριστόξενος] **of Tarentum,** a Greek philosopher, a pupil of Aristotle, lived about 350–320 B. C. He wrote numerous works, which are lost, and a treatise on music ("Elements of Harmony"), which is extant and is accounted valuable. It was published by Meursius in 1616. He founded a school of musicians, who rejected the system of Pythagoras, and judged of the notes in the diatonic scale by the ear exclusively.

Arith'metic [Gr. ἀριθμητική, from ἀριθμός, a "number"], the science which treats of numbers or the art of computation, is a branch of mathematics. In the ordinary use of the term it is the art of expressing numbers by symbols, combining these symbols, and applying to them rules of the greatest practical utility. Among the ancient Greeks, Pythagoras, Archimedes, and others cultivated the science of numbers, but they labored under the disadvantage of a clumsy mode of notation, and had no sign for zero or naught. The Roman numerals, I, V, X, L, C, etc., continued to be commonly used in Europe until the fifteenth century. The invention of the symbols called Arabian numerals, now in use, is attributed to the Hindoos. The use of the cipher (0) gives the modern arithmetic a great advantage over the ancient. In the modern system of notation every symbol has a *local* as well as an *intrinsic* value. The intrinsic value of a symbol is the number it represents; the local value depends, *first,* upon the number of symbols used, and *secondly,* on the position of that symbol with respect to the others. The ordinary system is called *decimal,* because the calculations are performed by ten symbols or digits.

Arithmet'ical Mean, The, of two numbers is equidistant from those numbers, and is found by adding them together and dividing by 2. The mean of a series of numbers is the quotient obtained by dividing their sum by their number; thus the arithmetical mean of 1, 2, 7, and 10, is 5.

Arithmet'ical Progres'sion, a series of three or more numbers that increase or diminish by a common difference, as 5, 7, 9, 11, 13. To find the sum of such a series, multiply the sum of the first and last terms by half the number of terms.

A'rius (classical pronunciation *Ari'us*), or **Arei'us** [Gr. 'Αρειος], the founder of Arianism, was born at Cyrene, in Africa, near the middle of the third century. He was made a deacon by the patriarch Peter at Alexandria, and was placed in the highest rank in the clergy by the patriarch Alexander. About 318 A. D. a controversy arose between Arius and Alexander, which caused Constantine to summon a general council at Nicæa (Nice). This council pronounced the doctrines of Arius (who denied that the Son was coessential and coeternal with the Father) to be heretical, and Arius, who was present at the council, was exiled to Illyricum. This sentence, however, was soon after revoked. Arianism was approved by the Synods of Tyre and Jerusalem in 335 A. D., soon after which Arius returned to Alexandria, where his presence created such a disturbance that he was under the necessity of retiring to Constantinople. He suddenly died in 336 A. D. Arianism was supported as the state religion by the emperor Constantine and by Valens. The Goths, Vandals, Suevi, and Longobardians of the fifth, sixth, and seventh centuries were mostly Arians. After the reunion of the Longobardians with the Catholic Church (662), Arianism as a sect soon ceased to exist. The followers of Arius were sometimes called Eusebians, from Eusebius, bishop of Berytus and Nicomedia. They became divided into two portions—the "Hetero-ousians" (strict or ultra-Arians), and "Homoiousians," who allowed the "similar essence" of the Son with the Father. (See J. H. NEWMAN's "The Arians of the Fourth Century," 2d ed., 1854, and STANLEY's "Eastern Church," Lectures ii.–vii.)

Arius, a genus of siluroid fishes in which the body is partially protected by strong bony plates. It has been suggested by Huxley that the ancient placoderm fishes (*Pterichthys* and *Coccosteus*) may have modern representatives in the plated siluroids, such as *Arius*, *Clarias*, etc.

Arizo'na, a south-western Territory of the U. S. (see map of Ariz., Cal., New Mex., Utah, and Nev., in article "California"), between lat. 31° 20′ and 37° N., and lon. 109° and 114° 35′ W. Bounded by Nevada and Utah on the N., New Mexico on the E., Mexico on the S., California and Nevada on the W. Area, 113,020 square miles, 72,332,800 acres, which is about equal to that of N. Y., N. J., Penn., Del., and Md. combined.

Topography.—Surface generally elevated, and composed of wide plateaus, descending gradually from 7500 feet above the sea in the N. to 80 or 100 feet in the S. These plateaus are crossed by ranges of mountains with towering peaks rising to the height of 12,000 or 14,000 feet. They are riven by streams and rivers which have cut for themselves beds varying from 1000 to 6000 feet below the surface. The mountains have many local names; the longer and more important ranges are the Mogollon and Zuni Mountains in the E., the Pinaleno and Santa Catarina in the S. E., the Santa Aña and the Dragon Mountains in the S., the Gila range, the Black Mesa, and the San Francisco Mountains in the centre, the Gerbat and Black Mountains in the W., and the great mass rising above the Colorado plateau, the Northside Mountains, in the N. W. The San Francisco Mountains seem to have been a group of volcanoes, none of them now active; but centuries ago they poured out immense streams of lava, which flowed northward to the banks of the Colorado Chiquito. Extensive *mesas*, or table-lands, rise above the plains, with perpendicular sides, often 1000 feet or more in height. The whole of Arizona is drained by the Colorado River and its tributaries. It is the most remarkable river in the world. Its own course in Arizona for 400 miles is through the Grand Cañon, from 5000 feet to 400 feet below the surface of the plateau, and its actual fall in the 400 miles is over 3000 feet. Nearly all its affluents, and particularly the San Juan, Little Colorado, Zuni, Salt, and Upper Gila rivers, pass through similar, and perhaps deeper, cañons. These cañons are among the greatest wonders of the world. It is said they expose to view geological strata of all the formations in their regular places to the thickness of 25,000 feet. The Colorado is navigable for about 550 miles.

Minerals.—Gold, silver, platinum, quicksilver, copper, tin, lead, nickel, iron-ores of all sorts, bituminous coal, and perhaps anthracite, salt, sulphur, gypsum, loadstones, opals, garnets, sapphires, chalcedony. Many gold and silver-mines had been worked by the Spaniards and Mexicans successfully for years before the Territory came into possession of the U. S., and they are still largely productive.

Soil and Vegetation.—The lava-covered and granitic sides of the mountains are sterile. Aside from these, the soil is fertile where irrigation is possible, and yields large crops; elsewhere it is dry and barren. There are forests, generally of pine and spruce, in the mountains, but protracted drought kills many of the trees. Wherever there is water, flowers and shrubs are profuse and beautiful. On the dry and hot plains, mimosas and cacti of many forms are the only vegetation.

Zoology.—The buffalo and elk are found, though not abundant; two species of deer, antelopes, the big-horn, wild horses or mustangs, pumas, jaguars, ocelots, black and cinnamon bears, wildcats, lynxes, the red or gray wolves, the true coyotes, foxes, raccoons, opossums, and skunks are more numerous. Birds of prey, game-birds, and birds of fine plumage abound.

Climate.—In the mountains and on the plateaus, a warm but healthy and very uniform temperature. At Prescott, lat. 34° 29′, the mean of the year 65.49° F.; summer mean, 84°; only two days above 100°. In Southern Arizona very hot and dry. Yuma (lat. 32° 43′, but low) had, in 1877, 106 days of summer above 100° F., 30 days above 108°, and 12 days above 110°; the maximum is 126° F. Tucson is not quite so hot; only 51 days were above 100°. But the whole Gila valley is very hot, yet the air is dry and invigorating, and sunstrokes are rare. The lack of rain is very general. Yuma has but 2 or 3 inches in the year, Prescott about 10 inches, and Tucson not over 6 or 7. Most of the rain comes in July and August, though at long intervals there is rain in December and January.

Industries.—Mining is the most important of these. Gold is found, both in placers and in quartz-lodes, at various points, and the latter are often very rich; silver in galena, and combined with both lead and copper as sulphides and carbonates; copper as gray sulphuret; quicksilver as cinnabar, etc.; platinum and nickel nearly pure; iron in all kinds of ores, and coal where it is easily accessible. The mines of both gold and silver are very numerous in Southern Arizona, near and below the Southern Pacific R. R.; copper, gold, some silver and iron, as well as the other metals, in Central and Western Arizona, between lat. 33° and 35°. In both sections the scarcity of wood and water renders mining very expensive. The estimated value of products of gold and silver for 1880 was $2,537,790. There are good pasturage-lands in Central Arizona and in Apache co. in the N. E., where the Navajo Indians keep a great many sheep. The irrigable lands yield under irrigation immense grain- and root-crops, and the semi-tropical fruits are plentiful.

Agricultural Productions.—The census of 1880 reports 239,051 bushels of barley, 136,427 of wheat, 34,746 of Indian corn, 564 of oats, and 313,698 lbs. of wool.

*Farm Animals.**—In 1880, 6798 horses, 891 mules and asses, 44,983 cattle, 76,524 sheep, and 3819 swine.

Manufactures.—In 1880 there were 66 manufacturing establishments, employing 220 hands; capital, $272,600; value of products, $618,365.

Finances.—The assessed valuation was, in 1880, real estate, $3,922,961; personal, $5,347,253; total, $9,270,214. The net debt was $377,501. Total taxation, $293,096.

Railroads.—The Southern Pacific crosses Arizona from W. to E. between the 32d and 33d parallels. Another crosses from E. to W. near the 35th parallel, and one or two others are projected. Silver-, copper-, lead-, and iron-ores, wheat, and cattle are the principal freights.

Education.—Arizona in 1880 had 101 public schools, with 4212 pupils; expenditure for the year, $61,172.

Pop., 1880.—(White and colored except tribal Indians) 40,440, including 3493 Indians, 1630 Chinese, 2 Japanese.

COUNTIES.	† Ref.	Pop. 1870.	Pop. 1880.	COUNTY TOWNS.	Pop. 1880.
Apache	5–H	......	5,283	St. John's	546
‡Cochise	8–H	......	....	Tombstone	973
‡Gila	7–H	......	....	Globe.	704
‡Graham	7–H	......	....	Solomonsville	175
Maricopa	7–G	.....	5,689	Phœnix	1,708
Mohave	5–F	179	1,190	Mineral Park	318
Pima	8–G	5,716	17,006	Tucson	7,007
Pinal	7–G	......	3,044	Florence	902
Yavapai	6–G	2,142	5,013	Prescott	1,836
Yuma	7–F	1,621	3,215	Yuma	1,200
Total		9,658	40,440		

The number of tribal Indians in 1879 was 21,092. These are of various tribes, the Apaches, the most turbulent and treacherous, numbering about 5000, the more peaceful tribes about 13,000, and the Moquis about 1800. The last are of a different race from the others, probably Aztec; they live in villages, and have many manufactures and a civilization of their own. Their religious rites are very interesting.

History.—Indian tribes originally Aztec or Toltec; these occupied the country long, and reared walled towns, of which there are now ruins; mostly dispossessed by more northern tribes; Spaniards and Jesuit missionaries here before 1600, and established many settlements in the seventeenth century. Arizona, as well as New Mexico, belonged to Mexico till 1848, when all N. of the Gila was ceded to the U. S.; the Gadsden Purchase made in 1853; Arizona made a separate Territory in Feb., 1863.

Governors.

John A. Gurley	1862–63	John P. Hoyt	1877–78
John N. Goodwin	1863–66	John C. Fremont	1878–82
Rich. C. McCormick	1866–69	Frederick A. Tritle	1882–85
A. P. K. Safford	1869–76	C. Meyer Zulick	1885–
Charles E. G. French	1876–77		

L. P. BROCKETT.

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* On farms only.

† Reference for location of counties. See map of Ariz., Cal., New Mex., Utah, and Nev., in article CALIFORNIA.

‡ Organized since census of 1880.

Arjish′, a river of European Turkey, rises in the East Carpathian Mountains, flows south-eastward through Wallachia, and enters the Danube 42 miles S. S. E. of Bucharest. Length, estimated at 175 miles.

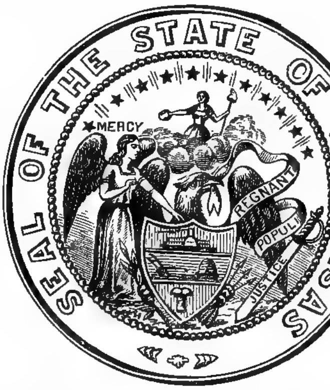
Arjish-Dagh. See ARGÆUS, MOUNT.

Ark [Lat. *ar′ca*], a chest, a coffer, a large vessel. The term is principally used in a scriptural signification.

ARK OF THE COVENANT [Heb. *aron;* Gr. κιβωτός]. This ark, together with the mercy-seat, was especially invested with sacredness and mystery by the ancient Jews. It is said to have been an oblong chest two and a half cubits long by one and a half broad and deep, overlaid within and without with gold, and supporting upon its lid the mercy-seat, with the cherubims. Its principal purpose or use was to contain inviolate the tables of stone upon which were written that "covenant" from which it derived its title. It was also the receptacle for the pot of manna and the rod of Aaron. It occupied the most holy spot (the "Holy of Holies") of the whole sanctuary, and thus excluded any idol from the centre of worship. (See Exodus xxv., xxxvii., xl.; also SMITH'S "Dictionary of the Bible.")

Arkadel′phia, on R. R., capital of Clark co., Ark. (see map of Arkansas, ref. 4–B, for location of county). It is situated at the head of steam-navigation, on the right shore of Washita River, 65 miles S. W. of Little Rock, has water-power, an active trade, is the seat of a State normal school, and was, during the first two years of the late civil war, a principal military dépôt for the States of Arkansas, Missouri, and Louisiana. On Feb. 15, 1863, a skirmish took place between a detachment of Union troops under Capt. Brown and a party of Confederates, in which the latter were defeated. Pop. in 1870, 948; in 1880, 1506.

Arkansas, a river of the U. S., next to the Missouri the longest affluent of the Mississippi, rises in the Rocky Mountains and in the W. central part of Colorado. Its general direction is eastward for more than 500 miles through extensive plains, large portions of which are sterile. Having crossed the eastern boundary of Colorado into the State of Kansas, and reached nearly the 98th degree of W. longitude, it turns and flows south-eastward through Kansas and the Indian Territory to Fort Smith, on the western boundary of Arkansas; continuing thence in a south-eastern course, it traverses the State of Arkansas, which it divides into two nearly equal portions, and enters the Mississippi in lat. 33° 54′ N., lon. 91° 10′ W. The whole length is 2170 miles. It is navigable by steamers 800 miles from its mouth during nine months of the year. The difference between high and low water in this river is about twenty-five feet.



Arkansas, one of the south-western States of the Mississippi Valley, is bounded N. by Missouri, E. by Missouri and the Mississippi River, S. by Louisiana, W. by Texas and the Indian Territory. It is between 33° and 36° 30′ N lat., and 89° 40′ and 94° 42′ W. lon. Area, 53,850 square miles, about the size of England without Wales. Arkansas, by census of 1880, ranked 25 among the States in population, 21 in value of agricultural products, and 36 in value of manufactures.

Topography.—Eastern part of the State, from 30 to 100 miles W. of the Mississippi, low, with lakes, bayous, and swamps; subject to overflow, except occasional bluffs. W. of this, land rises by stages to the table-lands and hills of Ozark, Ouachita, and Black Hills, in N. W., W., and S. W. These rise 1500 to 2000 feet, and knobs 500 to 800 feet higher. The rivers are: Mississippi, eastern boundary; Arkansas, crossing diagonally; White, St. Francis, Ouachita, Red, and their affluents; 3000 miles of navigable rivers in the State.

Minerals.—Gold, argentiferous galena, zinc, copper, manganese, iron (various ores), semi-bituminous coal, lignite, marble, novaculite or oilstone, millstone, kaolin, mineral paints, salt, and remarkable hot and other mineral springs.

Soil and Vegetation.—Arkansas has much good soil and some which is not productive. The lowlands are alluvial and highly fertile. Some of the table-lands are sterile, but are covered with scattered pines. The river valleys and some of the mountain slopes have a good and productive soil and are largely covered with heavy forests. Oak, black walnut, hickory, red elm, maple, tupelo, gum trees (black and sweet), yellow poplar, American elm, white and blue ash, hornbeam, ironwood, Osage orange, red cedar, beech, pecan, sycamore, buttonwood, sassafras, persimmon, locust, wild cherry, pine, cypress, and cottonwood are the principal forest trees. Wild and cultivated fruits of all kinds abound.

Zoology.—Wild game: Bears, deer of two species, rarely the buffalo and elk, peccaries and wild hogs, rabbits or hares, several species of squirrels and other rodents; cougars or panthers rarely, wolves, foxes, raccoons, opossums, skunks, Texan coyotes. Game birds: Turkeys, ducks, partridges, quails, prairie-hens, etc.; eagles, vultures, hawks, owls, and many song-birds. The rivers, lakes, and bayous abound in fish, with an occasional alligator, serpents, and other reptiles.

Climate.—In the lowlands, mean annual temperature, 60.6°; summer mean, 81.4°; winter, average minimum, 9°; summer maximum, 98°; annual rainfall, 63.42 inches. On the table-lands (Little Rock), annual mean, 62.66°; maximum, summer, 96°; winter minimum, 4°; annual range, 92°; rainfall, 55 to 60 inches. Mountains in the W., annual mean, 60° F.; rainfall, about 58 inches. As a whole, the climate is very fine, and it has a high reputation for the cure of pulmonary diseases.

Productions.—Agricultural: Cotton, 608,256 bales in 1880; tobacco, 970,220 pounds; wheat, 1,269,715 bushels; Indian corn, 24,156,417 bushels; oats, 2,219,822 bushels; small quantities of barley, rye, and buckwheat; Irish potatoes, 402,027 bushels; sweet potatoes, 881,260 bushels; hay, 23,295 tons. Value of all principal crops, about $88,000,000. Live-stock: Horses and mules, 233,415; neat-cattle, including milch-cows, 708,243; sheep, 236,757; swine, 1,565,098; total value of live-stock, $20,472,425.

Manufactures.—Principally of cotton, seed-oil, flour and meal, lumber, leather, cotton and woollen goods, wagons, tobacco and segars, and hones of novaculite; amount moderate, but increasing. In 1880 there were 1202 manufactories; capital, $2,953,130; average number of hands employed, 4557; wages paid, $925,358; value of products, $6,756,159.

Railroads.—There were 948 miles in operation in 1880, and about 200 more projected. The railway system of the State connects with the Texas and Southern Pacific lines.

Finances.—The State debt, net, in 1880, was $4,039,737; local debt, net, $3,899,047; total debt, State and local, net, $7,938,784. The assessed valuation in 1880 was: Real estate, $55,760,388; personal, $30,648,976; total, $86,409,364; total taxation, State, county, and local, $1,839,090. The valuation of the State is increasing. Its commerce is wholly internal, having no ports of entry.

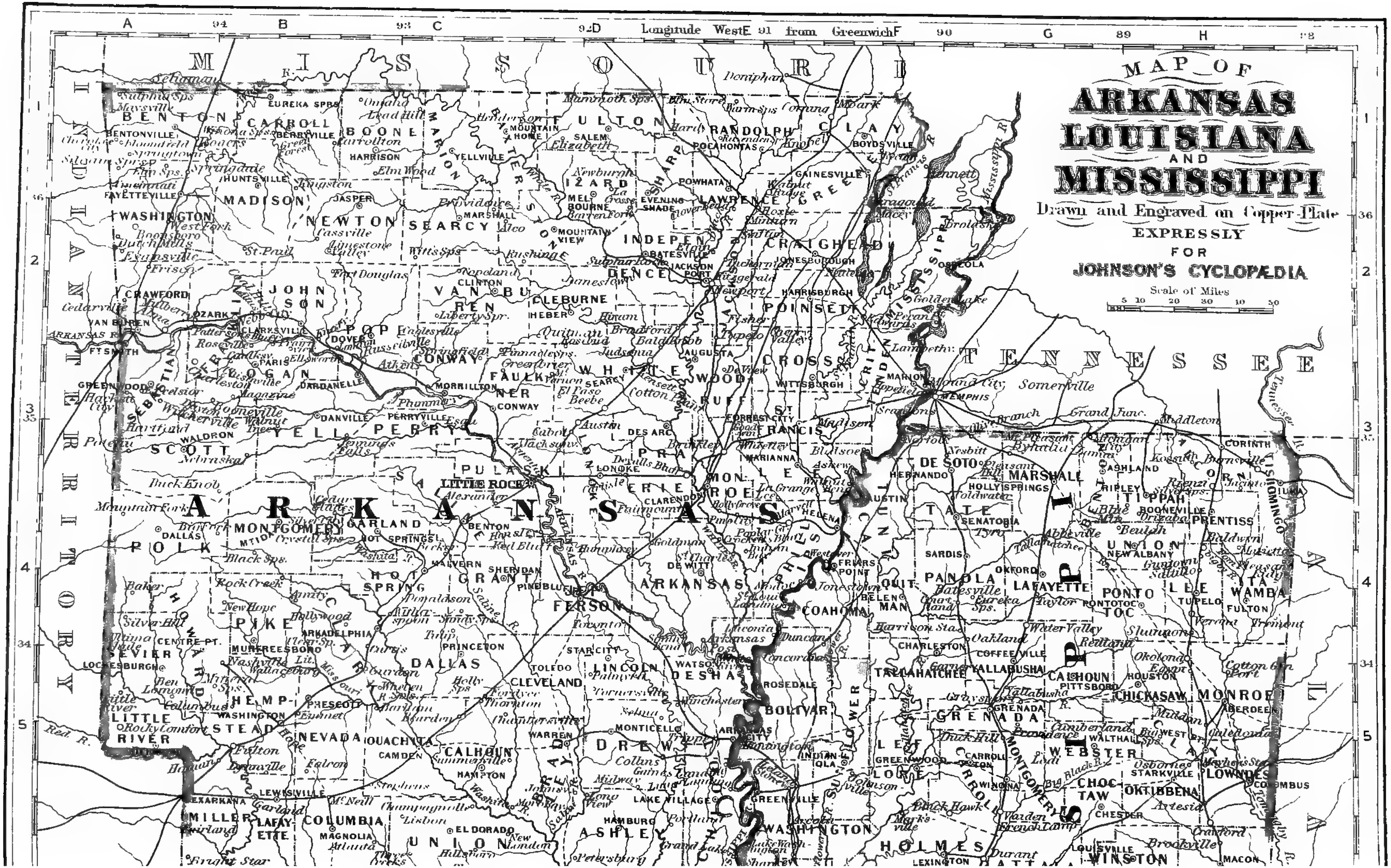
Education.—Population of school age 1879 (six to twenty-one years), 236,601; enrolled in public schools, 53,049; number of schoolhouses, 708; value, $151,565; number of teachers, 1458; average monthly pay of men, $50; of women, $40; receipts for public schools, $261,088; expenditure, $205,449; amount of available school fund, $136,070. There are normal departments in connection, with colleges at Fayetteville, Pine Bluff, Judsonia, and Little Rock. There are five universities and colleges, with 20 instructors, 908 students, and $145,000 property. There was also one school of science, with 59 students, and one of medicine, with 15 teachers and 32 students. In 1880 there were 2768 public schools in Arkansas, with 108,236 pupils; expenditures for the year, $382,637.

Newspapers and Periodicals.—The number of these in 1880 was 117, of which 6 were dailies; the total circulation per issue was 103,501.

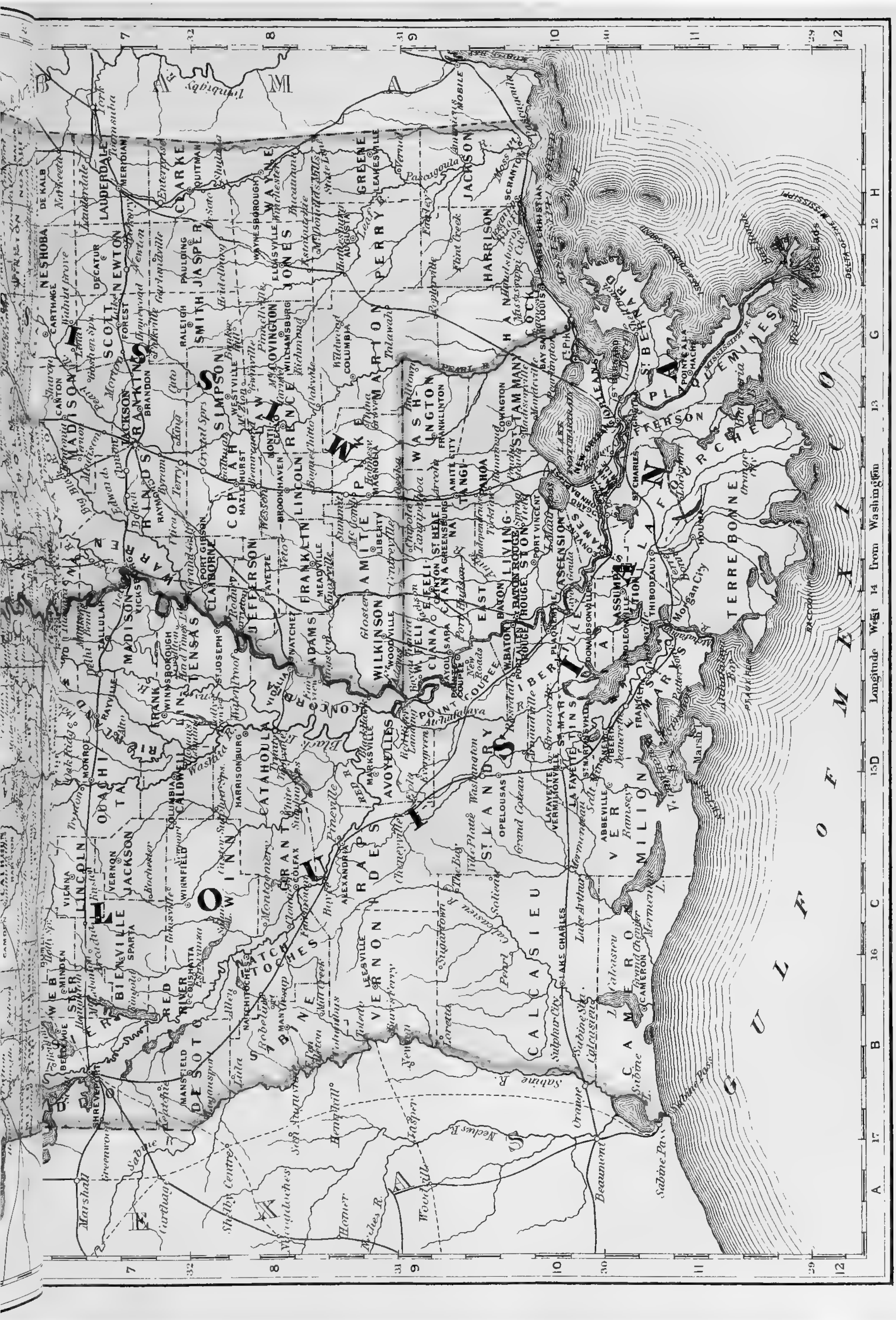
Churches.—The Methodist and Baptist denominations are the most numerous, and, taking the various organizations of each, are of about equal numbers, having between 750 and 800 churches, and from 54,000 to 56,000 members each. The others, in the order named, were Presbyterians, Union, Episcopals, Roman Catholics, Lutherans, etc.

Population.—In 1870, Arkansas had 484,471 inhabitants; in 1880, 802,525 (white 591,531, colored 210,994, including 195 Indians and 133 Chinese). The counties and county towns, with population of each, are as below.

Principal Towns and Population in 1880.—Little Rock, capital, 13,138; Eureka Springs, 3984; Helena, 3652; Hot Springs, 3554; Pine Bluff, 3203; Fayetteville, 1788; Arkadelphia, 1506; Camden, 1503; Batesville, 1264; Prescott, 1253; Hope, 1233; Van Buren, 1029; Conway, 1028.



MAP OF
ARKANSAS
LOUISIANA
AND
MISSISSIPPI
Drawn and Engraved on Copper-Plate
EXPRESSLY
FOR
JOHNSON'S CYCLOPÆDIA
Scale of Miles
5 10 20 30 40 50
Longitude West 91 from Greenwich
M I S S O U R I
INDIAN TERRITORY
T E N N E S S E E
A L A
A R K A N S A S
M I S S I S S I P P I
LITTLE ROCK
MEMPHIS
Arkansas R.
Mississippi R.
Red R.
Tennessee R.


LOUISIANA
GULF OF MEXICO
TEXAS
Longitude West 14 from Washington
NEW ORLEANS
BATON ROUGE
SHREVEPORT
ALEXANDRIA
MONROE
LAKE CHARLES
NATCHEZ
VICKSBURG
JACKSON
MERIDIAN
MOBILE
Beaumont
Sabine Pass
Marshall

COUNTIES.	* Ref.	Pop. 1870.	Pop. 1880.	COUNTY TOWNS.	Pop. 1880.
Arkansas	4–E	8,268	8,038	Dewitt	169
Ashley	6–D	8,042	10,156	Hamburgh	747
Baxter	1–C	....	6,004	Mountain Home	137
Benton	1–A	13,831	20,328	Bentonville	696
Boone	1–C	7,032	12,146	Harrison	582
Bradley	5–D	8,646	6,285	Warren.	
Calhoun	5–C	3,853	5,671	Hampton	150
Carroll	1–B	5,780	13,337	Berryville Eureka Spgs.	253 3,984
Chicot	5–E	7,214	10,117	Lake Village.	
Clark	4–B	11,953	15,771	Arkadelphia	1,506
Clay	1–F	....	7,213	Corning	393
† Cleburne	2–D	....	....	Heber.	
Cleveland	5–D	....	8,370	Toledo	143
Columbia	6–B	11,397	14,090	Magnolia	536
Conway	3–C	8,112	12,755	Morrillton	770
Craighead	2–E	4,577	7,037	Jonesborough.	
Crawford	2–A	8,957	14,740	Van Buren	1,029
Crittenden	3–F	3,831	9,415	Marion	199
Cross	2–E	3,915	5,050	Wittsburg	209
Dallas	5–C	5,507	6,505	Princeton	205
Desha	5–E	6,125	8,973	Arkansas City Watson.	503
Drew	5–D	9,960	12,231	Monticello	891
Faulkner	3–D	....	12,786	Conway	1,028
Franklin	2–A	9,627	14,951	Ozark	824
Fulton	1–D	4,843	6,720	Salem	86
Garland	4–C	....	9,023	Hot Springs	3,554
Grant	4–C	3,943	6,185	Sheridan	42
Greene	1–F	7,573	7,480	Paragould.	
Hempstead	5–B	13,768	19,015	Washington	730
Hot Spring	4–C	5,877	7,775	Malvern.	
Howard	4–A	....	9,917	Centre Point	316
Independence	2–E	14,566	18,086	Batesville	1,264
Izard	1–D	6,806	10,857	Melbourne	149
Jackson	2–E	7,268	10,877	Jacksonport	656
Jefferson	4–D	15,733	22,386	Pine Bluff	3,203
Johnson	2–B	9,152	11,565	Clarksville	656
Lafayette	6–B	9,139	5,730	Lewisville	301
Lawrence	1–E	5,981	8,782	Powhatan	196
Lee	3–E	....	13,288	Marianna	627
Lincoln	5–D	....	9,255	Star City.	
Little River	5–A	3,236	6,404	Richmond	150
Logan	3–B	....	14,885	Paris.	
Lonoke	3–D	....	12,146	Lonoke	659
Madison	2–B	8,231	11,455	Huntsville	312
Marion	1–C	3,979	7,907	Yellville	345
Miller	5–B	....	9,919	Texarkana	3,223
Mississippi	2–F	3,633	7,332	Osceola	317
Monroe	3–E	8,336	9,574	Clarendon	400
Montgomery	4–B	2,984	5,729	Mount Ida	60
Nevada	5–B	....	12,959	Prescott	1,253
Newton	2–B	4,374	6,120	Jasper	91
Ouachita	5–C	12,975	11,758	Camden	1,503
Perry	3–C	2,685	3,872	Perryville	256
Phillips	4–E	15,372	21,262	Helena	3,652
Pike	4–B	3,788	6,345	Murfreesboro'	84
Poinsett	2–E	1,720	2,192	Harrisburgh.	
Polk	4–A	3,376	5,857	Dallas	176
Pope	2–C	8,366	14,322	Dover	368
Prairie	3–D	5,604	8,435	Des Arc	548
Pulaski	3–C	32,066	32,616	Little Rock	13,138
Randolph	1–E	7,466	11,724	Pocahontas	325
Saline	4–C	3,911	8,953	Benton	452
Scott	3–A	7,483	9,174	Waldron	239
Searcy	2–C	5,614	7,278	Marshall	160
Sebastian	2–A	12,940	19,560	Ft. Smith Greenwood	3,099 204
Sevier	5–A	4,492	6,192	Lockesburgh	256
Sharp	1–D	5,400	9,047	Evening Shade	286
Stone	2–D	....	5,089	Mountain View.	99
St. Francis	3–E	6,714	8,389	Forrest City	903
Union	6–C	10,571	13,419	El Dorado	443
Van Buren	2–C	5,107	9,565	Clinton	166
Washington	2–A	17,266	23,844	Fayetteville	1,788
White	3–D	10,347	17,794	Searcy	840
Woodruff	3–E	6,891	8,646	Augusta	702
Yell	3–B	8,048	13,852	Danville Dardanelle	200 748
Total		484,471	802,525		

History.—First settled in 1670 by the French, near St. Francis River; part of Louisiana Territory in 1803, of Missouri Territory in 1812, and of Arkansas Territory in 1819; organized as a State in 1836, Indian Territory being set off; its growth at first slow—only 97,500 inhabitants in 1840, less than 210,000 in 1850; large increase from Southern immigration in 1850–60. Settled almost exclusively from the Southern States, its population were very thoroughly identified with the maintenance of slavery, and it entered heartily into the secession movement. The State convention assembled at Little Rock and passed the ordinance of secession Mar. 4, 1861. Arkansas was overrun by both armies several times 1861–63; controlled by Federal troops after Dec., 1863; a new constitution adopted Mar. 18, 1864, but not accepted by Congress, and the State for four years under military control; another constitution adopted Mar. 13, 1868, and Congress restored the State to the Union June 22, 1868.

Governors.

TERRITORIAL.

James Miller.	1819-25
George Izard	1825–29
John Pope	1829–35
William S. Fulton	1835–36

STATE.

James S. Conway	1836–40
Archibald Yell	1840–44
Saml. Adams (acting)	1844
Thomas S. Drew	1844–48
John S. Roane	1848–52
Elias N. Conway	1852–60
Henry M. Rector	1860–64
Isaac Murphy	1864–68
Powell Clayton	1868–71
Ozro A. Hadley (actg.)	1871–72
Elisha Baxter	1872–75
Augustus H. Garland	1875–77
William R. Miller	1877–81
Thomas J. Churchill	1881–83
James H. Berry	1883–85
Simon P. Hughes	1885–87

L. P. BROCKETT.

Arkansas City, on R. R. and Mississippi River, capital of Desha co., Ark. (see map of Arkansas, ref. 5–E, for location of county). Pop. in 1880, 503.

Arkansas City, on R. R. and the southern border of Kansas, in Cowley co. (see map of Kansas, ref. 8–H, for location of county), is at the confluence of the Arkansas and Walnut rivers. Pop. in 1880, 1012; in 1885, 3328.

Arkan'sas In'dians, now generally called **Quapaws,** a tribe allied by language to the Dakotas.

Arkansas Post, a post-village of Arkansas co., Ark. (see map of Arkansas, ref. 4–E, for location of county), on the left bank of the Arkansas River, 50 miles from its mouth, settled by the French in 1685. During the civil war this post was garrisoned and fortified by the Confederates. On Jan. 11, 1863, a combined attack of the U. S. military and naval forces under General McClernand and Admiral Porter was made upon the place, and its works were finally carried by storm. Pop. in 1880, 37.

Arkansas Stone, a material largely employed for hones and oil-stones, consists of novaculite, which is quarried extensively in Hot Spring and Grant counties, Ark.

Arkansaw, Wis. See APPENDIX.

Ark'ansite, a name given to the thick black crystals of brookite (titanic acid) found at Magnet Cove in the Ozark Mountains of Arkansas.

Arko'na, or **Arcona,** a promontory on the N. side of the Prussian island of Rügen, in the Baltic. Here is a lighthouse on the site of the heathen temple of Swantewit, which King Waldemar of Denmark burned in 1168.

Ar'kose, a rock composed of fragments of feldspar; a kind of feldspathic sandstone.

Arkwright (Sir RICHARD), an English inventor, was born at Preston, in Lancashire, Dec. 23, 1732. He learned the trade of a barber, which he soon abandoned, and applied himself to the invention of machinery for spinning cotton. At that time no machine could produce cotton yarn fit for warp. In 1768 he set up at Preston his first spinning-frame, for which he obtained a patent in 1769. He removed to Nottingham in 1769, and formed a partnership with Need and Strutt. His machine caused a great extension of the cotton manufacture and greatly promoted the prosperity of the nation, and he may be called the founder of the factory system. He was knighted by George III. in 1786. Died Aug. 3, 1792. (See BAINES, "History of the Cotton Manufacture in Great Britain," 1835.)

Arlberg, a railway-station on the frontier between Tyrol (Austria) and the Grisons (Switzerland), is situated 5400 feet above the sea. At an elevation of 4030 feet a tunnel was built (1880–84) 10,270 mètres long.

Arles (anc. *Ar'elas, Arela'te,* or *Arela'tum*), a city of France, in the department of Bouches-du-Rhône, and on the Rhone, 15 miles from the Mediterranean. It has a cathedral of the seventh century, a museum, a college, and a public library. It was once the capital of the kingdom of Arelate. Important councils of the Church were held here in 314, 354, 452, and 475 A. D. Here are the remains of a grand Roman amphitheatre, and an ancient granite obelisk which was dug out of the Rhone about 1389. Arles has manufactures of hats, silk, brandy, etc. Pop. in 1881, 23,480.

Arlington, on R. R., Middlesex co., Mass. (see map of Massachusetts, ref. 2–H, for location of county), 7 miles N. W. of Boston. It has gas and water-works, and sends a large supply of ice to market. There are important manufactures. The principal business is market-gardening. Pop. of township, in 1870, 3261; in 1880, 4100; in 1885, 4673.

Arlington (HENRY **Bennet**), EARL OF, born in 1618, served as a royalist in the civil war (1642–45), was knighted at Bruges (1658), became secretary of state (1662), a baron (1664), a member of the "Cabal" (1667), received the Garter, and was sent as ambassador to the king of France in the same year; was impeached by the Commons, resigned, and was appointed lord chamberlain (1674). Died July 28, 1685.

Arlon (anc. *Orolaunum*), a frontier town of Belgium, capital of the province of Luxembourg, 22 miles by rail

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* Reference for location of counties. See map of Arkansas.
† Formed since census of 1880.

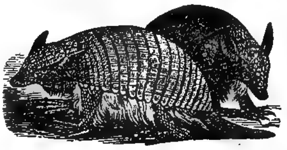
W. N. W. of Luxembourg. It has manufactures of woollen stuffs, and an active trade in grain, etc. Pop. 5779.

Arlt (Ferdinand), a distinguished German oculist, was born April 18, 1812. He wrote, among other works, "Krankheiten des Auges" (3 vols., 1851–56; 4th ed. 1867), "Pflege der Augen im gesunden und kranken Zustande" (3d ed. 1865).

Arm (the Human) consists of two portions—the arm proper and the fore arm; the former having one bone, the humerus, which moves freely upon the scapula, forming the shoulder-joint; and the latter having two bones, the radius and ulna, which move upon each other and upon the humerus, forming the elbow-joint. These connect below with the eight small bones of the carpus or wrist. The humerus is attached to the acromion process of the shoulder-blade by a ball-and-socket joint, allowing great freedom of motion; and were it not for the muscles surrounding the joint, it would be frequently dislocated, but it is supported by muscles on all sides except at the armpit, into which the head of the bone is sometimes driven. The roundness of the shoulder is due to the head of the humerus, so that displacement is generally accompanied by a flattening which suggests the nature of the accident. On the shoulder is a large muscle, the deltoid, which lifts the arm from the side. At the back is the triceps, which extends the fore arm; in front are two muscles which bend it—the biceps and the brachialis anticus; and on each side below are muscles passing to the fore arm and hand; while above the great muscle of the back (latissimus dorsi) and that of the chest (the pectoralis major) are inserted on each side of the groove, wherein lies one of the tendons of the biceps. The motions of the ulna are flexion and extension, its projections being received in these movements into corresponding depressions on the humerus. The rotatory movements of the hand are principally due to the radius, the head of which rolls upon the ulna, turning the palm downward (pronation), or upward (supination), these movements being effected by muscles which, taking their fixed points from the humerus and ulna, turn the radius upon the latter. The elbow-joint is hinge-like, and has strong lateral ligaments; but it is liable to dislocations, often accompanied by fracture, especially in the young. The arm affords interesting illustrations of some principles of mechanics. The insertion of the muscles so near to the fulcra or centres of motion involves a loss of power; there is, however, a corresponding gain in velocity at the end of the lever; and for most of the purposes to which the hand is put agility is of far greater moment than dead strength. The arm is supplied with blood by the brachial artery, the continuation of the axillary. The superficial veins collect into large trunks, which unite at the bend of the elbow, and then pass to the axillary—on the outside by the cephalic vein, on the inside by the basilic. The nerves pass from the brachial plexus by the side of the artery, and diverge from it to their ultimate distribution; the musculo-spiral passing back to appear on the outside, and giving off the radial and posterior interosseous nerves; the ulnar running behind the internal condyle, for which it has obtained the name of "crazy bone," from the electric-like thrill which passes along the arm when the nerve is struck. The median, as its name implies, keeps a middle course with the artery. In wounds of the fore arm the bleeding may be controlled by pressure of the brachial artery, on the inner side of the biceps, against the bone. Much interest is also furnished by the comparison of the arm and hand of man (see Hand) with the anterior extremities of other animals. Essentially the same bones and other parts are found in the fore limb of a mole, the fore leg of a horse, the paddle of a whale, and the wing of a bird, although modified in each to suit the uses of the animal. In variety of movement and facility of prehension the arm of man far excels that of any other creature.

Revised by Willard Parker.

Arma'da, The Spanish, often called the "Invincible Armada," a great Spanish fleet or armament which was fitted out by Philip II. for the conquest of England in 1588. It consisted of about 130 vessels, some of which were of enormous size, carrying in all 2431 guns and more than 19,000 soldiers. The command of this armada was given to the duke of Medina Sidonia, who was not a competent naval commander. Lord Howard of Effingham commanded the English fleet, which was greatly inferior in size. Among his subordinates were some of the best naval-officers of the time, such as Drake, Hawkins, and Frobisher. The armada sailed from Spain about the end of May, 1588, and in passing through the English Channel was harassed by the English, who avoided a general engagement. During a night in August, Lord Howard sent eight fire-ships against the armada, and produced a panic and great disorder, in consequence of which the English captured or destroyed about twelve ships early the next morning. This defeat induced the Spanish admiral to abandon the invasion of England, and he resolved to return to Spain by sailing around the Orkney Islands, the passage of the English Channel being closed by the enemy. Many of the Spanish ships were wrecked on their circuitous voyage, and only fifty-three returned to Spain.



Armadillos.

Armadil'lo (*i. e.* in Spanish, the "little [animal] in armor"), (the *Dasypus* of the naturalists), a genus of animals of the order Edentata, natives of South and Central America. They derive their name from a bony armor which covers the body, and consists of zone-like pieces united to form solid bucklers, one over the rump, one piece over the shoulders, and between them a dorsal cloak consisting of a number of plates disposed in transverse bands, which are movable and allow freedom of motion. The head is protected by a similar buckler, not connected with that of the body. The largest species is about three feet long, exclusive of the tail. They have short legs and feet adapted to burrowing in the ground, in which, when pursued by enemies, they bury themselves quickly. These animals are nocturnal, and feed on insects, carrion, and vegetable food. Their flesh is often eaten by the natives, but, owing to its rank and strong flavor, it is not agreeable to European palates. The *Glyptodon* is an extinct and gigantic kind of armadillo.

Armaged'don ["mount of Megiddo"], the Plain of Esdraelon, the great battlefield of the Old Testament; used figuratively in Rev. xvi. 16.

Ar'magh, an inland county of Ireland, in Ulster, is bounded on the N. by Lough Neagh, on the E. by Down, on the S. by Louth, and on the W. by Monaghan and Tyrone. Area, 512 square miles. The surface is undulating or level, except the S. W. part, where Slieve Gullion rises to the height of 1893 feet. The soil is mostly fertile. The chief rivers are the Bann, Blackwater, and Callan. Granite, trap, carboniferous limestone, and lower Silurian rocks underlie the county. Capital, Armagh. Pop. of the county in 1881, 162,823.

Armagh (*Ard-magha*, the "high field"), a city of Ireland, capital of the above county, is situated on high ground 36 miles by rail S. W. of Belfast. It is built of limestone quarried in the vicinity, and has a Protestant cathedral of red sandstone crowning the central eminence, down the sides of which the streets diverge. Armagh is the archiepiscopal seat of the primate and metropolitan of all Ireland, both in the Anglican and Roman Catholic churches. It has a Roman Catholic cathedral, a college, a large public library, a famous astronomical observatory, and a lunatic asylum. It was the capital of Ireland in the sixth and seventh centuries, and was renowned as a school of theology, etc. On account of the Danish incursions and the English conquest and wars it fell into decay, but is now one of the best-built cities in Ireland. Pop. 8952.

Armagnac, a former name of a region in France, now comprised in Gers and parts of Haut-Garonne, Tarn-et-Garonne, and Lot-et-Garonne. Its ancient counts were feudal to the crown of France until the time of Henry IV., who united it in his own person to the crown. In later times the title of count of Armagnac was an honorary one.

Armagnac, d' (Bernard), Count, constable of France, was an ambitious and turbulent nobleman. He became in 1407 the enemy of the duke of Burgundy and the chief of the faction called "Armagnacs," who waged a civil war against the Burgundians. In 1415 he obtained the office of constable of France, the highest in the nation. Having excited by his tyranny the odium of the Parisians, he was killed by the populace June 12, 1418.

Armagnac, d' (Jean V.), Count, a grandson of Bernard, noticed above, was born about 1420. He was notorious for his crimes, and was excommunicated by the pope. As a party to the League of Public Good, he revolted against Louis XI. in 1465. He was put to death by order of that king Mar. 5, 1473.

Armand (Charles), Marquis de la Rouarie, a French officer, born in 1756, fought for the U. S. 1777–83. He rose to the rank of general of brigade. Died in France Jan. 30, 1793.

Arman'di (Pierre Damien), an officer of the French army, was born in Italy in 1778. He served as colonel under Napoleon I. In 1848–49 he fought for the Italian patriots against Austria. He wrote in French an able "Military History of Elephants" (1843). Died in 1855.

Ar'mansperg', von (Joseph Ludwig), Count, an able German statesman, born in Bavaria in 1787. He became a leader of the liberal party, Bavarian minister of finance in 1826, and minister of foreign affairs in 1828. By the influence of the Catholic priests he was removed from office in 1831. From Jan., 1833, to Feb., 1837, he governed Greece as regent or chief minister under King Otho, who was a minor. Died in 1853.

Armato'li, or **Ar'matoles,** a body of Greek militia organized about 1500 A. D., or earlier. They lived and operated in mountainous regions that were difficult of access, and were very tenacious of their independence. They were employed by the Turkish sultan to protect the fertile plains from the raids of the *klephts* (mountain-robbers) of Thessaly. Northern Greece was divided into about sixteen districts, each of which was placed under the supervision of an armatol. In the war of Greek independence the armatoles fought against the Turks, and distinguished themselves by daring exploits.

Ar'mature [from the Lat. *armatu'ra,* "armor"], a piece of soft iron which is placed in contact with the poles of an artificial magnet to preserve its magnetic power. If a magnet remains long idle, having no object on which to exert its attractive force, it loses part of its strength. The armature when placed against the poles of a magnet becomes itself a magnet, the north pole of which is in contact with the south pole of the horseshoe magnet. A larger weight can be suspended from the armature, thus placed, than the poles of the other magnet can sustain without an armature.

Arme'nia [Turk. *Erminee'yeh*], an important country of Western Asia which has now no political existence, but is historically very interesting as the original seat of an ancient civilized people (Armenians), who have preserved their nationality to the present time. Armenia, the boundaries of which varied in different periods, was situated between Asia Minor and the Caspian Sea. It was mostly included between lat. 37° and 42° N., and between lon. 36° and 49° E. It was divided into Armenia Major and Armenia Minor, the former of which was bounded on the N. E. by the river Kur, on the E. by the Caspian Sea, and on the W. partly by the Euphrates. The Lesser Armenia was situated on the western side of the other. This country is an elevated table-land, enclosed on several sides by the ranges of Taurus and Anti-Taurus, and partly occupied by other mountains, the highest of which is the volcanic peak of Ararat. It is drained by the Euphrates and Tigris, which rise within its limits, and traversed by the river Aras (Araxes). Among its physical features are the large lakes of Van and Sevan, the former of which is saline. It abounds in romantic mountain-scenery. The chief towns of ancient Armenia were Artaxata, Anni, and Tigranocerta. The Armenians call themselves *Haiks,* or *Haikans,* a name derived from Haik or Haig, represented as the first king of Armenia and a descendant of Japhet. Among the most famous of their ancient kings was Dikran or Tigranes, who lived about 550 B. C., and was a friend and ally of Cyrus the Great. The kingdom was conquered by Alexander the Great in 325 B. C., and recovered its independence about 190 B. C. It was afterwards ruled by the Parthian Arsacidæ, among whom was Tigranes the Great, a son-in-law of Mithridates, king of Pontus. He waged war against the Romans, and was defeated about 63 B. C. The Armenians adopted the Christian religion about 300 A. D., and still adhere to that faith. Since the Christian era this country has been the subject and scene of many bloody contests between the Romans, Persians, Byzantine Greeks, Saracens, Turks, etc., who have successively been masters of it. It is now divided between Russia, Persia, and Turkey. The scourge of war and persecution for religious opinions drove great numbers of the Armenians from their native land, and they are now dispersed in various parts of Europe and Asia Minor. The number of Armenians is estimated at from 2,500,000 to 4,000,000, of whom about 1,000,000 live in Armenia. The climate of Armenia is very cold in the highlands, while the summer heat of the valleys is intense. Here is a variety of soils, some of which in the valleys produce good crops of cotton, rice, tobacco, and grapes. Grazing and cattle-breeding are more extensively followed than agriculture. Among its mineral resources are copper, iron, lead, alum, and salt. The chief modern towns are Erivan, Erzroom, and Van. The Armenians (who are now only a small minority of the population, which is about 4,500,000), are physically a fine variety of the Indo-European race. They have excellent talents for business, and are especially skilful in banking and mercantile pursuits. (See St.-Martin, "Mémoire historique et géographique sur l'Arménie," 1818; Curzon, "Armenia," 1854; Strecker, "Beiträge zur Geographie von Hoch-Armenien," 1869.) A. J. Schem.

Armenian Church. Christianity is said to have been introduced into Armenia by the apostle Thaddeus. It became, through the influence of Gregory the Illuminator, the established religion of the state in 289. King Tiridates was baptized in 289, and Gregory the Illuminator made "hierarch" in 302. Political troubles prevented the Armenian Church from taking part in the Council at Chalcedon (451). Hence a misunderstanding, which led the Armenians to set up a separate communion in 491, without ever having become really monophysitic. Among their greatest divines was Nerses of Klah (about 1150), whose works have been repeatedly published. The head of the Armenian Church, called catholicos, resides near Erivan, the capital of Russian Armenia, to which place every Armenian is required to make a pilgrimage once in his life. The Armenians believe in the worship of saints, but not in purgatory, and are especially rigid in the observance of fasts. A small portion of the Armenians in Turkey, Persia, Austria, and Russia have recognized the supremacy of the pope, and are called United or Roman Catholic Armenians; they date from 1316–34. Of late a split has taken place among the United Armenians of Turkey, on account of the changes which the pope made in the ancient constitution of their Church. They were excommunicated by the pope, and in 1872 entered into official communication with the Old Catholics of Germany. The whole number of Armenians is supposed to be about 4,000,000, more than half in Turkey. In 1830 a very successful Protestant mission among the Armenians was organized by the American Board of Commissioners of Foreign Missions. (See "Life and Times of S. Gregory the Illuminator," translated by Rev. S. C. Malan, London, 1868; Hamachod, "Chronological Succession of Armenian Patriarchs," 1865; "The Divine Liturgy of the Armenian Church," translated by S. C. Malan.)

Revised by R. D. Hitchcock.

Armenian Language and Literature. The Armenian language is a branch of the Indo-European stock, and, according to Fr. Müller, belongs to the Iranian group. The old Armenian, the language of the classic literature, is now extinct, and has been supplanted not only as conversational language, but even in literature, by the modern Armenian, which is mixed with many Turkish elements, and is divided into four principal dialects. The Armenian language has its own alphabet, introduced by Miesrob in 406, and containing thirty-six letters. Grammars of the Armenian language have been published by Petermann (1837; an abridgment of it in 1841) and Lauer (1869); dictionaries by Aucher (1821, Armenian and English) and Tchaktchak (1837, Armenian and Italian).

Except a few old songs or ballads, no remains of the literature of Armenia exist of a date earlier than the introduction of Christianity into that country. After this event, however, the Greek language and literature became favorite objects of study, and the works of many Greek authors were translated into Armenian. The most flourishing period of Armenian literature extended from the fourth to the fourteenth century. The Armenian Bible, translated from the Septuagint version by Miesrob and his scholars (411 A. D.), is a model of classic style. The theological writers and chroniclers of this era are considered, both in adherence to facts and good taste, superior to the general order of Oriental historians. (See Neumann, "Gesch. der armen. Literatur," 1836.)

Armentières, a town of France, in the department of Nord, on the river Lys, 12 miles by rail N. W. of Lille. It has manufactures of cotton, linen, lace, and sailcloth. Pop. in 1881, 25,089.

Arm'felt (Gustaf Mauritz), a Swedish general and courtier, born in the province of Abo in 1757. He became a favorite of Gustavus III., who, after he was mortally wounded by an assassin in Mar., 1792, appointed Armfelt governor of Stockholm. This appointment was nullified by the duke of Sudermania, who was the enemy of Armfelt, and acted as regent during the minority of Gustavus IV. The regent sent him on a mission to Naples, and during his absence charged him with treason, for which he was sentenced to death. When Gustavus IV. began to reign in 1799 he restored Armfelt to honor and office. He became governor-general of Finland in 1805, and commanded the army in a war against Norway in 1808. Having entered the service of Russia in 1810, he obtained several high civil offices. Died in 1814.

Armi'da, the name of a beautiful sorceress in Tasso's poem of "Jerusalem Delivered." She attempted to seduce Rinaldo and other crusaders. The former was fascinated for a time, but finally returned to the war against the infidels, and converted Armida to Christianity.

Ar'millary [from the Lat. *armil'la,* a "bracelet" or "large ring"] **Sphere,** an ancient and obsolete astronomical machine, consisted of an assemblage of rings or circles fixed together, so as to represent the principal circles of the celestial sphere in their proper relative positions. These rings were movable round the polar axis within a meridian and horizon, as in the celestial globe. The observations of Hipparchus were made by means of the armillary sphere.

Arminius, Arminianism. The name of Arminius in his native language was Jacobus Hermans, identical with Herman, the name of the hero of Germany, who destroyed the Roman legions under Varus. And as this name was transformed into Arminius by Tacitus and other Roman writers, so, in accordance with the custom of the age when Latin was the language of current literature, this name was Latinized, and has come down in modern English as James Arminius. He was born in 1560 at Oudewater ("old water"), a small town in the Southern Netherlands. He lost his father in early childhood, and his mother being left in straitened circumstances, the promising intellect of the boy so attracted the attention of patrons that he was taken to school at Marburg. When fifteen years of age his native town, Oudewater, was taken by the Spaniards, and his mother, brother, and sister were all massacred, leaving him the sole survivor of his family. He was sent by his patrons to the new university at Leyden, where he remained six years. Such was his proficiency that the city of Amsterdam adopted him as her *vesterling* or foster-child, to be educated at the public expense, being bound by a written obligation to be at the command of the city through life. He studied at Geneva under Beza, as well as at Basle under Gryneas. At the latter place he was offered a doctorate, but declined the honor on account of his youth. By Beza he was commended to Amsterdam in high terms. He then went to Italy to become accomplished in philosophy under Zarabella, and having visited Rome and the other principal cities, returned to Amsterdam, where he was installed minister at the age of twenty-eight.

Arminius's ministry in Amsterdam, of fourteen years' duration, forms the second period of his life. His learning and eloquence were rapidly rendering him one of the leading theologians and preachers of his age. He was of middling size, had dark, piercing eyes, and voice light but clear, and possessing a winning mellowness. His manners were magnetic, and he had the power of fastening firm friends. He was condescending to the lowly and a sympathizing guide to the religious inquirer. At the same time he was an independent seeker and follower of truth.

In 1585, the extreme predestinarianism prevalent in the Netherlands had been for ten years so effectively attacked by Richard Coornhert, an eminent patriotic and acute layman of Amsterdam, that Arminius was invited by the city to refute him. In a debate at Delft between Coornhert and two high Calvinistic clergymen, the latter were so hard pressed that they yielded, and took the lower or sublapsarian ground, and published a pamphlet against the higher view. The extreme Calvinists called upon Martin Lydius, professor of theology in Friesland, to refute them, but he handed over the task to Arminius, who had thus a double request on his hands. He bravely undertook the task, but was soon convinced of the untenableness of either the higher or lower predestination. At the expense of an ignominious failure in even *attacking* Coornhert, he resolved to pursue the light of honest conviction. Avoiding the entire subject in public, he prosecuted his investigations with earnest study. Yet, in lecturing on Romans vii., having given the non-Calvinistic interpretation, he found himself generally assailed by the high Calvinists as a Pelagian and Socinian. He was arraigned before the ecclesiastical courts, where he successfully defended himself on the ground that, though adverse to the prevalent opinions, his interpretation contradicted nothing in the standards—namely, the Belgic Confession and the Catechism. Being questioned as to predestination, he declined to answer, as no fact was alleged against him.

In prosecuting his inquiries he determined to consult privately the best theologians of the day. He commenced a confidential correspondence with Prof. Francis Junius of the University of Leyden, the most eminent of the Dutch theologians. He was delighted to find how far Junius coincided with him, but when he addressed to Junius the arguments for still more advanced views, the professor kept the letter by him unanswered for six years, when he died. The friends of Arminius believed that this silence arose from the fact that Junius found more than he could answer or was willing to admit. Unfortunately, this correspondence was inadvertently exposed by Junius to discovery, and was used to the disadvantage of Arminius. Arminius also, having received a treatise in favor of predestination by Professor Perkins of Cambridge, prepared an epistle to him, but was prevented by Perkins's death from sending it. His letters both to Junius and Perkins are embodied in his published works, and, whatever may be thought of the validity of the argument, no one will deny that in candor, courtesy, and Christian dignity they are hardly to be surpassed.

On the death of Junius the curators of the University of Leyden looked to Arminius as his successor. The reluctant consent of Amsterdam being at length gained, Arminius assented. But the predestinarians, led by Gomarus, senior professor of theology at Leyden, opposed his election. After a long series of strifes, Arminius offered to meet Gomarus and satisfy his objections. The meeting took place, and Gomarus, admitting that he had judged Arminius by hearsay, after Arminius had fully declared his entire opposition to Pelagianism and Socinianism, fully renounced his objections. So far as predestination was concerned, each professor was to deliver his own sentiments with moderation, and all collision with the other was to be avoided; and Arminius was thereupon elected.

The six years of his Leyden professorship closing with his death are the most important yet troublous period of his career. The terms of peace were broken within the first year by Gomarus, who delivered a violent public harangue on predestination in terms of insult to Arminius, who was personally present; to which the latter prepared a refutation clothed in terms of personal respect towards his opponent. Gomarus afterwards confessed that he could easily live at peace with Arminius but for the clergy and churches, who were intensely hostile to his liberal doctrines. Their Belgic Confession, Calvinistic as it was, was sacred in their hearts as being the banner under which they had fought the battle of civil and religious liberty against Spain and popery; and they now, alas! were making it the instrument of religious intolerance. Arminius was held as invalidating that Confession, and so was everywhere traduced by the clergy as a papist, a Pelagian, and a Coornherter. Yet, really, the doctrines he taught were essentially the doctrines of Saint Chrysostom, Melanchthon, Jeremy Taylor, and John Wesley. In regard to the Confession, he ever treated it with reverence, and only claimed the right of that same liberality of interpretation which Lutherans exercised with the Augsburg Confession—a liberality similar to that which the English clergy now exercise in regard to the seventeenth of their Thirty-nine Articles. A voluntary Church may, like any other voluntary association, be, if it pleases, stringent in its interpretations, but a state Church, which strains all to a tight interpretation of a very specific creed under pain of state disabilities, runs into religious despotism. This was therefore a genuine contest for religious liberty. Arminius was proscribed by the clergy, harassed by irresponsible deputations, and his students were subjected to persecutions and exclusions from the ministry. The more intelligent laity, including the magistracy, and especially the chief magistrate, Olden Barnevelt, were favorable to Arminius, who at length appealed to the national legislature (called the States General) for protection. That body appointed a committee or council, who, having heard both Gomarus and Arminius in full, reported that the latter taught nothing but what could be tolerated. Before the States General themselves Arminius delivered a full oration, expounding his entire views, which is published in the American edition of his works. The clergy demanded the appointment of a national synod, consisting purely of ecclesiastics, but the States General, well knowing what would be the fate of Arminius in their hands, refused. Under the constant pressure of these years of persecution the gentle spirit of Arminius at length sunk. He was taken from the bloody times that followed the Synod of Dort. His nervous system was prostrated, and, attended by his faithful pupil, the afterwards celebrated Episcopius, he died in the faith he had maintained, Oct. 19, 1609, a martyr to his views of truth.

Arminianism, as the customary antithesis to Calvinism, is, within the limits of the evangelical doctrines, the theology that tends to freedom in opposition to the theology of necessity or absolutism. This contrast rises into thought among all nations that attain to reflection and philosophy. So in Greek and Roman thinking, Stoicism and all materialistic atheism held that mind, *will*, is subject to just as fixed laws in its volitions as physical events are in their successions. When, however, men like Plato and Cicero rose to a more transcendent sense of moral responsibility, especially of eternal responsibility, they came to say, like Cicero, "Those who maintain an eternal series of causes despoil the mind of man of free-will, and bind it in the necessity of fate."

Theistic fatalism, or Predestination, consists in the predetermination of the Divine Will, which, determining alike the volitions of the will and the succession of physical events, reduces both to a like unfreedom; but those who hold Predestination very uniformly hold also to volitional necessity, or the subjection of will in its action to the control of strongest motive force. And as the Divine Will is held subject to the same law, so Necessity, as master of God, man, and the universe, becomes a universal and absolute Fate. This doctrine, installed by Saint Augustine, and still more absolutely by John Calvin, in Christian theology, is from them called Augustinianism, or more usually Calvinism.

In opposition to this theology, Arminianism maintains that in order to true *responsibility, guilt, penalty*, especially *eternal penalty*, there must be in the agent a *free-will;* and in a true responsible free-will the freedom must consist in the power, even in the same circumstances and under the same motives, of *choosing either way*. No man can justly be eternally damned, according to Arminianism, for a choice or action which he cannot help. If fixed by Divine decree or volitional necessity to the particular act, he cannot be held responsible or justly punished. In all such statements, however, it is presupposed, in order to a just responsibility, that the agent has not responsibly abdicated or destroyed his own power. No agent can plead in bar of responsibility any incapacity which he has freely and wilfully brought upon himself. It is also to be admitted that there may be suffering which is not penalty—finite sufferings for which there are compensations, and for which every one would take his chance for the sake of life. But eternal suffering, for which there is no compensation, inflicted as a *judicial penalty* on the basis of *justice*, can be justly inflicted only for avoidable sin. If Divine decree or volitional necessity determine the act, it is irresponsible, and judicial penalty is unjust.

Arminianism also holds that none but the person who freely commits the sin can be guilty of that sin. One person cannot be guilty of another person's sin. A tempter may be guilty of tempting another to sin, but then one is guilty of the sin, and the other of solely the sin of temptation. There can thus be no vicarious guilt; and as punishment, taken strictly, can be only infliction *for guilt upon the guilty*, there can literally and strictly be no vicarious punishment. If innocent Damon die for Pythias guilty of murder, Damon is not guilty because he takes Pythias's place in dying, and his death is not *to him* a punishment, but a suffering, which is a substitute for another man's punishment. The doer of sin is solely the sinner, the guilty, or the punished. These preliminary statements will elucidate the issues between Calvinism and Arminianism on the following points:

1. *Foreordination.*—Calvinism affirms that God does unchangeably and eternally foreordain whatsoever comes to pass. That is, God from all eternity predetermines not only all physical events, but all the volitions of responsible agents. To this Arminianism objects that the predetermination of the agent's volitions destroys the freedom of his will; that it makes God the responsible predeterminer and willer of sin; and that it makes every sinner to say that his sin accords with the Divine Will, and therefore, so far as himself is concerned, is right. It makes God first decree the sin, and then punish the sinner for the sin decreed. The Arminian theory is this: God does from all eternity predetermine the laws of nature and the succession of physical and necessary events; but as to free moral agents, God, knowing all possible futurities, does choose that plan of his own conduct which, in view of what each agent will ultimately in freedom do, will bring out the best results. His system is a system of his own actions. And God's predeterminations of his own acts are so far contingent as they are based on his prerecognition of what the agent will freely do; yet as his omniscience knows the future with perfect accuracy, so he will never be deceived nor frustrated in his plans and providences.

Some Arminians deny God's foreknowledge, on the ground of the intrinsic impossibility of a future contingency being foreknown. As the performance of a contradictory act is impossible, intrinsically, even to Omnipotence, so, say they, the knowability of a future contingency, being an essential contradiction, is impossible even to Omniscience. A contradiction is a nothing; and it is very unnecessary to say in behalf of God's omnipotence that he can do all things, and all nothings too. So it is equally absurd to say in behalf of his omniscience that he knows all things, and all nothings too. The exclusion of contradictions does not *limit* God's omnipotence or omniscience, but *defines* it. Arminians do not condemn this reasoning, but generally hold that their theory is maintainable against Calvinism on the assumption of foreknowledge. They deny, as against the Calvinist, that foreknowledge has any influence upon the future of the act, as predetermination has. Predetermination *fixes* the act—foreknowledge *is fixed* by the act. In foreordination God determines the act as he pleases; in foreknowledge the agent fixes the prescience as he pleases. In the former case God is alone responsible for the creature's act; in the latter case God holds the creature responsible, and a just divine government becomes possible. Yet most Arminians probably would say, with the eminent philosopher Dr. Henry More, If the divine foreknowledge of the volitions of a free agent contradicts the freedom, then the freedom, and not the foreknowledge, is to be believed.

2. *Divine Sovereignty.*—Calvinism affirms that if man is free God is not a sovereign. Just so far as man is free to will either way, God's power is limited. Arminians reply that if man is not free, God is not a sovereign, but sinks to a mere mechanist. If man's will is as fixed as the physical machinery of the universe, then *all* is machinery and not a government, and God is a machinist and not a ruler. The higher man's freedom of will is exalted above mechanism, so much higher is God elevated as a sovereign. Here, according to Arminians, Calvinism degrades and destroys God's sovereignty, and Arminianism exalts it; that the freedom of man no more limits God's power than do the laws of nature by him established; that in both cases, equally, there is simply a self-limitation by God of the *exercise* of his power; that Arminianism holds to the absoluteness of God's omnipotence just as truly as Calvinism, and to the grandeur of his sovereignty even more exaltedly.

3. *Imputation of Adam's Sin.*—Calvinism affirms that Adam's posterity is truly *guilty* of Adam's sin, so as to be eternally and justly punishable therefor without a remedy. As *guilty* of this sin, God might have the whole race born into existence under a curse, without the power or means of deliverance, and consigned to eternal punishment. Upon this Arminians look as a dogma violative of the fundamental principles of eternal justice. They deny that guilt and literal punishment can, in the nature of things, be thus transferred. Their theory is, that upon Adam's sin a Saviour was forthwith interposed for the race as a previous condition to the allowance of the propagation of the race by Adam, and a provision for inherited disadvantages. Had not a Redeemer been provided, mankind, after Adam, would not have been born. The race inherits the nature of fallen Adam, not by being held *guilty* of his sin, but by the law of natural descent, just as all posterity inherit the species-qualities, physical, mental, and moral, of the progenitor. Before his fall the presence of the Holy Spirit with Adam in fulness supernaturally empowered him to perfect holiness—the tree of life imparted to him a supernatural immortality. Separated from both these, he sunk into a mere *nature*, subject to appetite and Satan. The race in Adam, without redemption, is totally incapable of salvation; yet under Christ it is placed upon a new redemptive probation, is empowered by the quickening spirit given to all, and through Christ may, by the exercise of free agency, attain eternal life.

4. *Reprobation.*—Of the whole mass of mankind thus involved in guilt and punishment for sin they never actually committed, Calvinism affirms that God has left a large share "passed by"—that is, without adequate means of recovery, and with no intention to recover them—and this from the "good pleasure of his will" and for a display of his "glorious justice." The other portion of mankind God does, from "mere good pleasure," without any superior preferability in them, "elect" or choose, and confers upon them regeneration and eternal life, "all to the praise of his glorious grace." Arminians pronounce such a proceeding arbitrary, and fail to see in it either "justice" or "glorious grace." The reprobation seems to them to be injustice, and the "grace," with such an accompaniment, unworthy the acceptance of honorable free agents. Election and reprobation, as Arminianism holds them, are conditioned upon the conduct and voluntary character of the subjects. All, submitting to God and righteousness, by repentance of sin and true self-consecrating faith, do meet the conditions of that election; all who persist in sin present the qualities upon which reprobation depends. And as this preference for the obedient and holy, and rejection of the disobedient and unholy, lies in the very nature of God, so this election and reprobation are from before the foundations of the world.

5. *Philosophical or Volitional Necessity.*—Calvinism maintains the doctrine that all volitions are determined and fixed by the force of strongest motive, just as the strokes of a clock-hammer are fixed and determined by the strongest force. The will can no more choose otherwise in a given case than the clock-hammer can strike otherwise. There is no "power of contrary choice." Calvinism often speaks, indeed, of "free agents," "free-will," "self-determining power," and "will's choosing by its own power;" but bring it to analysis, and it will always, say the Arminians, be found that the freedom is the same as that of the clock-hammer—the freedom to strike as it does, and no otherwise. Arminianism affirms that if the agent has no power to will otherwise than motive-force determines, any more than a clock-hammer can strike otherwise, then there is no justice in requiring a different volition any more than a different

clock-stroke. It would be requiring an impossibility. And to punish an agent for not performing an impossibility is injustice, and to punish him eternally, an infinite injustice. Arminianism charges, therefore, that Calvinism destroys all just punishment, and so all free volition and all divine government.

6. *Infant Damnation.*—Holding that the race is truly *guilty*, and judicially condemnable to endless torment for Adam's sin, Calvinism necessarily maintains, according to Arminians, that it is just for God to condemn all infants to eternal punishment, even those who have never performed any moral act of their own. This was held by Augustine, and wherever Calvinism has spread this has been a part of the doctrine, more or less explicitly taught. Earlier Calvinists maintained against the Arminians that there is actual reprobation—that is, a real sending to hell—as well as particular election, of infants. Arminianism, denying that the race is judicially *guilty*, or justly damnable for Adam's sins, affirms the salvation of all infants. The individual man as born does, indeed, irresponsibly possess within his constitution that nature which will, amid the temptations of life, commence to sin when it obtains its full-grown strength. He is not, like the unborn Christ, "that holy thing." There is, therefore, a repugnance which God and all holy beings have towards him by contrariety of nature, and an irresponsible unfitness for heaven and holy association. If born immortal, with such a nature unchangeable, he must be for ever unholy, and for ever naturally unhappy under the divine repugnance. Under such conditions Divine Justice would not permit the race, after the fall, to be born. But at once the future Incarnate Redeemer interposes, restores the divine complacency, and places the race upon a new probation. Man is thereby born in a "state of initial salvation," as Fletcher of Madely called it, and the means of final salvation are amply placed within the reach of his free choice.

7. *Pagan Damnation.*—On its own principle, that power to perform is not necessary in order to obligation to perform, Calvinism easily maintains that pagans, who never heard of Christ, are rightly damned for want of faith in Christ. They may be damned for original sin, and for their own sin, and for unbelief in Christ, without any Saviour. Arminianism, on the contrary, maintains that there doubtless are many in pagan lands saved even by the unknown Redeemer. They, not having the law, are a law unto themselves. Nay, they may have *the spirit of faith*, so that were Christ truly presented he would be truly accepted. They may have faith in that of which Christ is the embodiment, like the ancient worthies enumerated in Heb. xi. There may not be as great differences in the chances for salvation in different lands as Calvinism assumes. Where little is given, much is not required. Arminianism holds that no one of the human race is damned who has not had full chance for salvation. Missions are none the less important in order to hasten the day when *all* shall be converted. If that millennial age shall come, and be of long duration, Arminianism hopes that the great majority of the entire race of all ages may be finally saved.

8. *Doctrines of Grace.*—Calvinism maintains that the death of Christ is an expiation for man's sin: first, for the guilt of men for Adam's sin, so that it is possible for God to forgive and save; and second, for actual sin—that thereby the influence of the Spirit restores the lapsed moral powers, regenerates and saves the man. But these saving benefits are *reserved for the elect only.* Arminianism, claiming a far richer doctrine of grace, extends it to the very foundations of the existence of Adam's posterity. Grace underlies our very nature and life. We are born and live because Christ became incarnate and died for us. All the institutes of salvation—the chance of probation, the Spirit, the Word, the pardon, the regeneration, the resurrection, and the life eternal—are through him. And Arminianism, against Calvinism, proclaims that these are for ALL. Christ died for all *alike;* for no one man more than for any other man, and sufficient grace and opportunity for salvation is given to every man.

Calvinism maintains the irresistibility of grace; or, more strongly still, that grace is *absolute*, like the act of creation, which is called *irresistible* with a sort of impropriety from the fact that resistance in that connection is truly unthinkable. Against this Arminians reply that will, aided by prevenient grace, is free even in accepting pardoning grace; that though this acceptance is no more meritorious than a beggar's acceptance of an offered fortune, yet it is accepted freely and with full power of rejection, and is none the less grace for that.

9. *Justifying and Saving Faith.*—Faith, according to Calvinism, is an acceptance of Christ wrought absolutely, as an act of creation in the man, whereby it is as impossible for him not savingly to believe as it is for a world to be not created or an infant to be not born. And as this faith is resistlessly fastened in the man, so it is resistlessly kept there, and the man necessarily perseveres to the end. Faith, according to Arminianism, is, as a *power*, indeed the gift of God, but as an *act* it is the free, avoidable, yet really performed act of the intellect, heart, and will, by which the man surrenders himself to Christ and all holiness for time and eternity. In consequence of this act, and not for its meritorious value or its any way compensating for or earning salvation, it is accepted for righteousness, and the man himself is accepted, pardoned, and saved. And as this faith is free and rejectable in its beginning, so through life it continues. The Christian is as obliged, through the grace of God assisting, to freely retain it as first freely to exercise it. It is of the very essence of his probationary freedom that he is as able to renounce his faith and apostatize as to reject it at first.

10. *Extent of the Atonement and Offers of Salvation.*—Earlier Calvinism maintained that Christ died for the elect alone; later Calvinism affirms that he died for one and all, and so offers salvation to all on condition of faith. But Arminianism asks, With what consistency can the atonement be said to be *for all* when, by the eternal decree of God, it is foreordained that a *large part* of mankind shall be excluded from its benefits? How also can it be *for all* when none can accept it but by efficacious grace, and that grace is arbitrarily withheld *from a large part?* How can it be for *all* when God has so fastened the will of a large part of mankind, by counter motive-force, that they are unable to accept it? The same arguments show the impossibility of a rightful *offer* of salvation to *all*, either by God or by the Calvinistic pulpit. How can salvation be rationally offered to those whom God by an eternal decree has excluded from salvation? What right to exhort the very men to repent whom God determines, by volitional necessity, not to repent? What right to exhort men to do otherwise than God has willed, decreed, and foreordained they shall do? If God has decreed a thing, is not that thing right? What an awful sinner is the preacher who stands up to oppose and defeat God's decrees! If a man is to be damned for fulfilling God's decrees, ought not that imaginary God to be, *a fortiori*, damned for making such decrees? If a man does as God decrees, ought he not to be by God approved and saved? And since all men do as God decrees, wills, and determines they shall do, ought not all men to be saved, so that the true theory should be Universalism? How can grace be offered to the man whom God had decreed never to have grace? or faith be preached to those to whom God has made faith impossible? or conditions proposed to those from whom God withholds the power of performing conditions? Hence, the Arminian affirms that in all public offers of a free or conditional salvation to *all* the Calvinistic pulpit contradicts its own creed.

11. *Analogy of Temporal Superiorities.*—Calvinism argues that in this world God distributes advantages, such as wealth, rank, beauty, vigor, and intellect, not according to desert, but purely as a sovereign. Hence, in the same way he may bestow on one faith and eternal life, and on others unbelief and eternal death. Arminianism replies that this very analogy between the temporal and the eternal bestowment proves the precise reverse. In this probationary world advantages are *professedly* distributed *without regard to judicial rectitude.* Men are not rewarded according to their works or voluntary character. The wicked are set on high, and Satan is this world's god. And the very difference between the dispensation of the world and that of the kingdom of God is, that in the latter blessedness is placed at every man's choice, and the result is judicially according to voluntary faith and works. The Bible nowhere places beauty or intellect at our own choice, but it does declare faith, repentance, and eternal life to be in our own power, and holds us responsible for not exerting the power.

Basis of Morality.—Calvinism claims that the very severity of its system, its deep view of human guilt and necessary damnability by birth and nature, its entire subjection to divine absolutism irrespective of human ideas of justice, tend to produce a profound piety. Arminianism replies that this is missing the true ideal of piety. It seems to be basing Christian morality on fundamental immorality. For God to will and predetermine the sin, and then damn the sinner—for him to impute guilt to the innocent, and so eternally damn the innocent as guilty—are procedures that appear fundamentally unrighteous, so far as the deepest intuitions of our nature can decide. Thus, first to make God in the *facts* intrinsically and absolutely bad, and then require us to *ascribe* holiness and goodness to his character and conduct, perverts the moral sense. It is to make him what we are in duty bound to hate, and then require us to love and adore him. Such adoration, secured by the abdication not only of the reason, but of the moral sense, and the prostration of the soul to pure, naked absolutism, naturally results in the sombre piety of fear; just as children are frightened into a factitious goodness by images of terror. While the piety of Jesus is serene, firm, winning, and gently yet powerfully subduing, the piety of absolutism tends to be stern and Judaic-like. While thus apparently defective at the roots, it does nevertheless often present an objective character of rectitude, a practical hardihood and aggressive energy in the cause of morality and regulated freedom. Arminianism, in order to a true and rational piety, sees the ideal of rectitude in the divine character and conduct, not by mere *ascriptions* contradicted by *facts,* but both in the *facts* and the *ascriptions.* A harmony of facts and intuitive reason is produced, love to the Divine Being becomes a rational sentiment, and a piety cheerful, hopeful, merciful, and gladly obedient becomes realized.

Civil and Religious Liberty.—As the freedom of the individual, and his own intransferable responsibility for his own voluntary character and conduct, are fundamental principles with Arminianism, it is in its own nature adverse to civil or religious despotism. It has been said that when Romanism persecutes, it accords with its fundamental *principle,* the denial of right of private judgment, while when Protestantism persecutes, it contradicts itself. So when Calvinism persecutes, it obeys an intrinsic absolutism, while if Arminianism persecutes, it contradicts its own freedom and individualism. Yet *position* has often in history produced in all these parties palpable violations of, and discordances with, their *principle.* Romanists often become by *position* asserters of ultra-democracy, and Protestants of absolute despotism. And so Calvinism has, historically, been *by position* the advocate for revolution, and Arminianism the asserter of authority. In fact, as Arminianism has been, as above shown, the ruling doctrine of the Church, and Calvinism an insurgent specialty, so the historical *position* of the first has been favorable to the assertion of authority, and the normal position of the latter has been revolt. This may be called one of the *accidents of history.* So the learned Selden in his "Table-Talk" remarked on the curious contradiction in the English civil war, that the advocates of absolutism in religion were the advocates of political liberty, and *vice versâ.* Yet it may perhaps be truly said that when the religious absolutist gains the power he is apt to be an absolute though a conscientious despot. He makes a better rebel than ruler. Prof. Fisher, a Calvinist, gives a severely true picture of the conscientious despotism of Calvin at Geneva. A similar despotism on a larger scale in England under Cromwell rendered the nation willing by reaction to rush into the depravities of the Restoration. Driven to America, even while under the rule of an Arminian monarchy, a similar despotism on a small scale overspread New England.

Nor was Calvinism, as Prof. Fisher truly affirms, the advocate of liberty of conscience. Not only did Calvin himself banish Bolsec, ruin Castellio, and favor the execution of Servetus, but he maintained, doctrinally, the *duty of the magistrate to punish heresy.* Beza, his learned successor, wrote a treatise in favor of punishing heretics. Bogerman, the president at the Synod of Dort, was the translator of Beza's essay. It is but too evident that the Protestant Calvinists differed with the Romanists not about the punishment of heretics, but about who the heretics to be punished were. In this respect the Calvinism of the new Church and the Arminianism of the old were nearly upon a par. The new Church, however, belonged to the progressive order of things; but whether, finally, the Calvinism or the Arminianism of the new Church first actually proclaimed toleration is a matter of question.

Comparative Morality.—Mr. Froude endeavors by comparison to show that Calvinism is superior to Arminianism in morals by selecting his own examples. But the Arminian may perhaps in reply make also *his* selections. Scottish Calvinism has an unquestioned severity of morals, but are Scotch character and history, as a whole, even ethically superior to the English? Is the morality of Presbyterianism in its entire aspect superior to that of Moravianism, Quakerism, or Wesleyan Methodism? Are our American Calvinistic Baptists more Christian in morals than the Free-will Baptists? Is there any umpire qualified to decide that the devout Presbyterian is superior to the devout Episcopalian? Did Jonathan Edwards present a type of piety superior to that of Fletcher of Madely? or John Calvin to that of James Arminius? Can Calvinism show a grander type of an evangelist than was John Wesley in England or Francis Asbury in America? Has she produced, in all her history, a system of evangelism as earnest, as self-sacrificing, as aggressive as the itinerant ministry of English and American Methodism? Taking the entire body of Calvinism since the Reformation, does it excel in purity, martyrdom, doctrine, and missionary enterprise the (Arminian) Church of the first centuries? If it comes to counting persons, has any section of the Church nobler names than Justin Martyr, Ignatius, Irenæus, Origen, Athanasius, Tertullian, Jerome, Chrysostom, John of Damascus, Hincmar of Rheims, Erasmus, Luther, Melanchthon, Sir Thomas More, Calixtus, Savonarola, Arminius, Grotius, Episcopius, Limborch, Curcellæus, John Milton, John Goodwin, Jeremy Taylor, Cudworth, Bishop Butler, Bishop Bull, Bengel, Wetstein, Wesley, Fletcher, and Richard Watson?

Comparative Republicanism.—Nor did, nor does, Predestination as compared with Arminianism, possess any peculiar affinity with republicanism against monarchy. By its very nature Calvinism establishes an infinite and eternal distinction between different parts of mankind made by divine prerogative, by which one is born in a divine aristocracy, and the other in an eternal helpless and hopeless pariahism; whilst Arminianism, holding every man equal before God, proclaims an equal yet resistible grace for all, a universal atonement and Saviour alike to all, an equal power of acceptance in all, a free, unpredestined chance for every man to be the artificer of his own eternal, as well as temporal, fortunes. Caste, partialism are the characteristics of the former; equality, universality, republicanism, of the latter. It is as plain as consciousness can make any fact that it is the latter that is the natural ally, not of monarchies, aristocracies, or hierarchies, but of regulated freedom. Hence, neither Luther nor Calvin was any more a republican than Eck or Erasmus. Augustine and Gottschalk were good papists, and Augustinianism was entirely at home under the tiara of Gregory the Great as under the cap of Bogerman—in the court of Charlemagne as in the camp of the Covenanter. Irrespective of their Calvinism, the Reformers everywhere acted *according to conditions.* Where kings and nobles favored them, they favored kings and nobles; where (as was generally the case) they were rejected by rank and power, and had nothing to make royalty and aristocracy out of, they fashioned a theocratic Commune, out of which modern political experience has picked some aids and methods for voluntary government. Modern experience has eliminated the theocracy, the intolerance, and the predestinarianism, and added the elements to make republicanism. For all this it duly thanks the Reformers, but does not thank their Calvinism.

History of Arminianism.—The theology of freedom, essentially Arminianism, in opposition to predestination, necessitated volitions, and imputation of guilt to the innocent, is universally acknowledged to have been the doctrine of the entire Christian Church through its most glorious period, the martyr age of the first three centuries. The Calvinistic historian of theology, Hagenbach, says (vol. i., p. 155): "All the Greek Fathers, as well as the apologists Justin, Tatian, Athenagoras, Theophilus, and the Latin author Minucius Felix, exalt the autonomy or self-determination of the human soul. They know nothing of any imputation of sin, except as a voluntary and moral self-determination is presupposed. Even Irenæus and Tertullian strongly insist upon this self-determination in the use of freedom of the will." Again (157): "Even the opponents of human liberty, as Calvin, are compelled to acknowledge this remarkable unanimity of the Fathers, and in order to account for it they are obliged to suppose a general illusion about this doctrine!"

Arminians contend that we know as well when predestination was introduced into the Church—namely, by Augustine—as we do when transubstantiation and image-worship were introduced; that it was in the fourth century, when Pelagius upon one extreme made free-will dispense with divine grace, Augustine on the other extreme made divine grace irresistibly nullify free-will, and thus both lost their balance; that both invented dogmas never before recognized in the Church; that, tried by the previous mind of the Church, both were equally heretical; that the heresy of one, pushed to extreme, becomes rationalism and pure deism—the heresy of the other, pushed to extreme, becomes presumptuous antinomianism. They assert that the Eastern Church maintained her primitive position, neither Pelagian on one side nor Augustinian on the other, essentially in the position of modern Arminianism; that hence Arminianism is not a *compromise,* but the primitive historical position, the permanent centre, rejecting innovations and extremes on either side; that the Western Church, in spite of the great name of Augustine, never became Augustinian. It is indeed customarily said by anti-Arminian writers that this was because the "age of systematic theology" had not then arrived. Arminians reply that a theology not only unrecognized during that best period of the Church, but, still more, a theology unanimously condemned as heretical by that period, has little right now to lay claim to pre-eminent Christian orthodoxy. The Eastern Church—namely, the churches of Asia, with whom the language of our Lord and his apostles was essentially vernacular; the Greek Church, to whom the language of the New Testament was vernacular; and the Russian Church, embracing many millions—all inherited and retain, firmly and unanimously, the theology of freedom, essential Arminianism. The learned Calvinistic scholar Dr. Shedd, in his "History of Doctrines" (vol. ii., p. 198), says: "The Augustinian anthropology was rejected in the East, and, though at first triumphant in the West, was gradually displaced by the semi-Pelagian theory, or the theory of inherited evil [instead of inherited guilt] and synergistic [or co-operative] regeneration. This theory was finally stated for the papal Church in exact form by the Council of Trent. The Augustinian anthropology, though advocated in the Middle Ages by a few individuals like Gottschalk, Bede, Anselm, slumbered until the Reformation, when it was revived by Luther and Calvin, and opposed by the papists." It will thus be seen, on a review of the universal Church in all ages, how small though respectable a minority Augustinianism or Calvinism, before the Reformation, ever was. With minor exceptions, Arminianism was the doctrine of the universal Church.

The accuracy of Dr. Shedd's statement of the general non-existence of Augustinianism during the Middle Ages is not invalidated by the fact of the great authority of Augustine's name, arising from the powerful genius and voluminous writings of the man. It was no proof that a man was truly Augustinian because he belonged to the "Augustinian order" or quoted Augustine's authority. Such Schoolmen as Bernard, Anselm, and Peter Lombard modified Augustine's doctrine materially; Bonaventura and Duns Scotus were essentially Arminians, and Hincmar of Rheims and Savonarola literally so. Gottschalk, the high predestinarian, was condemned for heresy, and Thomas Bradwardine, the "second Gottschalk," made complaints, doubtless overstrained, that in his day "almost the whole world had become Pelagian."

At the Reformation, however, we encounter the phenomenon that all the eminent leaders at first not only adopted, but even exaggerated, the absolutism of Augustine. This might seem strange, for it was apparently natural that the absolute papacy should identify itself with the absolute, and that asserters of freedom would have stood on the free-will theology. The twin doctrines of the supremacy of Scripture and of justification by faith were amply sufficient, without predestination, for their purpose to abolish the whole system of popish corruption. The former dethroned alike the authority of tradition and the popedom; the latter swept away alike the mediations of Mary, saints, and priests. But the first heroic impulse of reform tends to magnify the issues to their utmost dimensions. The old free-will theology belonged universally to the old historic Church, and was identified by the first Reformers with its corruptions. Luther at first, in his reply to Erasmus "On the Bondage of the Will," uttered fatalisms that probably had hardly ever before been heard in the Christian Church, and perhaps it would be hard to find a Calvinist at the present day who would adopt the trenchant predestinarian utterances of Calvin. Under the indoctrinations of these leaders, especially of Calvin at Geneva, the absolute doctrines were diffused and formed into the creeds of Germany, the Netherlands, France, England, and Switzerland. But in Germany the "second sober thought" of Melanchthon, who at first coincided with Luther, receded from predestination, and Melanchthon himself intimates that Luther seceded with him; so that the Lutherans are now essentially Arminian. In the Netherlands the same "second thought," led by Arminius himself, was suppressed by state power. In France, Protestantism, which was Calvinistic, was overwhelmed in blood. In England the Calvinism was generally of a gentle type, and the same "second thought" was awakened by the Arminian writings of Grotius and Episcopius diffused through Europe. And as the English Church gradually inclined to the ancient high episcopacy of the old Church, so it adopted the ancient Arminianism. Calvinism, persecuted and oppressed, overthrew monarchy and Church, and for a brief period ruled with hardly less intolerance, until, overthrown in turn, Calvinism took refuge in America, and laid foundations here. Even here past sufferings did not teach tolerance, and that doctrine had to be learned from checks and lessons administered by surrounding sources. Calvinism has, nevertheless, here acted a noble part in our Christian civilization. It perhaps about equally divides the evangelic Church with Arminianism.

Arminianism, proper and Protestant, came into existence under the severe persecution by Dutch Calvinism, in which the great and good Arminius himself was a virtual martyr. The Synod of Dort, the standard council of the Calvinistic faith, made itself subservient to the unprincipled and sanguinary usurper Maurice; and even during its sessions the judicial murder of the great Arminian and republican statesman Olden Barnevelt was triumphantly announced at Dort to overawe the Arminians at the synod, who were bravely maintaining their cause under the leadership of the eloquent Episcopius. Then followed the banishment of Episcopius, the imprisonment of Grotius, the ejection of hundreds of Arminian ministers from their pulpits, and the firing of soldiers upon the religious assemblies of Arminian worshippers. The great Arminian writers of Holland, Episcopius, Grotius, and Limborch, are claimed by Arminian writers to be the first public proclaimers of the doctrine of liberty of conscience in Europe, as those two Arminian Puritans, John Milton and John Goodwin, were its earliest proclaimers in England.

Wesleyan Methodism is now by all admitted to be a great modern Arminian development. Beginning most humbly as a half-unconscious awakening amid the general religious chill of Protestantism, it has not only quickened the religious life of the age, but gathered, it is said, twelve millions of worshippers into its congregations throughout the world. Its theology is very definite, and very nearly the exact theology of James Arminius himself, and of the first three centuries. Cradled in both the Arminianism and High-Churchism of the English establishment, Wesley's maturer years earnestly approved the Arminianism, but severed it from the High-Churchism. The connection between Arminianism and High-Churchism is hereby clearly revealed to be historical and incidental rather than intrinsic or logical. Yet, even after adopting the doctrine that every Church has the right to shape its own government, as a lover of the primitive, post-apostolic Church, as well as from notions of Christian expediency, Wesley preferred, and provided for American Methodism, an episcopal form of government. Arminian Methodism has, in little more than a century of her existence, apparently demonstrated that the Augustinian "systematic theology" is unnecessary, and, what it deems, the primitive theology amply sufficient for the production of a profound depth of piety, a free ecclesiastical system, an energetic missionary enterprise, and a rapid evangelical success. She exhibits in her various phases every form of government, from the most decisive system of episcopacy to the simplest congregationalism, all voluntarily adopted, and changeable at will. The problems she has thus wrought suggest the thought that the free, simple theology of the earliest age may be the universal theology of the latest.

The Literature of Arminianism.—The literature of the controversy of free-will and predestination, beginning with Justin Martyr, Chrysostom, and the Greek Christian Fathers generally, is very extensive. Since the Reformation we may name the following: ARMINIUS'S "Works" (3 vols. 8vo, translated into English by Nicolls and Bagnall, American edition, 1853); EPISCOPIUS, "Instit. Theol." (1650); Episcopius's works, in two volumes folio, are mainly devoted to the maintenance of the Arminian views against the doctrines of the Synod of Dort; STEPHEN CURCELLÆUS, "Opera Theologica" (1 vol. fol.); LIMBORCH'S "Theologia Christiana," the first complete body of Arminian theology (1686), translated into English by Rev. William Jones, presbyter of the Church of England (London, 1713); Bishop BURNET'S "Exposition of the Thirty-Nine Articles" (1699) furnishes what was intended as an impartial presentation of the argument on both sides, though expressing a preference for the Arminian in his preface; *American ed. (Appleton's), 1842;* WHITBY, "On the Five Points" (London, 1710, 1 vol. 8vo), a standard work on the subject in English theology; WESLEY'S "Works" (New York, 7 vols.); "Checks to Antinomianism" and other works, by FLETCHER OF MADELY (New York, 4 vols. 8vo); RICHARD WATSON'S "Theological Institutes" (New York, 2 vols.), a standard work in Methodist theology; NICOLLS' "Calvinism and Arminianism compared" (London, 1824, 2 vols. 8vo).

The maintenance of the Arminian view of the divine government has, during the present period, proceeded largely from the Methodist body, and most of the productions have been furnished in America. We may enumerate among both foreign and American the following: Dr. WILBUR FISK'S "Calvinistic Controversy" (New York, 1830, 1 vol. 12mo), a work which exerted much influence on American Methodist theology; Bishop RANDOLPH S. FOSTER'S "Calvinism as it Is" (Cincinnati, 1840, 12mo); Dr. A. T. BLEDSOE'S "Theodicy" (New York, 1853, 1 vol. 8vo); WHEDON'S "Freedom of the Will" (New York, 1864, 12mo); "Bibliotheca Sacra" (April, 1862); Dr. WILLIAM B. POPE, professor in the Wesleyan Theological School, Didsbury, England, has published in one large 8vo volume "A Systematic Theology" (London, 1875); Dr. MINER RAYMOND, professor in the Methodist Theological Seminary, Evanston, Ill., has just completed (New York, 1879) "A Systematic Theology" (in 3 vols. 8vo); Dr. SULSBACHER, professor in the German Methodist Theological Seminary, Bremen, has issued (1878, in 3 vols.) a "Christliche Glaubenslehre vom Methodisten Standpunkt." (See CALVINISM, by PROF. A. A. HODGE, S. T. D.)

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Arminius. See Hermann.

Ar′mistead (Lewis Addison), a general, born at Newbern, N. C., Feb. 18, 1817, graduated at West Point in 1836. He served in the Mexican war (1846–47), and joined the Confederate army in 1861. He was killed at Gettysburg July 3, 1863.

Armistead (Walker Keith), an American general, born in Virginia about 1780. He became chief of the corps of engineers, and served in the war of 1812. He commanded an army against the Indians in Florida. Died Oct. 13, 1845.

Ar′mistice [from the Lat. *ar′ma*, "arms," and *sto* (or *sis′to*), to "stand still"], a truce; a suspension of hostilities between two armies or belligerent powers, which often agree to suspend operations for a definite time while the diplomatists are negotiating the preliminaries of a peace. During the third Crusade, Richard Cœur de Lion and Saladin made a truce for three years three months and three days. In modern times the duration of armistices is much less. After the Germans captured Paris, Jan. 30, 1871, the French people, having no regular government, desired to elect a national assembly, for which purpose an armistice was granted by the Germans. The armistice, during which the armies on both sides were bound to remain stationary, ended in a treaty of peace, the preliminaries of which were ratified on Feb. 26, 1871. The definitive treaty of peace was signed at Frankfort in May of that year.

Ar′mitage (Edward), an English historical painter of high reputation, born in London in 1817. Among his masterpieces are "St. Francis before Pope Innocent III.," and the frescoes in the new Houses of Parliament.

Armitage (Thomas), D. D., LL.D., born at Pontefract, England, Aug. 2, 1819, became in his youth a Methodist preacher. In 1838 he came to New York, and entered the ministry of the Methodist Episcopal Church. In 1848 he became a Baptist, and settled as a pastor in New York. He warmly advocated the movement for Bible revision, which led in 1850 to the formation of the American Bible Union, of which organization he became an efficient officer, and subsequently the president. He occupies a high rank as a pulpit orator and as a writer of great power and elegance. His position as a leader in the denomination with which he is identified is generally acknowledged.

Armitage (William Edmond), D. D., a bishop of the Protestant Episcopal Church, was born in New York City Sept. 6, 1830. He graduated at Columbia College in 1849 and at the General Theological Seminary in 1852. He became rector of an Episcopal church at Portsmouth, N. H., and afterwards at Augusta, Me. In 1859 he accepted a similar position in Detroit, Mich. In 1866 he was appointed assistant bishop of Wisconsin, and in 1870 he became bishop of that diocese, which position he held until his death. Died in New York City Dec. 7, 1873.

Ar′mor [Lat. *armatu′ra*], the defensive covering or coat-of-mail worn by a soldier; the apparatus which in former times men used for personal defence in war, and was often called *harness*. Since the invention of gunpowder, armor has fallen into disuse. The principal parts of the ancient armor were the helmet, breastplate, and shield. The material generally used for this purpose by the Greeks, Romans, and other nations of antiquity was brass or bronze. The most ancient description of such a panoply or complete armor is given in 1 Samuel xviii., which says Goliath "had an helmet of brass upon his head, and he was armed with a coat-of-mail; and the weight of the coat was five thousand shekels of brass. And he had greaves of brass upon his legs, and a target of brass (margin, *gorget*) between his shoulders; . . . and one bearing a shield went before him." The Greeks of the Homeric age used a large circular shield made of several folds of bull's hide, bound and embossed with brass. They also wore a helmet, a breastplate, and greaves, and a leather petticoat which descended nearly to the knee, and was covered by narrow strips of metallic plates or scales hinged together so as to permit freedom of movement. The coat-of-mail worn by the knights of the Middle Ages, and sometimes called chain-armor, was formed of a network of steel or iron rings attached to a foundation of leather. The modern Europeans also used an interlaced ring-armor of Oriental origin, which was made in the form of a shirt with small steel rings, which were not stitched to any foundation. Chain-mail or ring-armor fell into disuse in the fourteenth century, and was succeeded by plate-armor. The cuirass, almost the sole existing relic of mediæval armor, is now of no practical importance. The term is also applied to iron-plate covering applied to modern war-vessels and fortifications. (See Ships of War, Iron Plating, and Shields.)

Armor′ica [from the Cymric *ar*, "upon," and *mor*, "sea"], the ancient name of the north-western part of Gaul, bordering on the ocean, and extending from the Seine to the Loire. The Armoricans had numerous ships, and were extensively engaged in maritime pursuits. About 400 A. D. Mariadec, a Briton, obtained the chief power in Armorica, which became an independent state. In consequence of the immigration of Britons or Welsh in the sixth or seventh century, the name of Armorica was changed to Bretagne. The language of the country is closely allied to the Welsh.

Ar′mory [Lat. *arma′rium*, from *ar′ma*, "arms"], a storehouse for arms; a place where arms and instruments of war are deposited; a collection of ancient armor, as that in the Tower of London. In the U. S., armory signifies a place where arms are manufactured. The U. S. government has extensive armories at Springfield, Mass., and Rock Island, Ill. (See Arsenal, by P. V. Hagner, U. S. Army.)

Arms [Lat. *ar′ma*], weapons of war; offensive weapons or instruments, which are divisible into two great classes—firearms, and arms which are used without gunpowder or any explosive substance. The latter, which are the more ancient, are the sword, spear, dart, javelin, lance, arrow, battle-axe, cutlass, dagger, dirk, bayonet, scimetar, pike, sling, etc. The ancient Greeks, according to Homer, used the spear chiefly as a missile, which they hurled at a distant enemy. The most effective weapon of the steel-plated cavalry of the Middle Ages was a ponderous lance nearly eighteen feet long. The principal varieties of firearms are described under the appropriate heads. (See Firearms.)

Arms, or Armo′rial Bear′ings, the name given in heraldry to devices borne on shields; ensigns armorial. "There is no doubt," says Hallam, "that emblems somewhat similar have been immemorially used both in war and peace. The shields of ancient warriors, and devices upon coins or seals, bear no distant resemblance to modern blazonry. But the general introduction of such bearings as hereditary distinctions has been sometimes attributed to tournaments, wherein the champions were distinguished by fanciful devices; sometimes to the Crusades, where a multitude of all nations and languages stood in need of some visible token to denote the banners of their respective chiefs. In fact, the peculiar symbols of heraldry point to both these sources, and have been borrowed in part from each. Hereditary arms were perhaps scarcely used by private families before the beginning of the thirteenth century. From that time, however, they became very general, and have contributed to elucidate that branch of history which regards the descent of illustrious families."

Armstrong (George Dodd), D. D., a brother of Dr. W. J. Armstrong, born in 1813 in Mendham, N. J., graduated at Princeton in 1832, studied theology in Union Seminary, Prince Edward co., Va., was professor of chemistry and mechanics in Washington College, Lexington, Va. (1838–51), and since then pastor of a Presbyterian church in Norfolk, Va. He has been a large contributor to periodicals, and has published "The Summer of the Pestilence," "The Doctrine of Baptism," "The Christian Doctrine of Slavery," "The Theology of Christian Experience," etc.

Arm′strong (James), brother of John, was born in Pennsylvania early in the eighteenth century. He was appointed brigadier-general in the Revolutionary army in 1776, and aided in the defence of Fort Moultrie, S. C., and in the battle of Germantown, Pa.; resigned in 1777, and was afterward member of Congress from Pennsylvania, 1793–95. Died at Carlisle, Pa., Mar. 9, 1795.

Armstrong (James), U. S. N., born at Shelbyville, Ky., Jan. 17, 1794, entered the navy as a midshipman in 1809, was captured by the British while serving in the Frolic in 1814, received the regular promotions, becoming a captain in 1841, commanding the East India squadron (1855–58), and captured the Barrier Forts in the Canton River in 1857. Jan. 12, 1861, he was compelled to surrender Pensacola navy-yard to a greatly superior force of Confederates. He became a commodore in 1866, and died Aug. 27, 1868.

Armstrong (James F.), U. S. N., born Nov. 20, 1817, in New Jersey, entered the navy as a midshipman Mar. 7, 1832, became a passed midshipman in 1838, a lieutenant in 1842, a commander in 1861, a captain in 1862; retired at his own request Sept. 27, 1866. From 1862 to 1866 he commanded the State of Georgia in the North Atlantic blockading squadron, and April 25, 1862, took part in the bombardment of Fort Macon, which resulted in its surrender to the combined army and naval forces.

Foxhall A. Parker.

Armstrong (James Francis), born at W. Nottingham, Md., Apr. 3, 1750, graduated at College of New Jersey in 1773; was pastor of a church in Trenton, N. J., for thirty years, and a chaplain through the Revolutionary war. Died Jan. 19, 1816.

Armstrong (James Loudon), M. D. See Appendix.

Armstrong (John), M. D., a poet, born at Castleton, in Roxburghshire, Scotland, in 1709. He studied medicine at Edinburgh, where he graduated in 1732, and soon after began to practise in London. His poem called "The Economy of Love" (1739) was censured as indecent. In 1744 he produced a didactic poem on "The Art of Preserving Health," which is his principal work, and has had an extensive popularity. He was physician to the English army in Germany in 1760. Among his other works are "Benevolence," a poem (1751), "Taste," an epistle in verse (1753), and a volume of "Medical Essays" (1773). He was a friend of the poet Thomson and Dr. Young. Died Sept. 7, 1779.

Armstrong (John), an American general, born at Carlisle, in Pennsylvania, Nov. 25, 1758. He served in the Revolutionary war with the rank of major. He was the author of the anonymous and celebrated "Newburg Addresses," written in Mar., 1783, in order to obtain from Congress a payment of the money due to the officers of the army. He was a member of the old Congress, and in 1800 was sent to the U. S. Senate from New York. He was sent as minister to France in 1804, and was appointed secretary of war in Jan., 1813. He was censured because he failed to defend Washington in 1814, and resigned in September of that year. Died April 1, 1843.

Armstrong (John), M. D., an English writer, born in the county of Durham in 1784. He graduated as M. D. in the University of Edinburgh in 1807, after which he practised at Sunderland. In 1816 he published a work on "Typhus Fever," which widely extended his reputation. He removed in 1818 to London, where he practised with great success. Dr. Armstrong and Edward Grainger founded in 1821 a medical school in Webb street, where the former lectured and acquired popularity. He died Dec. 12, 1829. (See F. Boot, "Memoir of the Life of J. Armstrong," 1834.)

Armstrong (John), a native of Pennsylvania, commanded successfully the expedition sent in 1756 against the Indian allies of the French at Kittanning, served as brigadier-general in the Revolutionary army at Fort Moultrie, and commanded the militia at Brandywine and Germantown. He was a member of Congress (1778–80 and 1787–88). Died at Carlisle, Pa., Mar. 9, 1795.

Armstrong (Richard), D. D., born in Northumberland co., Pa., in 1805, graduated at Dickinson College in 1827, studied theology at Princeton, and went in 1832 as a missionary to the Sandwich Islands, where he served as minister of instruction, privy councillor, and president of the board of education. He received fatal injuries by a fall from his horse, and died Sept. 23, 1860.

Armstrong (Robert), Brigadier-General, born in 1790 in Eastern Tennessee, served in the Creek war of 1813–14, and at the battle of New Orleans as an officer of Tennessee volunteers, and in 1836 as a brigadier-general of volunteers in the Florida war. He was consul at Liverpool (1845–52), and for a time editor of the "Washington Union." Died Feb. 23, 1854.

Armstrong (Samuel T.), a bookseller of Boston, born in 1784. He was chosen lieutenant-governor of Massachusetts, and acted as governor in 1836, in consequence of the resignation of Governor Davis. Died in 1850.

Armstrong (Sir William George), F. R. S., LL.D., D. C. L., noted as the inventor of the Armstrong gun, was born at Newcastle-upon-Tyne in 1810. He became in 1845 a proprietor of an establishment for the manufacture of hydraulic cranes, engines, and bridges. After numerous experiments, he invented, in 1854, a wrought-iron rifled cannon of extraordinary power and precision, which bears his name. These guns are made of bars of wrought-iron two inches wide, heated to whiteness, twisted spirally round a steel bar or core, and welded; other bars are twisted over these in a similar way, but with an opposite turn of the spiral. Another heating to whiteness precedes a thorough welding of all the layers of bars by a steam hammer. The internal core is removed, and the bore is rifled by machinery. It is stated that one of these guns will throw a ball of thirty-two pounds to the distance of five miles. The inventor was knighted by the queen, and appointed chief engineer of rifled ordnance. (See Artillery for a description of this gun.)

Armstrong (William Jessup), D. D., a clergyman of the American Presbyterian Church, born at Mendham, N. J., Oct. 29, 1796, was pastor of the First Presbyterian church in Richmond, Va., from 1824 to 1834. In this latter year he accepted the appointment of secretary of the American Board of Commissioners for Foreign Missions, which office he held till his death, which occurred by shipwreck in a voyage, on the steamer Atlantic, between New York and Boston Nov. 27, 1846. His Life and a collection of his sermons were published.

Army. The title or expression "army" is of modern origin. During the Italian wars of Louis XII. his soldiers began to Frenchify the expression *armata*, which the Italians used, or rather *armada*, the term employed by the Spaniards. The latter term is constantly used not only in the German, but even the Swedish reports of the Thirty Years' war; whence from *armada, armée, army*. Previous to this the French indicated that which we look upon as appropriately styled army, by *bataille, ost* (*host, harst*, Germano-Swiss), *exercite* (*exercitus*, Latin; *exercito*, Span., Ital.), or *milice*. The latter word was preferred by several writers of the eighteenth century as having a more precise and general signification, as *milice* (*militia*) has its root in *miles*, a "soldier," which, in the accepted meaning of soldier, a "paid fighter," a militiaman certainly is not.

Since the earliest history of the world, fabulous or authentic, not alone the physical fate of empires, but the intellectual progress of humanity, the very development of mind, has depended upon the efficiency of the force which is defined an army. There is no doubt that civilization and Christianity—for the development of true civilization is the extension of Christianity—have been wafted to the end of the world upon the wings of commerce; but trade is transitory, and whatever is fixed has been made so by the force of arms. Even the most commercial nations, Phœnicia, Carthage, Holland, and England, could have accomplished little had they not occupied and held with an army or the fragments of an army what their sailors had discovered.

"Peace is the dream of philosophers, but war is the history of men;" and if almost universally, but erroneously, admitted to be "the greatest of evils," it is also one of the oldest. It is doubtful if some attempt at reducing war to a science is not the eldest of man's efforts at progress. "It preceded among all nations the arts and sciences proper, and perished in proportion as these developed." "The means of attack and defence appear to have been among the first essays of human invention, and to have called forth the powers of the mind in a greater degree than any of the arts of peace." The first expression of the art and science of war was an army. This may be defined as a certain proportion of a nation raised by means of "election" (Roman), conscription, voluntary enlistment, or otherwise, organized, armed, disciplined, and administered conformably to a digested system. It is an artificial combination of human and mechanical forces into a movable engine for defensive or aggressive purposes, of which discipline is the motive and regulating power. An army, in fact, is an aggregated force of men converted into soldiers, of each of whom it has been well said:

> "'Tis drilling that makes him, skill and sense—
> Perception—thought—intelligence,"

under a chief

> "Who has the energy—who the mind—
> The flashing thought—and the fearless hand—
> Together to bring, and thus fastly bind,
> The fragments"

into a homogeneous unit of force of which the soul is discipline.

An army as it should be is as Foy represented it to be in his time: "The army constituted a homogeneous and individual mass, in which, ascending from the conscript six months under arms to the field-marshal, there was no difference encountered in seeing and feeling."

In this connection a curious fact presents itself. Some of the most successful commanders on sea have been those who had their training in the land-forces of their country; more than one as cavalrymen. Not to encumber this article with names, consider almost all the Carthaginians' admiral-generals; Duilius, who first taught the Roman soldiers how to conquer on the most opposite element; Cæsar, Pompey; in modern times, Wrangel, Monk, Blake, Rupert, Opdam; the last three originally officers of cavalry.

Great captains have likewise proved the ablest organizers, administrators, statesmen, and negotiators: witness Gustavus, Torstenson, William III., Marlborough, Prince Eugène, Villars, Bentinck, Boufflers (the last two negotiated the Peace of Ryswick), Frederick the Great.

Although recent explorations have thrown some light upon the national military organizations of Nineveh and of Babylon, they are too vague to entitle them to more than the passing remark that they were based on scientific principles and administered in obedience to laws—laws which were sufficient for their era and extremely practical. They carried on campaigns at long distances from their base, and they besieged strong places, and took them after protracted efforts, and they fought battles; all of which proves that they must have comprehended and applied that which constitutes the art and science of war. Indeed, it would be very safe to assert that recent discoveries demonstrate that all the ancient armies were better organized, administered, and manipulated than we have been accustomed to believe. This remark, indeed, applies to all armies worthy the appellation. Even Tamerlane has left behind him a treatise that shows that his wild hordes were subjected to a military direction by which skill and tact were enabled to employ their very native habits to the best advantage. The armies of antiquity had peculiar tactics, it is true, but these were congenial to the people and country; and, however peculiar, they understood them and applied them. Whoever will examine the Bible carefully will find in its descriptions the strongest evidence of a discipline of iron, of order, cadenced step, organization, tactics, stratagem, and strategy—all that modern pride considers the result of its intelligence—such as has not existed even within the last four centuries except in the small armies of Alva, Maurice, Gustavus, and on a larger scale in those of Marlborough and Frederick the Great. Some of the passages are magnificent in their portrayal of an army worthy of the inspection and leading of the greatest captains, complete in every arm or branch of the service. There we find expressions which cannot be surpassed in descriptive grandeur and comprehensiveness (*procellæ equestres*, "hurricanes of cavalry," "whirlwinds of chariots," etc.). The finest light cavalry of all times, imitated with so much success by the Saracens, were the Numidians of Hannibal ("the Cossacks of the ancient world"), and the Parthians were the predecessors of those arrays which culminated under Timour (Tamerlane) in the overwhelming of an antagonistic system under Bajazet at Angora, 28th July, A. D. 1402. Their tactics might be expressed by the term "swarm attack," which, against a force broken into by the other arms, is no despicable method of employing mounted troops. Tamerlane's heavy cavalry was likewise admirable.

The first army of which we know anything definite was the Egyptian. Perhaps since men have aggregated into nations no army has ever been maintained in every sense in a better condition commensurate with the times; and if history is at all reliable, the results were stupendous, considering the difficulties against which logistics had then to contend. If Sesostris (Se-seos-t-re or Rameses, "son of the Supreme and Gift of the Sun") and his campaigns are not a myth, the conception and campaigns of Alexander shrink into dwarfs before those of the armies which he made and directed; likewise those of the Romans, although they planted their eagles against the arctic and within the equatorial circle. The genius and generalship of Sesostris, which carried his own peculiar aquiline symbols of Apis eastward beyond the Ganges and northward of the Caspian, westward to the Ister or Danube, and southward towards the swell of the Mountains of the Moon, were not inferior to that "inspiration" of Alexander which bore those of the Macedonian Jove to the Indus, or that other inspiration which bore the eagles of the first triumvir to his unfulfilled invasion of Britain.

One question, however, presents itself which has a parallel in a more recent period, and this within a century and a half. Did Sesostris make his army or simply make use of it? The organization of the greatest of Egyptian armies, and the creation of the military spirit with which it was imbued, are said to have been due to his father, Amenophis III. Here we have an exact type of the preparation of Frederick William I., and the application by his son, Frederick (II.) the Great, although the latter has been compared in a critical analysis and examination to Philip II., the founder of the Macedonian power, rather than to Alexander the Great, its developer. To compare Frederick the Great to the son, rather than to the father, is preferable.

Between the Egyptian and better known organizations of civilizations more clearly understood, the Persian army deserves consideration, in that its cavalry was excellent, and even in the period of its decay it demonstrated that if properly commanded it was capable of achieving great things. This was shown at the battle of the Granicus, where its gallant behavior excited the admiration of every Macedonian officer, from the royal general-in-chief down to the humblest commander of a company. This is one side of the question. The conduct of the Persian horse at Platæa (B. C. 479) scarcely justifies a favorable criticism, although their defeat is mainly attributable to the fall of their leader, Masistius.

Close following on the Egyptian comes the better understood phalangian array of the Greeks, doubtless derived from the idea of that "impregnable phalanx" of the Nilish genius and organization which Cyrus found that even his Persians were unable to break. This disposition of force was exquisitely adapted to the Greek systematic and geometrical mind. The mutual dependence which made a phalangite nothing more than a particle of a grand machine was in perfect accordance with the national character. And it would be almost sufficient to prove the thorough efficiency of the discipline arrived at through the training *in* and *for* the phalanx to cite one example which it would trouble the critic to parallel—the march described by Xenophon, known as the "Retreat of the Ten Thousand."

Even although the career of the phalanx was short (say 200 years, from B. C. 550, Cyrus, to B. C. 350, Pyrrhus of Epirus), and it did go down before the Roman legion, its spirit revived from time to time in the return to dense formations, since, after all, the Greeks recognized the phalanx in any army corps disposed in compact order or "in mass," and even applied the term to Roman armies when they were drawn up without intervals (*ordre plein*). Short-lived in comparison, it had already accomplished great things in the "exact" wars which made Greek generals famous, and the tactics of Epaminondas proved a guide for the greatest, a key to success on modern fields. It is claimed that the three classes of the Greek infantry may be considered analogous —the first, the *hoplitæ*, to the grenadiers or to the line infantry; the second, the *peltastai*, to the light infantry; the third, the *gumnetai*, to the riflemen, tirailleurs, or sharpshooters of modern armies. It was in the time of Pericles that the Athenian soldiers were first paid, material changes made in clothing and armor, the second class of infantry intermediate between the heavy troops and skirmishers was added, and the distinction drawn between heavy and light cavalry. This was the acme of the glory of the Greek national citizens. With Alexander, artillery (ballistæ and catapultæ) accompanied armies to the field, and the commissariat became an acknowledged branch of the art of war.

In comparing the phalanx with the legion, in order to express the deficiencies of the former and the better characteristics of the latter, the critic is almost justified in claiming that the first was human, the second divine—the first the creation of human intelligence, the second the result of an inspiration of a superior power, or as Vegetius (A. D.? 375–390) has it: "Non tantum humano consilio sed etiam divinitatis instructu, legiones a Romanis arbitror constitutas," which Clarke translates well: "Heaven certainly inspired the Romans with the establishment of the legions, so superior does it seem to human invention" (xxi. 77), "or the idea of the legion must have been inspired by a god (Saxe, *Traité des Legions*, p. 39), for man was incapable of originating so perfect a military machine"—one destined in the course of events to conquer and consolidate for the future.

A clear idea of the striking difference between the phalanx and the legion can be conveyed to any reader's mind by saying that the first was mass or weight, and the second mobility or momentum; or, as a further demonstration, the first possesses little, the second perfect elasticity; the first little, the second perfect adaptability to any ground. The field had to be fit for the phalanx; the legion could be fitted to any stage of action. The best proof of the inferiority of the phalanx and the superiority of the legion was in one case its limited sphere as to theatre and existence; in the other, the fact that it outlived itself, that its spirit continued to conquer when the substance had almost completely deteriorated—when the legions of Fabius, Marcellus, Marius, Scylla, Cæsar, and Pompey had degenerated into a feeble militia; for instance, when Rome had ceased to be anything but a name; when Stilicho (A. D. 405–406) defeated Radagasius, and compelled a capitulation at Florence which had no parallel in the circumstances, of a monarch made prisoner and in the numbers surrendered, for fourteen centuries and a half, until Sedan, 1870.

It is a somewhat extraordinary fact that the only Eastern nation, the sixth Oriental monarchy, Parthia, the only one which successfully resisted the Roman armies at a period when as yet they had lost none of their efficiency—when it is claimed that among the Romans "the art of war had been brought to its highest point"—never possessed a standing army; their military organization was nearer that of the feudal times than any that we know of in antiquity. In A. D. 217 the Parthian king Artabanus fought a three days' battle at Nisibis with the Romans, and if he did not actually defeat them utterly, he compelled them "ignominiously to purchase a peace" (the mere permission to retreat cost $8,000,000); and, what is still more curious in this consideration, the tactics which lost the battle of the Pyramids won the battle of Nisibis, gunpowder having restored to the infantry the relative force or shock which was previously inherent in the cavalry. In the heavy horsemen (*κατάφρακτοι*) of the Parthians is to be found a perfect exemplification of Marmont's cuirassiers armed with lances or the feudal chivalry. The Parthian light horse represents, as well as the Numidians of Hannibal, the modern hussar, or rather mounted riflemen, if riflemen could shoot from the saddle at full speed, or the estradiots of the Venetian military era.

The principles of the phalanx survived in the Saxon wedge of Harold, and revived again in the Swiss wedge of Sempach, July 9, 1386. In the condition of arms in the ninth, tenth, and eleventh centuries the Saxon wedge (the Roman *cuneus*, only one of the many phases of Roman formation) would have been irresistible had the Saxons, bravest of people, maintained anything like a regular army. It was the scientific wedge to all intents and purposes, driven by the beetle of invincible determination. As in the era of Hastings, even so the principle of the legion gives vitality to the very tactics of our own time. The tactics of Leo VI. (Flavius the Wise, or the Philosopher, A. D. 865–911), with a change of nomenclature and weapons, would serve as a valuable text-book for to-day; and when Gustavus Adolphus inaugurated a new system of tactics, it was a new birth of those of republican Rome, and his triumph at Leipsic (Aug. 28–Sept. 7, 1631) was simply a modern victory of the legion over the phalanx, of the Swedish brigade (open order) over the Tercias (masses) of Tilly.

If this antagonism should be traced back to first principles, it would be found that the contest between the phalanx and the legion has been going on ever since the first shock in arms of organized bodies of men. Even at this day we recognize the principles of the phalanx in the dense column (for instance, that of the English at Fontenoy, that living tower of strength which Foy represented as possessing the magic power of repairing the breaches made in it), and the legion in the deployed line-of-battle. The battle of the Pyramids is a curious example in a case the reverse of one previously stated. Whenever weight was required to resist the shock of momentum the idea of the phalanx revived. On the other hand, whenever the ground would not permit of this massed organization the legionary system prevailed, and the primary idea of the legion was revived in the lines-of-battle. In the Macedonian phalanx was combined all that was excellent in the other different Greek systems, while all their defects were avoided, and every improvement introduced which expediency recommended or necessity required. Thus completed, the Macedonian phalanx was capable of conquering every opposing organization, to be in turn conquered by the world-conquering Romans, as its principle and direction ever must be by superior tactics and greater mobility and adaptability.

The real birth of the modern standing army, in the present comprehension of the term, does not date back farther than the middle of the fifteenth century (1445–48). There were, it is true, from time to time, if not always, imperial and royal guards maintained, like the Varangians of the Byzantine court; also municipal guards, such as those recently in the service of the Free Cities, but standing armies, none. This occurred at the East in the reorganization of the Janizaries by Amurath I., 1350–72, originated by his father, Orchan, 1329. These Janizaries, organized into a regular force when the arrays of the Christian powers consisted of a disorderly militia, were invincible for a long period through a species of discipline to which fanaticism, blind obedience, courage, and enthusiasm gave a strength which it did not possess in reality. It was *esprit de corps*—a substitute, but an imperfect one, for true discipline. Amurath or Murad I. perfected likewise the institution of the *Spahis* (cavalry), and, wonderful foresight, of the *woinaks* (a sort of soldiers of the train). If this is correct, he was 450 years ahead of the first train corps in any Christian army. It is claimed that the Turkish regular army dates from Aladin or Ala-Eddyn (1219–36), but whether this is true or not, it certainly preceded that of Charles VII. by a whole century. Be this as it may, the new birth of the army took place at the West by the establishment of the "Companies of Ordonnance" by Charles VII. of France. It would not be an actual error to style him the father of standing armies, were it not that his regular force did not combine the three arms; it embraced only the second, mounted troops. It remained for his astute son, Louis XI., to perceive that no arm of the three could develop itself without the appropriate support of the other two. He was to Charles VII. what Remington cum suis, and previously Col. Poncharra, as to rifled and breech-loading small arms, and Louis Napoleon (or whoever was the real factor) as to rifled and breech-loading artillery, were to Colonel Ferguson of King's Mountain celebrity; what Torstenson was to Wurmbrand in mobilized cannon 250 years ago; what the infantry system of to-day and of the future is to that of de Guibert. Louis XI. was the father of field-artillery. What his wily brain conceived has been better done or further developed, but the glory of the conception *by* him it is impossible to deny *to* him, the most sagacious, at the same time most unprincipled, king that ever administered French affairs—the first sovereign of Europe styled "majesty." The result was, that his son, Charles VIII., invaded Italy in 1494 (he entered Rome on New Year's day, 1495) with the first real army which the modern world had seen—with the first real army that the Romans, with whom the legion originated, had seen since the legion disappeared from its soil (Charlemagne in Italy, A. D. 773) nearly a thousand years previous, swarmed out by the hordes or hosts of barbarians which superficial history deceives careless readers by styling armies.

Moreover, it is very remarkable that the new birth of a permanent force, with its first train of real artillery, its cavalry, the heavy, very much like that of the Parthians (Κατάφρακτοι), and resembling that recommended by Marmont in his "Institutions," and partially adopted in Russia (cuirassiers with lancers), and its light types of hussars,—this new birth in arms and its advent in the country of art led to a new birth of the arts and sciences. This discovery of Italy had more effect upon the sixteenth century, says Michelet, than that of America. War and commerce inevitably seek the same channels; even so do the arts, for scientific war is always the precursor of peace, and the triumphs of tranquillity are borne along on the lava-floods whereon fertility resumes its sway with greater force and beauty when the fiery torrents have cooled.

It is impossible to refrain from translating a few paragraphs which present a lively picture of the first national army whose descent into Italy cleft the barrier of centuries, whence issued forth to the world through the re-birth (*renaissance*) of the art of war—the new birth of all that elevates, refines, beautifies the advance of humanity; of all that can justify luxury, the inevitable consequence of the development of combined industry and art.

The army, 60,000 strong when it passed the Alps, having left detached corps all along the road, scarcely numbered 30,000 when it reached Rome. But these constituted the very sinew, the boldest and the best armed; relieved of its weaklings and stragglers, it was only the more formidable. To the music of its drums, with cadenced step, the wild battalion of Swiss and Germans led the march. In short tunics and tight pantaloons they shone in a hundred various colors. Many were of enormous stature, and to exalt it the more their casques were surmounted with lofty plumes. Besides the sword, they were armed as a rule with sharp lances of ash; one quarter of them carried halberds—the blade hatchet-shaped, surmounted with a four-sided spike. This (originally the Danish or pole-axe) was a deadly weapon in their hands. It served both to slash and to stab; in fact, represented a gigantic sword-blade bayonet. To each thousand halberdiers there were one hundred musketeers. The Swiss despised the cuirass; the front rank alone wore iron corselets. Behind these Swiss giants marched five or six thousand little, dark-complexioned, sunburnt men, vicious-looking, Gascons, the best marchers in Europe, full of fire, of intelligence, of resources, hard and quick hitters, each of whom was good for ten mortal shots.

The mounted gendarmes followed, 2500, covered with iron, each accompanied by his page and two valets; plus, 6000 light cavalrymen. In appearance these were feudal troops, but in reality the very contrary. As a rule, the captains were no longer noblemen leading their vassals, but the king's men commanding those more noble than themselves. "In France," said Guicciardini, "every one can attain command." The heavy horses of this cavalry, bobbed and cropped in French fashion, without tails and without ears, astonished the Italians, and appeared to them as monsters.

The light-horsemen carried the English long bow of Agincourt and of Poitiers, which launched strong cloth-yard arrows. Thus the French had adopted the weapons of their enemies.

Around the king, on foot, besides the Scotch guard, 300 archers and 200 knights, all gold and purple, shouldering iron maces, served as escort.

Behind these came thirty-six bronze cannon, each weighing 6000 pounds; then the long culverins (guns of position); then 100 falcons (lightest field-pieces), rolling briskly along, not dragged slowly by oxen, according to the Italian method. Each piece had a team of six active horses, on a mobilized carriage, which in action was unlimbered and at once was in battery.

Every beholder comprehended that this display indicated a great revolution in military affairs, and not the mere passage of an ordinary army.

This era of Charles VII., father, Louis XI., son, and Charles VIII., grandson, was an era of warlike innovations in every branch of the military service. Louis XI. was the first French monarch who had a large quantity of cannon. He first introduced cast-iron and bronze guns; cast-iron shot superseded stone bullets, and in his intrenched camp of instruction in 1480 he had a large and respectable park of artillery. During his reign the medical service began to hold up its head for the first time since the legionary organization foundered, with its surgeon to each cohort, its hospital attendants and much of what is now deemed indispensable, but had not been dreamed of for centuries. In the succeeding reign of Louis XII., France had one of those terrible awakenings whose vigor astonishes the world. In 1510, Gaston de Foix being commander-in-chief, a native French Napoleon of the first quarter of the sixteenth century, the French *Enfants Perdus*, or light troops (footmen) appeared, the best marchers for centuries which Europe had seen, and for centuries were to feel. At Ravenna, on Easter Sunday, 1512, they had a fearful baptism of blood and fire. This was the era of the introduction of the German Landsknechts (mercenary foot) and Hachenschützen (arquebusiers), the regimenting of infantry, the protection or support of artillery with picked troops, and "the disappearance of chivalry." Immediately the order of battle of necessity had to be adapted to the use of the rapidly improving firearms, and armies, as men of this century comprehend the term, were in being.

Thus the passage of the Alps by the young king Charles VIII., feeble, big-headed, six-toed to each foot, realized what Bismarck remarked of the Prusso-French war of 1870–71. This invasion of Italy by an organized national army was more than an invasion or an episode of war in the common application of the term—it was a historical phase. The existing conditions of society were crumbling and ready to pass away, and new developments of civilization were in the process of germination or ready for the shock to fecundate them. War is ever the necessary agent of this, and this new birth, like every other bringing forth of any new existence in human affairs, like human parturition, must be accompanied with anxiety intense, agony extreme, and loss of blood profuse; with an actual tearing to pieces. Thus armies are the midwives of progress.

It is in vain for other nations to attempt to deny that the military art and science owe the *impulse* of their progress to France and to French ideas; witness the introduction into all other services of so much of its nomenclature; but they also owe their highest practical development and close application to the Saxo-Germanic mind.

The military forces of Greece and Rome, of all antiquity indeed, except Egypt (native) and Phœnician or Carthaginian (mercenary), and of every other nation prior to 1450, were militia, more or less highly organized, subjected to a greater or lesser degree of discipline and instruction. Whether or not Philip of Macedon maintained a standing army is open to discussion. The advantage of an army of natives over one composed of mercenaries is shown especially in reverses. A national army may be beaten, but it is difficult to destroy it so that it may not revive from its very ashes; as, for instance, that of Rome after Cannæ. It will learn by experience, by being beaten, to conquer or persevere, as was the case with the Romans against Hannibal, the Russians against Charles XII., the Austrians against Frederick the Great, the Allies against France republican and imperial. With mercenaries, however, disaster or dearth is dissolution or worse, as happened more than once to Carthage, and to those who employed German or Swiss landsknechts and reiters. Still, the iron hand of Discipline and the genius of a master like Hannibal could organize invincible troops from the most discordant materials. This would indicate that while nothing can afford an antidote to indiscipline, discipline can remedy almost everything. An idea can make good defective discipline, and ideas amounting to fanaticism almost, but not entirely, supply the place of discipline; but, *cæteris paribus*, discipline is the *nephesh* or living spirit of an army, without which it is dead. Such armies as Hannibal's are like the "Grand Company" of Werner and Fra Moreale in the fourteenth century—vast forces of condottieri, which, led by great captains such as Saxe-Weimar, Baner, Torstenson, and Frederick the Great; their "Monks of the Flag" anneal into masses almost as irresistible as fate. Indeed, Hannibal, greatest of generals and war administrators, has been actually compared to a condottiere on the grandest scale, even though no one was fit to be named as his parallel for eighteen centuries, until Baner, the second Gustavus, and Torstenson, "the inimitable," demonstrated, under similar circumstances, that armies are ever subjected to the same laws and influenced by the application of like qualities in a leader. There was comparatively no discipline in the French republican armies, especially that wonderful army which from the Maritime Alps carried victory eastward to the last Alpine ridge before it sinks into the Austrian plain, and southward to the Gulf of Tarentum. Critics, eye-witnesses, and associates admit this. Enthusiasm took its place, and a belief in its innate force, its invincibility, such as permeated the U. S. army in Mexico, and made the escort of a wagon-train willing to encounter any force which sought to bar its way.

The only existing national army which continues to be militia, pure and simple, is that of Switzerland, unless the old Bönder system still holds good in Norway. The military force or army of Holland was a union of regulars and militia, to the uninitiated something like that of the U. S., but in reality vastly superior and more reliable. Prussia's organization is a union of regulars and militia in the strictest definition of the term (using the word "militia" in the sense of "the gallant and well-exercised militias of the principal republics of Greece," which were overthrown by the forces of Philip of Macedon, that "*may be termed* a standing army"). The Prussian system has been imitated in Sardinia—a feeble imitation, as was demonstrated in the campaigns of Custoza and Novara—and, later, in Turkey, and may be said to operate wherever a Landwehr and Landsturm, "ordinary and extraordinary militia," are recognized as the bases, constituting besides the regular force, equally important elements of the national army.

The famous English bowmen—who won such victories as Falkirk, 22d July, 1298; Halidon Hill, 19th July, 1333; Crecy, 25th Aug., 1346; Poitiers or Maupertuis, 19th Sept., 1356; Agincourt, 25th Oct., 1415; Pinkey, 10th Sept., 1547—were warlike militia, and nothing else—militia in the true sense of the expression, as were the Franks of Charles Martel, and not in the signification in which the term is misunderstood in the U. S. From the time of the Balearic slingers, taught in childhood to rely upon their peculiar weapons for their food (fifth century B. C.), and the Carduchians, who slaughtered the legionaries of Crassus, there were no marksmen or sharpshooters for many centuries, until the Indian wars in America developed the capabilities of the rifle (whose regular introduction into European armies dates from the American Revolution), with the exception of the above-mentioned English long-bowmen, who well deserved the proud term applied to them: "In the forefrount, he (Richard III., no mean general nor authority) placed the archers like a strong fortified trench or bulwarke." These archers were equivalent to such unsurpassed skirmishers as were many of our woodsmen who glorified the war for the Union. Even so from Maharbal to Ziethen and Seydlitz no cavalry existed worthy of the fame which these have connected immutably with their names. Charlemagne's armies are claimed to have been organized according to the old Roman discipline, but this is impossible. Still, that there was an acknowledged system needs no other proof than the success and extent of his campaigns against the most different peoples—from the obstinate Saxon to the intellectual Moor, from the brutish Hun to the Latinized Goth. Each of these had an army of its own, with peculiar weapons and tactics. To meet them the Netherlandish hero and emperor must have had armament, discipline, and a system of logistics. Even without proof the results obviate any demonstration that his armies could not have been mere hordes like those of the Crusaders.

Modern war as a *fixed* or exact science dates from Maurice of Nassau or Gustavus Adolphus, in the beginning of the seventeenth century. The first real articles of war published were those of the latter. The first infantry which, in square, laughed to scorn the efforts of the best existing cavalry, the Polish, at Wallhof, 7th Jan., 1626 (type of Bonaparte's battle of the Pyramids), were likewise his. His was the first artillery, whether its effective development was due to him or Torstenson, which manœuvred and played the part of modern artillery according to modern ideas. His was the first cavalry which charged in successive lines, with reserves or supports to rally on. (Here it may be as well to remark that in appearance, except as to armor, the cavalry of the Thirty Years' war resembled in dress and duties those of the "great American conflict" as near as might be. With their felt hats, drooping feathers, short tunics, heavy boots, scraggy, ill-groomed horses, and accoutrements, the picture of one of their columns might pass for one of ours on a raid.) His were the first field-engineers, although the Turks had retained a rude knowledge of this art, derived from the Romans or Byzantines. Vauban, Montecuculi, and Prince Eugène have left their testimony of this. Witness the last's successful operations against Lille in 1708, "a happy medium between the Turkish mode of never relieving their people until the end of a siege, and our system (British) of so frequently changing." (See "*War in Low Countries*," 34, 35.) His was the first organized staff administered systematically. His was the first camp which bred a series of scientific generals, who, through a succession of great captains, changed the fate of every European nation in whose service they were commissioned. Even in England this was so through Leslie, who crushed Montrose, victor in seven battles, and it might be said in as many campaigns, at Philipshaugh, 13th Sept., 1645. "These warriors, trained in the school of Gustavus and his successor, Bernard of Weimar, Baner, Horn, and the *inimitable* Torstenson, were scattered through the different countries of Europe," etc.

There is no doubt that a number of men ahead of their time, but imbued with the principles of the scientific military past, or taught by personal experience of what was needed, worked in to the result achieved by Gustavus

Adolphus: Simon Stevin of Bruges in fortification; Coligny in rapid marches and concentration and combination; de Rohan in tactics and handling of troops, especially mountain-warfare; Maurice of Nassau in equipment and detail—Maurice, whose camp was the finest school of officers which had existed for centuries; Torstenson for artillery; Königsmark for partisan operations, flying columns, so styled, on a grand scale demonstrating their effectiveness.

But the time has now arrived when a standing army has become a necessity for the maintenance of government. With the introduction of firearms it was no longer a question of individual foresight and exertion, but of national effort and preparation. These last involved time and outlay, the application of a sovereign's prerogatives, a national expenditure. "Among his arguments in favor of standing armies in modern times, Adam Smith enumerates the greater difficulty of preserving any considerable degree of order and prompt obedience from the noise of firearms, the smoke, and the invisible death to which every man feels himself every moment exposed as soon as he comes within cannon shot, and frequently a long time before the battle can be well said to be engaged. 'In an ancient battle,' he says, 'there was no noise but what arose from the human voice; there was no smoke; there was no invisible cause of wounds or death. Every man, till some mortal weapon actually did oppose him, saw clearly that no such weapon was near him.'" With the introduction of small-arms and artillery another new element of success had to be taken into consideration, precision of aim, as well as rapidity of fire. The effects of a point-blank volley delivered by an extensive deployment of cool and practised troops would invariably determine a battle were there no supports or reserves to retrieve the effect of such a volcano. Witness that scathing discharge at thirty paces of Wolfe's veterans upon Montcalm's gallant charge at Quebec, in 1759; or those volleys, again, of the duke of Cumberland's column at Fontenoy, in 1745, which actually annihilated in succession every French line of battle which attempted to stop their audacious advance. It was not until the ammunition of the English was wellnigh exhausted, their formation breached with point-blank discharges of artillery, and the gaps penetrated by fresh and furious cavalry, that, with victory almost within their grasp, the intrepid troops were compelled to relinquish their efforts, and sullenly withdraw from the field of their everlasting glory. (*Henderson's Duke of Cumberland,* 77–96.) The republic of Venice, wisest in its generation, comprehended this at once, and passed laws for the training of its arquebus-men. Very few students are aware of the immense influence in this regard exercised by the elector Maximilian of Bavaria. Had the other Roman Catholic sovereigns evinced a like prescience, the Thirty Years' war might not have eventuated in favor of free thought. Few monarchs ever paid more attention to musketry fire or thorough organization. Fortunately, his sphere was small, and he found few imitators, and his enemies, not his allies, profited by his examples and efforts.

With the Thirty Years' war began a new era of military history, and the world was henceforth to bow beneath the crushing weight of standing armies.

Prussia, which now stands first in rank as a military power, was the first to set an example of the mobilization of cavalry proper and of horse-artillery. Fehrbellin was a turning-point. There the great elector, Frederick the Great's great-grandfather, vanquished those Swedes, hitherto unconquered, who had beaten all others. He demonstrated what singleness of objective, the perception of it and of the value of time and celerity, and determination in execution, must accomplish. These, when combined, constitute the secret of success in war. From this time forward Prussian troops made their mark on almost every battle-field of Europe. The reign which saw these great changes inaugurated—that of Louis XIV.—saw them almost completed. The introduction of the bayonet restored to infantry that aggressive power which was lost with the just contempt of the knights on horseback for the villain or serf on foot. Since then but little changes have occurred, except in amelioration and perfection. The general introduction of uniforms has even been attributed to Louis XIV. This is an error. In his army, however, the identifying regimental clothing was first carried out thoroughly and splendidly. The distinctive dress dates back to the Carthaginians, in whose army every nationality wore peculiar clothing and bore particular arms. For instance, their Spanish forces wore white faced with purple; so the Grecian phalanx had made all the field resplendent with crimson and gold, or brass burnished into the brightness of the more precious metal. In the first we have the type of the Austrian, in the second that of the English uniform. Ezekiel (600 B. C.) alludes to blue as the distinguishing color of the Assyrian uniforms, "clothed most gorgeously." Nahum (710 B. C.) speaks of the "valiant men" of the forces confederated against Nineveh as wearing scarlet garments and as carrying red shields. At Angora (1402), in Tamerlane's army, Mohammed's contingent from Samarcand were uniformed complete by regiments. In the fifteenth century, at the relief of Neuss, the bishop of Münster's troops (7400 men) were clad all in green. In the army of Gustavus Adolphus different organizations wore distinctive colors in cloth and facings. With Louis XIV., however, uniform became the rule, the law. Here we have an army in the strictest sense of the word—regular, paid, permanent, uniformed, armed alike in each arm and branch of the service, disciplined, with pontoon trains, engineer corps; in fact, every appliance which science and service demanded. Never before had such existed. There was room for improvement, but nothing required a beginning. The idea was born and had a strong growth. The future could add little but adaptability to changed customs, habits, advanced and extended civilization. Armies were now tolerably complete as to all working purposes, if not perfectly complete in every particular and detail with staff and staff corps, for the first time since the legion was in its prime. It is well, however, to bear in mind that it was not until the end of 1797 that the staff (*état major*) of armies assumed its present form. In 1682 companies of cadets were formed for the instruction of young men destined for the service. Companies of miners (engineer troops) were now also, for the first time, regularly instructed and embodied. In the next few years and campaigns the value of these organizations was fully tested, and their efficiency proved. At the first siege of Luxembourg, 1684, in which they were present, exercising functions such as engineers of to-day discharge, eight were killed and nineteen wounded. In 1692 another less important but more remarkable change occurred. The pike, which since the first formation of armies, and for thousands of years, had been the principal weapon of infantry, was superseded by the bayonet, introduced, like many other notable ameliorations, such as copper pontoons, improved tactics, etc., by General Martinet, an officer the reverse of the popular opinion entertained of him. Steinkirk, 1692, was the last battle in Europe in which any bodies of infantry were armed with pikes. The contest in which the bayonet was first used is much disputed. According to some, it was at Turin, 1692, and the first charge at Spire in 1703. The pike or half pike, eight feet long, still lingered in the hands of officers, under the name of espontoon or spontoon, down to the beginning of this century, and its manual or mention was to be found in our militia regulations within the memory of the writer: "The militia law of the United States requires that the commissioned officers shall, severally, be armed with a sword or hanger, and espontoon." It is doubtful if this law of 1792 has been repealed.

The armies of Louis XIV. and those confederated against him accomplished all any army had accomplished or can accomplish. Witness Marlborough's march to Blenheim, 13th Aug., 1704, and Eugène's to Turin, 7th Sept., 1706. The first has never been surpassed, the second seldom equalled, in the annals of warlike achievements. Henceforward, the histories of European armies present magnificent efforts in obedience to surpassing genius, but it is always the same old story over again, with a variation of detail, but no important difference.

If judging from cause and effect is a criterion, one of the finest armies that ever existed was that of Cromwell, 1643–58. It deserves attention because it constituted a connecting link between the organizations of Maurice and Gustavus and those of William III., Louis XIV., and Marlborough. For its size it was as complete a working army as the world ever saw. England never possessed a native army but that of Cromwell, if indeed at any time it exhibited one to compare with it. For their day, and perhaps for any day, Cromwell's "Ironsides" were the best mounted, equipped, armed, uniformed, disciplined, and effective cavalry that ever charged an enemy. Their "get up" was in its way perfect, but they were so few they can only be considered as a model *in petto* of what all cavalry should be. In this they resembled the Swedish hussars of the Guard upon whom Nolan dwelt with so much emphasis—a very perfect text for the head of an exercise, with a blank page below.

English infantry, likewise, had already made a name which justified Bugeaud's remark, quoted by Trochu, that it was lucky for the world there were so few of them. Napoleon I. said, "I think that if I were at their head I could make them capable of anything."

But to return to the armies of the close of the seventeenth and first decade of the eighteenth centuries. Little has been better done than they did with the means at their commands, either in field operations or sieges. The siege of Maestricht, 29th of June, 1673, is remarkable for being the first at which European armies made use of the zigzags, or the present mode of tracing approaches in attacking a fortified place. They were introduced by Vauban, who borrowed them from the Turks. It is generally believed that parallels were first employed at this siege; but this is a mistake, and Vauban's talents and skill do not require any erroneous statements to give them a false glare. Trenches, to contain the assailants, had been excavated parallel to the works of the fortress to be attacked from the earliest times. Vauban's improvement consisted in tracing the approach or communication from the parallel, so that it should not be enfiladed, and which the Turks had done long before. Montecuculi, in his Mémoires, talking of the Turks, of whose military skill, as it existed in his time, he had very deservedly a high opinion, says: "They do not construct their trenches upon the shortest line, flanking them with redoubts from distance to distance, but they make them in curved lines, transversal, parallel to the place they are approaching, so that they can neither be enfiladed from the place nor damaged by its cannon."

There is another article in the Turkish system of discipline relative to sieges, as quoted by Montecuculi, which, in a modified degree, might be with advantage introduced into our service. Those who have witnessed the little labor performed by soldiers, the negligence in general of (in other respects) good officers, when employed upon working-parties, the time lost in relieving the detachments, and the hurry they are invariably in to be relieved, will perhaps agree that a medium between the two customs would be an improvement. "They (the Turks) do not change the guards of the trenches nor the working-parties: when they (the troops) have once been assigned to a position, they remain there to the end of the siege; their food, water, wood, and every other necessary are brought to them."

In reflecting upon the stupendous lines of earthworks executed almost at a nod by the opposing armies in the Low Countries in the wars of William III. and Marlborough, thinking men are at a loss whether most to admire the docility and good-will of the soldier, or the great and capacious minds which could conceive and direct such operations. They are equal to anything ever done by the Romans, and only require the pen of a Cæsar to be duly appreciated. Take those thrown up by Villeroi and Boufflers in 1695, from the Lys to the Schelde, twenty miles; those from the Schelde to the Mehaigne in 1701; those from the Little Gette to the Meuse, not less than thirty-two miles, in 1705; from Mons to the Sambre in 1707; those of Marlborough against Villars in 1711, twenty-two miles. Moret, in his "Fifteen Years of Louis XIV." (i. 131), speaks of Boufflers' lines as 150 miles long, enveloping Belgium; and Captain Parkes, who saw them, states in his "Memoirs" (77) that "Villeroi's lines were prodigiously strong;" they "surrounded the whole Spanish Netherlands." Our late civil war furnishes examples parallel to the above: for instance, the defensive works about Washington, D.C., 37 miles long, and strongly fortified; and the lines of the Union and Confederate armies before Richmond and Petersburg, Va.

Some of the marches of that era were likewise extraordinary; twenty-eight miles on a day, with such heavy arms, equipments, and clothing, is astonishing, when carefully considered and the condition of the roads and country taken into account. In Aug., 1711, in turning Villars' "*ne plus ultras*," Marlborough's troops marched sixteen hours without once halting (*Alison*, 281), and in Sept., 1791, the prince of Hesse, 49 miles in fifty-six successive hours (*Ibid.*, 224). Even as late as 1776 the British army in America carried sixty pounds per man, when uniform and equipments, everything, had been greatly simplified and mobilized. The British light infantry wore then a model dress. How much greater was the load under which Marlborough's veterans bore up! Nevertheless, the very movements of the day of Oudenarde are exemplary. In motion at 2 A. M., the allies marched 15 miles and crossed the Schelde to begin a battle which lasted from 3 P. M. until the obscurity of night alone put an end to the firing, and diminished the already wonderful results of the victory.

"Since the days of Marlborough," remarks a distinguished officer of British engineers, Sir James Carmichael Smith, "a most excellent system of tactics has been unquestionably introduced into the British army. Changes of front are made with rapidity and precision; columns are deployed, or the line formed into columns, with an accuracy and celerity formerly never even contemplated. It appears, however, open to discussion, whether, in the great and essential points which ought to form the character of the soldier, such as cheerfulness under privations, readiness to encounter fatigue as well as danger, perseverance under toil, and courage in the field, the army of Marlborough has, or ever can be, excelled."

The next stride in advance in all army organization matters was made by Frederick II. (the Great). With him, however, in many cases it was the practical application of improvements in theory originated in the reign of his common-sense father, so misjudged and misunderstood. As early as the first decade of the eighteenth century the Prussian was the pattern discipline, and Prussian *esprit de corps* acknowledged and renowned. The introduction of the iron ramrod was due to the "Old Dessauer," general-field-marshal of the Prussian armies; and this simple improvement gave a double force to the Prussian infantry, which his tactics—he is considered the father of the world's present tactics—quadrupled again by augmenting their manœuvring capacity. Frederick the Great was his pupil in beginnings, but he soon soared far beyond the vision of the pedagogue. The pupil seemed competent to realize the impossible. He lent "wings to the lightning" by the introduction of flying (horse) artillery (first battery 1759). Under him the reforms in the tactics of the three arms became accomplished facts in active service, but especially on the battle-field. His line tactics were as the working of machinery, and his revival or application of the oblique order of battle gave him victories such as Fame has seldom recorded—gave him one, Leuthen, such as has never been equalled since war has had reliable annals. Under him and his lieutenants, Ziethen and Seydlitz, Europe, the world, first saw cavalry such as it never yet had beheld since those of Hannibal's lieutenant, Maharbal—unless, perhaps, those Trabants of Charles XII. of Sweden, if they were what they were represented to be, and the chimeras dire of opponents without discipline—cavalry such as it should be, such as it never has been since. When the Seven Years' war was forced upon Frederick in 1756 the "use of cavalry in the Prussian army was at its highest perfection." These, whose magnitude can scarcely be comprehended by an unmilitary mind, were still but a few of the great and beneficial changes he inaugurated. He administered, marched, moved, and fought armies as they never had been before handled and battled, and he appreciated, first had a realizing sense, of what was well known, no doubt, as a theory and neglected as a fact, that "an army, like a serpent, goes on its *belly*." But why dwell on Frederick? This world has existed six thousand years, and with the means at his command no equal to "der Einzige" has ever appeared on its stage. Through his army he elevated little Prussia to the rank of a first-rate power. He did more: he showed it the possible future—the way through its army to that future. He did even more: while he enforced a discipline which was hailed as exemplary, he permeated his army and his people with an idea. And Napoleon has left us his witness of a fact that he discovered too late, and to his ruin—that "the moral is to the physical in war as three to one." In regard to every subordinate matter which unites in the consideration of the subject "Army," Frederick's stand is the pre-eminent position of the statue upon the column. He must rank among the very first generals and administrators of the world. Others had and have fought armies grandly and successfully; but he made one—an example of a fighting army, susceptible of everything required of an army. He left an army which, notwithstanding its misfortunes, served as an example, a base-course qualified to bear any weight imposed upon it, as time has shown. It still exists imbued with the Frederickian idea of its invincibility—the first, the cynosure, among the six or seven military powers of Europe: 1, Prussia (or Germany, but Prussia is the vital force); 2, Russia; 3, France; 4, Austria; 5, England; 6, Italy; 7, Spain.

Before closing this article upon the army organization of the seven great Christian powers of Europe in the past—of which, however, only four, Prussia, Russia, France, and Austria, were truly great—the pre-eminence in every respect must be given to Prussia. Russia may have a larger numerical force, but Prussia (or Germany) has the most reliable, and must be regarded as the greatest military power. If the opinion of Napoleon is entitled to consideration, it may be looked upon as perfect. He said that a country in which the whole male population fit to bear arms were cemented together by discipline or grouted into a cohesion by thorough organization, would have a perfect army. Were Prussia's national resources derivative from commerce, internal and external, from fertility of soil and agricultural proficiency, from manufacturing industry and mining commensurate with her military organization—were the nation on a par with the army—there would be scarcely any limit to its aggressive capabilities.

It is a curious fact that the elements or principles of the military system or organization of Prussia are the oldest of which there are authentic records. Of course, in this view of the case the Egyptian must be omitted, because the critic is dependent for his facts upon records which, whatever reliability is conceded, are nevertheless very open to question. Although in the Rosetta Stone a key was discovered, it does not follow that that key unlocks every difficulty. Like the method of interpretation of the inscriptions disentombed at Nineveh, worked out with so much skill and perseverance by the German scholar Grotefend, the result is by no means fixed, and until further corroboration is found it is little better than a process of more or less accurate guesswork.

"The principles of the Prussian system are to be observed in the military institutions of David, the second king of Israel. Like those of Prussia, it is remarkable that the natural foundation of all this grandeur was laid in the very beginning of a civil war of five years' continuance, which, to all appearance, was wasteful, and would be ruinous, both to him and his people. But whilst his enemies, for that reason, left him unmolested, he employed that whole time partly in gaining over the tribes to him, and partly in training up all those who sided with him to arms—his own tribe first, and all the rest gradually as they joined him; and all this under a specious and unsuspected color of keeping up a proper force against Ishbosheth his rival. And as his army at no time exceeded the number of twenty-four thousand men, so small a number created no suspicion, nor gave any jealousy to his neighbors, who never reflected that these troops were changed every month, and an equal number of new men brought into military discipline; or if they observed that it was so after some time, possibly this gave them less suspicion, apprehending that there was less to be feared from a body of raw, undisciplined men; little considering that by this monthly and regular rotation every man in his dominions must in a little time be trained up to arms, and in the course of a few circulations thoroughly disciplined, as in fact it came to pass. For we find him, in little more than eight or nine years, able to withstand the united force of all his neighbor nations invading him at once, which perhaps never was the case of any other prince from the foundation of the world."

"It is true, other princes (Alexander the Great, for example, and Charles XII. of Sweden) have been combined against and invaded by some of their neighbors in the beginning and (as they deemed it) infancy of their reigns; but I cannot recollect that ever I heard or read of any general combination unanimously entered into against any princes of any nation, and yet totally defeated, except David."

Thus far is a quotation from "The Historical Account of the Life and Reign of David," published in London in 1752, just four years before the commencement of the Seven Years' war, when Frederick the Great of Prussia was assailed by a confederation of nations whose population was to his own as nearly, if not more than, twenty-five to one—when the same Prussia which he raised to such a rank among the European kingdoms had fallen lower than he found it in consequence of the Peace of Tilsit: a system analogous to that of David raised it again, through its army, and its army alone, to its pristine position of pride and strength.

Scharnhorst was the chief of the commission for the reorganization of the army. Among its other members was von Boyen, who afterwards became minister of war under Frederick William III. and IV.; Grolmann; and, lastly, the gentle, kind, but particularly clever, Augustus von Gneisenau.

Although to Scharnhorst was entrusted the carrying out the reform of the army, Stein, who reorganized the civil administration, influenced the result materially with his clear sense and master mind. Whatever credit enures to the military men, without Stein all would have come to naught, for he it was first recognized in action that the true foundation of the state was "*the people in its unity*," and that a nation which wished to be respected had first to prove its own self-respect by a spirit of freedom and independence. Scharnhorst's system, in the new organization of the army, was based on the general obligation of all citizens to carry arms for the defence of the country; the monopoly of the nobility with regard to commissions in the army was abolished; any man might rise from the ranks, even to be a general—in war, by bravery and presence of mind; in peace, by military knowledge and acquirements. Corporal punishment was done away with, the pigtail was cut off, and "the worship of pipeclay" vanished. The restrictive clause of the Peace of Tilsit, according to which Prussia was allowed to keep only 42,000 troops, Scharnhorst quietly evaded by making new levies every year, and the trained soldiers returning to their homes, from whence they might be summoned in right time to form the nucleus of an army. The first idea of the "Landwehr" and "Landsturm," which afterwards led to such surprisingly fortunate results, was, even at that time, conceived and first developed by Scharnhorst.

The Russian army, the offspring of Peter the Great, has always, since it deserved the title of an army, been remarkable for the steadiness of its infantry. Zorndorf is one of the most wonderful instances of an infantry blasted away by a superlative infantry, mowed down by an efficient artillery, and stormed into by the finest cavalry in the world, all three arms directed by pre-eminent ability, "beaten without flying;"—an infantry which under a Suwarrow could emulate, and even surpass, the dash of the republican French. But solidity and obedience need nevertheless something more; and it is well to remember the remark of Wellington, who, after witnessing a review of 132,000 Russian infantry, 28,000 cavalry, and 540 guns on the plains of Vertus, 10th of Sept., 1815, said to the marquis of Londonderry, "Well, Charles, you and I never saw such a sight before, and never shall again; the precision of the movements of these troops was more like the arrangements of a theatre than those of such an army; but still, I think my little army would move round them in any direction while they were effecting a single change."

The organization of the English army, based upon voluntary enlistment, has been pronounced by foreign officers of thorough education and acute observation as unworthy of scientific study—that is, for home application, although the United States have borrowed a great deal from it—in the writer's opinion, to their detriment. Great merit, however, has been conceded to the British engineers and artillery. The excellence of the British infantry has been ascribed to the natural qualities of the people, and the dash of its cavalry to their habits of life. Almost all the marvellous achievements of England's footmen must be credited to their unshakable determination or pluck, and the judgment of the Russian general upon the charge at Balaklava, that "it was very magnificent, but it was not war," can be applied with some exceptions to the most notable exploits of the British horse. The staff corps, whose service is connected with logistics, have proved themselves as unreliable as our own developed a capacity which excited the admiration of all competent to criticise. If the former had not been backed by the resources of the wealthiest of nations—profuse expenditure making good the shortcomings of red-tape and misdirection—they would have neutralized all that bravery and fortitude could achieve—qualities which have rendered the British arms pre-eminently conspicuous. The military organization of Spain affords little to instruct, and less to imitate. With rare exceptions—and even the majority of these attributable to foreign direction—the military forces of the Spanish Peninsula have demonstrated a want of efficiency, especially within three centuries, which almost raises a doubt as to the validity of the encomiums lavished upon the Spanish infantry said to have been destroyed at Rocroi. So much so, that unbiassed criticism can equitably ask if the superiority of the Spanish arms in the zenith of their renown was not attributable to circumstances and comparison with inferior opponents, and (except in certain cases, as, for instance, that of Gonsalvo de Cordova, the "great captain") to Teutonic elements, much more than to those of Spanish proper or cognate origin.

Prior to the Prusso-French war of 1870–71 the French army organization was considered the best in Europe, and yet a few days sufficed to demonstrate the hollowness of that which seemed the acme of solidity, and the feebleness of that which appeared adequate to resist any strain. In theory perfect, in application it proved directly opposite. Why? Because it wanted vitality, living, sentient discipline. Thus, for a practical application it was the antithesis to that of the United States—scarcely considered worthy of more than a short paragraph or passing notice in any work consulted upon military affairs. Looked upon by experts as too defective for study, the military system of the U. S. displayed an elasticity and strength which showed that our skeleton formation, through the inherent force of our people, could be clothed upon with the muscle of an athlete, reversing the opinion of the duke of Alva—held for three centuries in Europe as an irreversible judgment—that veterans constituted the bone, sinew, and vital force of an army, to which new troops added no strength, but only plumpness and appearance. This capacity for expansion without destroying efficiency called forth from the famous French engineer-officer Rossel, shot at Sartory by the Thiers administration of vengeance, one of the most eloquent tributes ever paid by an able and accomplished officer to the military force and army of a foreign nation (*Abregé de l'Art de la Guerre*, Paris, 1871): "Since the grand wars (terminating in 1815) progress has been especially a question of technology. In Europe the Prussians alone have shown themselves investigators, and have made war subservient to great political designs, but there is little of art in their campaigns. Theirs are lessons thoroughly learned, theirs are improvisations studied out for fifty years and recited to perfection. But if there is a difference between modern war and war as it was made at the beginning of the nineteenth century, it must be sought out in the study of the war of secession in the U. S. The war of secession was an industrial, progressive war—humane, if the term is acceptable.

"As a military element, the corps of West Point officers is assuredly better (I do not say more instructed) than all the officers of Europe; as a political, a giant democracy, rugged for work, jealous of all its leaders. There all the new methods were tried, all the old ones were resurrected again; now, chambers of mines, such as were constructed in the sixteenth century; now, again, railroad trains brought into play against cavalry. As soon as a warlike procedure is recognized and appreciated, it is pushed to the extreme; abuse or excess of field fortifications; abuse of battles; abuse of skirmishers; of the navy, of guns. There were defences of forts such as should make all the commandants of fortified places in France and Alsace sink into the ground; battles of eight days, without termination and without pity; improvised armies staked and lost in less time than is necessary in Europe for a declaration of hostilities. There war constructed railroads, created ports, turned the course of rivers; to sum up, there the world beheld the application to this terrible science of all the exuberance of life, of a people seriously active, young, intelligent, and incapable of fear.

"Of military genius there was little or none, or at least confined to the second rank. Genius is something not practical, nor of commodious employment—above all, among these republicans. But, to make up for this, there was a very great deal of practical intelligence; the genius of commerce applied to war; the fever of production made use of to destroy. There war is not a speculation or a result, as with us; it is a business; and he was the good general who was capable of figuring out his balance-sheet and passing to his profit account the active and passive balances of the wise use of the time, of the money, and of the blood at his disposal. If we wish to begin anew, it is there in the United States that we must seek the elements and bring them down to our measure." In Von Hardegg's "Vorlesungen über Kriegsgeschichte," published at Stuttgart in 1852, the curious reader will find "chronological tables" that refer to leading works on military matters, which will enlighten him on almost every point referred to under this head, "Army." This valuable work was republished at Darmstadt and Leipsic, 1868, under the title of "Anleitung zum Studium der Kriegsgeschichte." (For a *Review of the present armies of Europe and America*, see Organization — *Existing Army*.)

J. Watts de Peyster.

Army Corps. See Corps d'Armée.

Army List, an official publication issued by the British war office, contains the names of all the commissioned officers in the British army, arranged according to the dates of their commissions. Then come the officers of that portion of the queen's army which belongs exclusively to India. The bulk of the work is filled with an enumeration of all the regiments in the queen's army, and all the officers in each regiment.

Army Register is an annual register published by order of the secretary of war, in compliance with an act of Congress, containing lists of the departments, regiments, and commissioned officers of the U. S. army, with the promotions and casualties for the year.

Army Regulations is the name of a volume published by the U. S. war department, containing rules for the management of troops in camp and field, with instructions for keeping accounts and making returns to the army bureaus. It is based upon the Articles of War and other acts of Congress. (See Articles of War.)

Army Worm, in the Northern States the larva or grub of a night-flying moth (*Leuca'nia unipunc'ta*). It varies considerably in color and size with age and locality, but its markings are characteristic. It is usually from less than an inch to an inch and three-quarters in length; dark gray, with three narrow yellowish stripes above, and a broader one of nearly the same color on each side; thinly clothed with short hairs, especially about the head, which is of a dull yellow color. The ravages of these worms, which sometimes march over grain-fields in great numbers, are best prevented by ploughing a double furrow around or across the field on which they are moving. Then they may be killed by setting fire to straw in the furrows or by turning pigs and fowls (after removal of the crop) into the field. Crows and blackbirds will also destroy them rapidly. The army worm of the Southern States, a near relative of the above, sometimes appears in countless hosts and devours the cotton. In the West Indies its ravages have led to a general abandonment of the cotton crop. Water mixed with 2 per cent. of carbolic acid will, it is said, prevent the mischief. Various other destructive larvæ are called by this name.

Arna. See Arnee.

Arnal'do, or **Arnold of Brescia,** an eloquent Italian reformer, born at Brescia about 1100. He was a pupil of the celebrated Abelard in France, and adopted the monastic life. As a preacher he boldly reproved the prevalent venality, luxury, and corruption of the clergy. He affirmed that the clergy ought not to possess temporal power or property. The second Council of the Lateran, in 1139, condemned Arnaldo as a disturber of the peace, and banished him from Italy. He retired first to France, where he encountered the hostility of Saint Bernard, and next to Switzerland, where he gained many adherents. In the mean time there was formed in Rome a numerous party which favored the principles of Arnaldo and were friends of civil liberty. These revolted in 1143 against the pope, who fled or was driven out of the city. Arnaldo in 1146 returned to Rome, again raised his voice for religious reform, and endeavored to organize a republic. His success was hindered by the violence and excesses of the populace, which filled the city with disorder for nearly ten years. A reaction ensued, and Pope Adrian IV. reduced the Romans to submission by laying the city under an interdict in 1154. Arnaldo was arrested by the aid of the emperor Frederick Barbarossa, and was hanged in 1155. (See D. H. Franke, "Arnold von Brescia," 1825; Gregorovius, "Geschichte der Stadt Rom im Mittelalter;" Clavel, "Arnauld de Brescie, et les Romains du XII. Siècle," 1868.)

Arnal'dus Villanova'nus [It. *Arnal'do di Villano'va*], sometimes called Arnaldus Novicomensis, an eminent physician, born about 1235. He devoted much attention to alchemy, wrote treatises on medicine, alchemy, and religion, and was suspected of heresy. He was employed in diplomacy by the king of Naples. Died in 1312. (See Campegius, "Arnaldi Vita.")

Arnaouts. See Albania.

Arnatto. See Annotto.

Arnaud (Henri), a pastor of the Waldenses and an able military commander, was born in Piedmont in 1641. He commanded the Waldenses (Vaudois), who in 1689 defeated the French in several actions, and recovered their native valleys, from which they had been driven by persecution. He served as colonel in the allied army in the war of the Spanish succession (1702–13). He published a "Histoire de la glorieuse Rentrée des Vaudois" (1710), translated by Ackland (1827). Died in 1721.

Arnauld (Angélique), called also Angélique de Saint Jean, an eminent French nun, born Nov. 28, 1624, was a daughter of Robert Arnauld d'Andilly. She was educated at Port Royal by her aunt, Marie Angélique, and was a zealous Jansenist. In 1669 she was elected prioress of the convent of Port Royal. She acquired a high reputation for piety, learning, and courageous endurance of persecution. She became abbess of Port Royal in 1678, after which she was persecuted by the Jesuits. She wrote memoirs of her aunt, the abbess Marie Angélique Arnauld (1591–1661). Died Jan. 24, 1684. (See Sainte-Beuve, "Port Royal;" also Beard, "Port Royal.")

Arnauld, formerly written **Arnaud** (Antoine), surnamed L'Avocat, a famous orator, born in Paris in 1560, was the most eloquent French advocate of his time. He was also distinguished for his probity. He became procureur-général in 1585. His most memorable performance was his defence of the University of Paris against the Jesuits in 1594. He was the father of four distinguished sons (the eminent Arnaulds of Port Royal) and of six daughters. Died in 1619.

Arnauld (Antoine), called le Grand Arnauld, a celebrated Jansenist theologian and philosopher, a son of the preceding, was born in Paris on the 6th of Feb., 1612. His mother was Catherine Marion. He was educated in the Sorbonne, ordained a priest in 1641, and published in 1643 a work "On Frequent Communion," which was highly esteemed, but gave offence to the Jesuits, of whom he was a constant and strenuous adversary. This book promoted a reform in the style of French theologians. He became a doctor of the Sorbonne in 1641, and engaged in the controversy between Jansenius and his opponents on the subject of grace. Having retired to Port Royal, a convent near Paris, he passed there many years in seclusion, and wrote numerous works on theology and philosophy. In 1650 he published an "Apology for the Fathers" ("Apologie pour les Saints Pères"). He was expelled from the Society of the Sorbonne in 1656, after which the Jansenists were generally proscribed and persecuted, both by the civil and ecclesiastical powers. He aided Pascal in his "Provincial Letters," and Lancelot in a "Grammaire générale et raisonnée." Among his other works are "Logic, or the Art of Thinking," commonly called "The Port Royal Logic" (1662); "The Moral Theology of the Jesuits;" "The Perpetuity of the Catholic Faith touching the Eucharist defended against Sieur Claude" (1669); and "The Practical Morality of the Jesuits" (8 vols., 1683–94). To escape the persecution which the Jesuits instigated, he became an exile in 1679, and passed the remainder of his life in Flanders and Holland. He died near Liege Aug. 8, 1694.

Boileau, who wrote his epitaph, pronounced him the "most learned mortal who ever wrote." Arnauld was distinguished for his earnestness and simplicity of character, his industry, and his alacrity in controversy. His works occupy forty-five closely printed quarto volumes, which were published in 1775–83. (See P. Quesnel, "Histoire de la Vie et des Ouvrages de M. Arnauld," 1697; Larrière, "Vie d'Antoine Arnauld," 1783; Sainte-Beuve, "Port Royal," vol. ii.; Varin, "La Vérité sur les Arnaulds," 2 vols., 1847.)

Arnauld d'Andilly (Robert), an able French writer, born in Paris in 1589, was a brother of Antoine Arnauld (1612–94), and the father of Angélique (de Saint-Jean), noticed above. He was appointed intendant of the army in 1634, and retired to the monastery of Port Royal about 1645. He produced a translation of Josephus's "History" (1669), and wrote autobiographical memoirs (1734), besides two volumes of lives of saints, called "Vies des Saintes Pères du désert." Died Sept. 27, 1674. His son Simon was marquis de Pomponne, and his brother Henry (1597–1694) was a devout and zealous Jansenist, and in 1649 became bishop of Angers.

Arnault (Vincent Antoine), a French poet and dramatist, was born in Paris Jan. 22, 1766. He produced a tragedy, "Marius at Minturnæ" (1791), which was warmly applauded, and other tragedies, entitled "Lucretia" ("Lucrèce," 1792) and "Germanicus" (1816). He was appointed in 1808 secretary-general to the University. He was admitted in 1829 into the French Academy, of which he was chosen perpetual secretary in 1833. Among his works is "Souvenirs of a Sexagenarian" (4 vols., 1833). Died Sept. 16, 1834.

Arnd, or **Arndt** (Johann), a German Lutheran "pietist," born at Ballendstädt Dec. 27, 1555. He began to preach at Quedlinburg in 1590, and removed to Brunswick in 1599. He published a very popular work "On True Christianity" ("Vom wahren Christenthum"), which was translated into many languages. W. Jacques produced an English translation of it in 1815. He was called the Fénelon of the Protestants. He became superintendent at Zelle in 1611. Died May 11, 1621. (See Fr. Arndt, "Johann Arnd, ein biographischer Versuch," 1838; F. W. Krummacher, "J. Arnd's Leben," 1842; Wehrhan, "Lebensgeschichte J. Arndts," 1848; H. L. Pertz, "Commentatio de J. Arndtio," 1852.)

Arndt (Ernst Moritz), a German patriot and popular political writer, was born in the island of Rügen Dec. 26, 1769. He travelled extensively in Europe after he left college, and was appointed professor of history at Greifswalde in 1806. He published a "History of Serfdom in Pomerania and Rügen," and animated the Germans to resistance against Napoleon in his "Spirit of the Times" ("Geist der Zeit," 1807). He also promoted the patriotic cause by many eloquent and spirited poems and prose-writings. His celebrated national song, "What is the German's Fatherland?" ("Was ist des Deutschen Vaterland?"), is, perhaps, the most popular of all the patriotic songs of Germany. He married in 1817 a daughter of the celebrated Schleiermacher. In 1818 he was appointed professor of history at the University of Bonn. He was suspended in 1819 on account of his liberal opinions, but was restored to his chair in 1840. He was a member of the national assembly which met at Frankfort in 1848, but he seceded with the constitutional party in 1849. Among his works is "Souvenirs of my Outward Life" ("Erinnerungen aus dem äussern Leben," 1840). Died Jan. 29, 1860. (See Schenkel, "E. M. Arndt; eine Biographie," 1866.)

Arne (Thomas Augustine), Mus. Dr., a distinguished English musician, born in London May 28, 1710. He was a skilful performer on the violin. He set to music Addison's "Rosamond" in 1731, and gained a high reputation by the music which he composed for Milton's "Comus" (1738). This formed an era in the history of English music. The national air "Rule Britannia" was his composition. Among his chief productions were "Artaxerxes," an opera (1762), and "Eliza," an opera. He married a vocalist named Cecilia Young in 1740. He excelled especially as a composer of songs. Died Mar. 5, 1778. His sister Susanna was a noted performer.

Ar'nee, or **Ar'na,** a large animal of the family Bovidæ, a native of India, is nearly allied to the ox, and congeneric, and is sometimes called *Bos arnee*. It is regarded by some naturalists as a wild variety of the buffalo. It is larger than an ox, and in the full-grown animal one of the horns measures sometimes more than six feet in length.

Arn'heim, von, or **Arnim** (Johann Georg), a German general and diplomatist, born in Brandenburg in 1581. He gained the rank of field-marshal in 1628, and entered the service of Saxony in 1630. He commanded a wing of the army of Gustavus Adolphus at Leipsic in 1631, and was opposed to Wallenstein in 1633. In May, 1634, he defeated the imperialists at Liegnitz. Died April 18, 1641.

Arn'hem, or **Arn'heim** (anc. *Arenacum*), a fortified town of Holland, capital of the province of Gelderland, on the right bank of the Rhine, 57 miles by rail S. E. of Amsterdam. It is very ancient, well built, has a governor's palace, and a famous church containing the tombs of the dukes of Gelderland; also manufactures of paper and cotton and woollen stuffs. A bridge of boats crosses the river here. Sir Philip Sidney died at Arnhem in 1586. It was taken in 1795 by the French, who were driven out by the Prussians in 1813. Pop. in 1881, 42,761.

Ar'nica [from the Gr. *ἄρς, ἀρνός*, a "lamb," on account of the softness of its leaf], a genus of herbs of the order Compositæ, sub-order Tubulifloræ. The flowers of the ray are pistillate and ligulate, those of the disk hermaphrodite and tubular. The receptacle is naked, the pappus bristly. The root, leaves, and flowers of *Arnica montana*, or leopard's bane of Europe, are poisonous when swallowed, and are even irritant to the skin, but are administered as a stimulant in paralytic affections, fevers, and other diseases. They are also applied with benefit to bruises. They contain a volatile oil, a resin, and an alkaloid, arnicine. The root is perennial, the stem about two feet high, simple, with few leaves, bearing a head of flowers of a dark yellow, often two inches in breadth. The *Arnica nudicaulis* and *mollis* of North America possess similar properties. Besides these there are five or more species in the Far West.

Arnim. See Arnheim, von.

Ar'nim, von (Elisabeth or Bettina), a German authoress, born at Frankfort-on-the-Main April 4, 1785, was a sister of Clemens Brentano. She had a very sensitive spirit and ardent imagination. In her youth she cherished a passionate admiration and platonic affection for Goethe, with whom she corresponded. She was married in 1811 to L. J. von Arnim, noticed below. Among her works are "The Correspondence of Goethe with a Child" (3 vols., 1835), which she translated into English, and "Die Günderode" (2 vols., 1840), which are commended as graceful and fascinating. Died in Berlin, Jan. 20, 1859.

Arnim, von (Heinrich), Count, was born in Pomerania in 1824. As envoy to Rome in 1864 he was noted for his attitude toward the Œcumenical Council, and was prominent in 1871 in the negotiations with the French resulting in the Treaty of Frankfort; was ambassador to Paris in 1872 and to Constantinople in 1874, but was dismissed from the service for publishing his Roman despatches. He had a controversy with Prince Bismarck, and was afterward prosecuted for stealing state documents from the German embassy at Paris. After he removed beyond the jurisdiction of the German courts he was sentenced to five years of penal servitude for treason and insults to the chancellor and the foreign office. Died at Nice, May 19, 1881.

Arnim, von (Ludwig Joachim), generally called Achim von Arnim, a popular and fantastic German poet distinguished for his originality, was born in Berlin Jan. 28, 1781. He devoted some years to the study of the physical sciences, and published a "Theory of Electricity" (1799). He was one of the founders of the romantic school of German literature. In conjunction with Clemens Brentano, whose sister, Bettina, he married, he published a collection of songs entitled "The Boy's Wonder-Horn" (3 vols., 1806). Among his works, which exhibit a rich imagination, are "The Poverty and Riches, Guilt and Repentance of the Countess of Dolores," a novel (1810); "Angelica the Genoese and Cosmus the Rope-dancer;" and "The Crown Guardians" (1817). Died Jan. 21, 1831.

Ar'no [Lat. *Arnus*], a celebrated river of Italy, which rises at Mount Falterona in the Apennines, and falls into the sea 7 miles below Pisa, which city, like Florence, is intersected by this stream. Its valley (Val d'Arno) is one of the most beautiful regions in Italy. The banks of the river are partially dyked on account of the floods which sometimes occur, and ordinarily small vessels can ascend to Florence, but since the opening of the railway traffic it is not much navigated. Its length is 150 miles.

Arno'bius (Afer), a Christian African rhetorician of pagan parentage, born probably near Carthage. The events of his life are mostly unknown. He wrote, about 295 A. D., a highty rhetorical work called "Disputations against the Gentiles" ("Disputationes contra Gentes"), in which he exposed the absurdities of paganism. This is not considered strictly orthodox, but it is interesting as an historical document. According to M. Villemain, "It has a character of originality, and a real importance in relation to philosophy and history." (See Neander, "History of the Christian Church;" BAYLE, "Historical and Critical Dictionary.")

Ar'nold (ALBERT NICHOLAS), D. D., born at Cranston, R. I., Feb. 12, 1814, graduated at Brown University 1838, and Newton Theological Institute 1841, ordained pastor of the Baptist church at Newburyport, Mass., Sept. 14, 1841, missionary to Greece 1844–54, professor of church history in Newton Theological Institute 1855–57, pastor at Westborough, Mass., 1858–64, professor of biblical interpretation and pastoral theology in Hamilton (N. Y.) Theological Seminary 1864–69, professor of New Testament Greek in the Baptist Union Theological Seminary at Chicago 1869–73, and author of "Prerequisites to Communion" and "One Woman's Mission." Died Oct. 11, 1883.

Arnold (BENEDICT), an American general and notorious traitor, was born at Norwich, Conn., Jan. 3, 1740. He was apprenticed to an apothecary, from whom he ran away and enlisted in the army, but soon deserted. In his boyhood he was noted for his audacity and unruly disposition. He became a merchant at New Haven, and the owner of several small vessels employed in trade with the West Indies. In this business he failed, and incurred a suspicion of fraudulent dealing. He obtained a commission as colonel in the service of Massachusetts soon after the war broke out, in April, 1775. In the autumn of that year he commanded a force of about 1000 men sent to capture Quebec, and in the long march through the pathless forests of Maine proved himself well fitted for such a service. Having reached the St. Lawrence River, he effected a junction with General Montgomery, who had the chief command. They attacked Quebec in Dec., 1775, but failed to take it, and Arnold was severely wounded. He was raised to the rank of brigadier-general for his service in this campaign. Before and after this event he was involved in difficulties by his rapacity and pecuniary frauds. He commanded a small flotilla which encountered a superior force on Lake Champlain, Oct. 11, 1776, and displayed there such unflinching courage as well as skill that he gained much applause, although he was not victorious. He was deeply mortified by the action of Congress, which neglected him, while it gave the rank of major-general to five of his juniors in rank. In 1777 he was appointed a major-general, but as he remained below the other five, he was still discontented. He took part in the battle of Bemus Heights, Sept. 19, 1777, where he was involved in a quarrel with General Gates. At the battle of Stillwater, Oct. 7, he entered the field without permission from Gates, rushed into the hottest part of the action, rode about issuing orders in every direction, and acted like a madman. He received on that day a severe wound, which disabled him for some months, and Congress at last accorded him full rank. In June, 1778, he was appointed to the command of Philadelphia, where he lived in an extravagant style and ran into debt. While here he married a daughter of Edward Shippen (afterwards chief-justice of Pennsylvania). His official acts here were so rapacious that a court-martial sentenced him (Jan., 1780) to be reprimanded by the general-in-chief. Before this date he had been for six months plotting treason, and had made overtures to the enemy. He now solicited and obtained (in Aug., 1780) command of West Point, the most important fortress in the U. S., which he offered to betray into the possession of Sir Henry Clinton. The agent chosen by the British general to conduct the negotiations with Arnold was Major John André. (See ANDRÉ, JOHN.) Arnold and André had an interview on the 21st of Sept., and made the final arrangements for the surrender of West Point, but in consequence of the capture of André, Sept. 23, 1780, the plot was detected, and Arnold escaped in the British sloop Vulture, Sept. 25. He received about £6300 from the British government as a reward of his treachery. Having joined the British army and issued an address to the American people in vindication of his course, he obtained command of an expedition against Virginia, which sailed from New York in Dec., 1780, passed up the James River, and burned and pillaged a considerable amount of property. In the autumn of 1781 the troops under his command burned New London, Conn. He went to England about the end of the war, and passed many years in that country, where he was generally despised. He died in London June 14, 1801. (See SPARKS's "Library of American Biography," vol. iii.) WILLIAM JACOBS.

Arnold (BENEDICT), a Rhode Island colonist, born in England Dec. 21, 1615, was president of Rhode Island 1663–71. He was a citizen of Providence in 1636, and one of the purchasers of Conanicut Island in 1657. He had a good knowledge of the Indian tongues, and thus greatly befriended the New England colonies. Died in June, 1678.

Arnold (EDWIN). See APPENDIX.

Arnold (GEORG DANIEL), a writer and jurist, born at Strasburg Feb. 18, 1780, became professor of civil law in that city. He published a work on Roman law (1812), and wrote in the Alsatian dialect a comedy of "Whit-Monday," which was praised by Goethe. Died Feb. 18, 1829.

Arnold' (GOTTFRIED), born at Annaberg, Saxony, 1666, died at Perleberg, Prussia, 1714, was minister first at Werben, then at Perleberg, and published (1699–1700) his "Impartial History of the Church" (4 vols.), written on the principle that no individual or sect shall be condemned by history because he was condemned by the Church of his time—a principle to which not only the Roman Catholics, but also the Lutherans, were strongly opposed.

Arnold (ISAAC N.) was born at Hardwicke, Otsego co., N. Y., in Nov., 1815, was called to the bar in 1835, removed to Chicago in 1836; M. C. from Illinois (1861–65), sixth auditor of the U. S. treasury (1865–66), and published a "Life of Abraham Lincoln" (1866). Died Apr. 24, 1884.

Arnold (JOHN), an English watchmaker, born at Bodmin, in Cornwall, in 1744. He improved the chronometer by the invention of the expansion balance and detached escapement. Died Aug. 25, 1799.

Arnold (JOHN W. S.), M. D. See APPENDIX.

Arnold (Dr. JONATHAN), born at Providence, R. I., Dec. 14, 1741, as a member of the colonial assembly brought forward in 1776 a bill repealing the oath of allegiance to Great Britain; was a surgeon in the Revolution, a member of Congress (1782–84). Becoming a resident of St. Johnsbury, Vt., he was long a judge of the Orange county court. Died Feb. 2, 1798.

Arnold (LEMUEL HASTINGS), born at St. Johnsbury, Vt., Jan. 29, 1792, graduated at Dartmouth in 1811, became a lawyer and manufacturer in Rhode Island, was governor of that State, 1831–33, member of Congress, 1845–47. Died at Kingston, R. I., June 27, 1852.

Arnold (LEWIS G.), a general, born in New Jersey, graduated at West Point in 1837, served gallantly in Mexico, and in 1862 became a brigadier-general of U. S. volunteers. Stricken with paralysis in that year while on duty, he was placed on the retired list in 1864. Died Sept. 22, 1871, aged fifty-four.

Arnold (MATTHEW), eldest son of Thomas Arnold, born at Laleham, Middlesex, Dec. 24, 1822, was educated at Rugby; studied in Balliol College, Oxford; became private secretary to Lord Lansdowne in 1847, and was appointed a lay inspector of schools in 1851 and professor of poetry at Oxford in 1857. The collected edition of his poems appeared in 1869, and was reprinted in 1877and 1881. His prose-writings comprise "Essays in Criticism" (1865); "On the Study of Celtic Literature" (1868); "Culture and Anarchy" (1869); "St. Paul and Protestantism" (1870); "Literature and Dogma" (1873); "Last Essays on Church and Religion" (1877); "Irish Essays and Others" (1882). In June, 1882, he delivered the annual Bede lecture at Cambridge, on the subject "Literature and Science," and in the winter of 1883–84 he made a lecturing-tour through the U. S. In 1867 he ceased to hold the chair as prof. of poetry at Oxford. (See his "Discourses in America," 1885.)

Arnold of Brescia. See ARNALDO.

Arnold (PELEG) was a delegate to Congress from Rhode Island 1787–88, and afterwards was long chief-justice of the supreme court of Rhode Island. Died at Smithfield, R. I., Feb. 13, 1820.

Arnold (Gen. RICHARD) was born at Providence, R. I., April 12, 1828, and graduated at West Point in 1850. He entered the artillery, and in 1862 became a brig.-gen. of U. S. volunteers, serving chiefly in the Gulf States. In 1866 he was brevetted major-gen. U. S. A. D. Nov. 8, 1882.

Arnold (SAMUEL), MUS. DR., an English musician, born in London Aug. 10, 1740. He became composer to the Covent Garden Theatre about 1762. His opera, "Maid of the Mill" (1765), was very popular. He produced many other operas, among which are "Rosamond" (1767) and "Inkle and Yarico" (1787). He was appointed organist to the king in 1783. His "Cathedral Music" in 4 vols. is still popular. Died Oct. 22, 1802.

Arnold (SAMUEL GREENE), born at Providence, R. I., April 12, 1821, graduated at Brown University in 1841, and at Cambridge Law School in 1845. He was several times lieutenant-governor of Rhode Island, served for a time as a volunteer in the late civil war, and became U. S. Senator in 1863. He published a "History of Rhode Island" (7 vols., 1859–60), and numerous addresses, reviews, and articles for periodicals. D. Feb. 13, 1880.

Arnold (THOMAS), D. D., an eminent English teacher and historian, born at Cowes, in the Isle of Wight, June 13, 1795. He entered the University of Oxford in 1811, graduated in 1814, and became a fellow of Oriel College in 1815. At college his habits were studious and his opinions liberal. He gained the chancellor's prize for Latin and English essays in 1815 and 1817. He removed to Laleham, near Staines, in 1819, and married Mary, a daughter of Rev. John Penrose, in 1820. In 1828 he was ordained a priest, and became head-master of Rugby School, which he conducted with eminent wisdom and decided success. He cultivated among the students a sense of duty and a high moral and religious tone, and enforced by his example and personal qualities the influence of Christian principles. He was much interested in the political and religious movements of the time, was a Whig or Liberal in politics, and a strenuous opponent of the High Church and new school of theology represented by Pusey. He would not recognize in the clergy any peculiar sacredness or any trace of mediatorial function. In 1832 he purchased Fox How, a small estate between Rydal and Ambleside, where he afterwards spent his vacations. He contributed to the "Quarterly Review" and "Edinburgh Review," published a good edition of Thucydides (1830–35), and five volumes of sermons (1828–42). His capital work is a "History of Rome" (3 vols., 1838–42), which he did not live to finish. It terminates near the end of the second Punic war. "Intellectually," says A. P. Stanley, "his chief excellence lay not so much in the philosophical and biographical department of history, as in analyzing laws, parties, and institutions." He was appointed regius professor of modern history at Oxford in 1841, and delivered there an introductory course of lectures, which were published in 1842. He died June 12, 1842, leaving two sons—Matthew, an eminent poet, and William D. "He will strike those who study him more closely," says the "Quarterly Review" for Oct., 1844, "as a complete character—complete in its union of moral and intellectual gifts; . . . for his greatness did not consist in the pre-eminence of any single quality, but in several remarkable powers, thoroughly leavened and pervaded by an ever-increasing moral nobleness." (See A. P. Stanley, "Life and Correspondence of Dr. Arnold," 2 vols., 1844; Zinzow, "Thomas Arnold," 1869.)

Arnold (Thomas Kerchever), an English clergyman, born in 1800. He published a number of popular textbooks for schools, among which are manuals for the Greek, Latin, French, and German languages. Died Mar. 9, 1853.

Arnott (Archibald), M. D., born in Scotland in 1771, was a surgeon in the English army at St. Helena while Bonaparte was confined there. He attended him at his request, and was greatly esteemed by him. Wrote "An Account of the Last Illness, Decease, and Post-Mortem Appearance of Napoleon Bonaparte." Died July 6, 1855.

Ar′nott (Neil), M. D., F. R. S., born in 1788, near Montrose, Scotland, was educated at Aberdeen and London, became a surgeon in the East India Company's service, settled in London in 1811, as a physician, published "Elements of Physics" (1827), "Essay on Warming and Ventilating" (1832), a "Survey of Human Progress" (1861), etc. He was distinguished as an inventor and as a benefactor of institutions of learning. Died Mar. 2, 1874.

Arnott (William), D. D., born in Perthshire, Scotland, in 1808, educated at the Univ. of Glasgow, ordained in 1839, and subsequently joined the Free Church movement, and was one of its ablest champions. In 1863 he removed to Edinburgh. He was a delegate to the meeting of the Evangelical Alliance in 1873 at New York. D. June 3, 1875.

Arnotto. See Annotto.

Arnould, or **Arnoult** (Sophie), a popular French actress, born in Paris Feb. 14, 1744. She was very successful as an opera-singer, and was distinguished for her wit and conversational powers. Her society was sought by such men as D'Alembert and Diderot, and her beauty was praised by several eminent poets. Died in 1803.

Arns′berg, or **A′rensberg,** a town of Prussia, in Westphalia, is situated on the river Ruhr, 46 miles S. S. E. of Münster. It contains several churches and a gymnasium; also manufactures of broadcloth, linen, etc. In the Middle Ages it was one of the seats of the Vehmic court. Pop. in 1880, 6131.

Arn′stadt, an old town of Germany, in Schwarzburg-Sondershausen, on the river Gera, 10 miles S. of Erfurt, with which it is connected by a railway. It is one of the most ancient Thuringian towns. Here are manufactures of gloves, pottery, etc. A copper-mine has been opened in the vicinity. Pop. in 1880, 10,516.

Arns′walde, written also **A′renswalde,** a town in the Prussian province of Brandenburg, 66 miles N. E. of Frankfort-on-the-Oder, has extensive chemical manufactures. It is on the railroad from Stettin to Posen. Pop. in 1880, 7358.

Ar′nulf [Lat. *Arnul′phus*], emperor of Germany, a son of Carloman of Bavaria. The latter was a grandson of Charlemagne. Arnulf was elected king of Germany in 887 A. D., invaded Italy about 894, and captured Rome in 896. He was crowned as emperor by the pope at Rome. He died in 899, and was succeeded by his son, Louis IV. (See Gagern, "Arnulfi Imperatoris Vita," 1837.)

A′rolsen, a town of Germany, capital of Waldeck, on the Aar, 23 miles N. N. W. of Cassel. It has manufactures of woollen cloth. Here is a fine castle of the prince of Waldeck, with a library of 30,000 volumes. Population, 2148.

Aro′ma (gen. **Aro′matis**), [Gr. ἄρωμα], the principle in plants or other substances which constitutes their fragrance; the peculiar odor of aromatic plants, such as nutmeg, cloves, vanilla, and lavender. It is extremely subtle, and seems to be almost imponderable, as these substances diffuse their odors for a long time without sensible diminution of weight. The aroma of plants is imparted to fixed oils by maceration.

Aromata′ri, degli (Giuseppe), born at Assisi, Italy, about 1586, was a learned physician and naturalist, and practised medicine with great success at Venice about fifty years. His fame reached England, and he received and declined invitations from James II., from the pope, and others. His principal work is "De Generatione Plantarum ex Seminibus," a treatise on the reproduction of plants, showing the analogy between their seeds and the eggs of animals. Died in 1660.

Aromat′ics [Lat. *aromat′ica*, from *aro′ma*, a "spice"], spicy plants or drugs; substances which emit aroma or agreeable perfumes, and are generally characterized by a warm, pungent taste, as cloves, cinnamon, ginger. They often contain essential or volatile oils or resins. The term aromatic is also applied to several animal substances, as ambergris, musk, and castor. (See Aroma.)

Aromat′ic Vin′egar is a compound or mixture of ordinary vinegar with aromatic essential oils, and is a powerful perfume. As it is very volatile, and is an excitant when snuffed in the nostrils, it is used as a remedy for fainting and nervous debility. It is often prepared by combining crystallizable acetic acid with the oils of cloves, lavender, rosemary, and *Acorus calamus*.

Aroos′took, a river of the U. S., rises in Piscataquis co., Me., flows north-eastward through Aroostook county into New Brunswick, and enters the St. John's River. Length, about 120 miles.

Arpád, the national hero of Hungary and the chief of the Magyars, who in 889 A. D. migrated from Galicia, and conquered the Slavonic people of Croatia and Transylvania. He is called the founder of the kingdom of Hungary. Died in 907 A. D. The dynasty of Arpád terminated in Andrew III., in 1301.

Ar′pe (Peter Friedrich), born at Kiel in Holstein in 1682, was professor of law (1717–22) at Kiel, and a learned jurisconsult and writer. He wrote "Themis Cimbrica" (1737), describing the institutions and manners of the Cimbri and other tribes. Died about 1745.

Arpeggio [It. *arpeggia′re*, "to play on the harp"], in music, a chord of which the notes are given in succession; or the sounding the notes of a chord in quick succession, so as to imitate the harp.

Arpent, a French land-measure nearly equivalent to an English acre. The French now measure land by the *hectare* instead of the *arpent*, which is obsolete.

Arpi′no (anc. *Arpi′num*), a town of Italy, in the province of Caserta, is pleasantly situated on high ground, 5 miles S. of Sora. It is surrounded by very beautiful scenery, has a royal college, several churches and convents; also manufactures of woollen cloth, paper, etc. Here is a cyclopean wall and other remains of Arpinum, which was founded by the Volsci, and became a Roman *municipium* about 188 B. C. It is celebrated as the native place of Caius Marius and of Cicero. Variegated and white marbles are quarried in the vicinity. Pop. 6240.

Ar′quebus, Arquebuse, or **Harquebus,** a hand-gun used by infantry before the invention of the musket. It was originally discharged by a match applied to the touchhole. The battle of Morat (1476) is said to have been nearly the first in which it was used. It was at first so heavy and clumsy that it had to be supported on a forked rest planted in the ground before the arquebusier.

Arraca′cha, the native name of an umbelliferous South American plant (*Arracacha esculenta*). It grows in Colombia, Jamaica, and other tropical regions, and is cultivated for its roots, which are large and sweet, and are eaten after being boiled or roasted. The taste is described as between that of a parsnip and a sweet chestnut. This plant was recommended as a substitute for the potato, and attempts were made to cultivate it in England, but that climate was found to be unfavorable.

Ar′rack′, or **Rack,** an alcoholic liquor distilled from fermented rice, is a common intoxicating drink in the East Indies and other Oriental countries. The term is also applied to a strong drink which is obtained from the fermented sap of the palm tree, and is often called palm wine or toddy. Among the species of palms which yield this drink are the cocoanut-palm and the date-palm. Arrack is imported into England, and used to make punch. When new it has an oily and disagreeable taste, which is improved by age.

Arragon. See Aragon.

Ar'rah, a town of British India, in the presidency of Bengal, 25 miles W. of Dinapoor. The British here gained a victory over the mutinous Sepoys in 1857. Arrah was the scene of several exciting incidents of that mutiny. Pop. about 15,000.

Ar'ran, an island of Scotland, in the Frith of Clyde, county of Bute, 13 miles W. of Ayrshire, and 4 miles E. of Cantire. It is about 20 miles long, 12 miles wide, and has an area of 165 square miles. The surface is mountainous, the granite peaks of the northern part being remarkably grand. Here is a cavern in which Robert Bruce once hid himself. The geology of Arran, it is said, presents a greater succession of strata than any other equal portion of the British isles. The south-eastern half consists of Devonian sandstone, trap-rock, and carboniferous strata. The north-western half exhibits a central granite nucleus, bordered by mica-slate on one side, and by lower Silurian rocks on the other sides. Pop. about 6000.

Arran, Earls of (1762); Viscounts Studley and Barons Saunders (1758, in Ireland), and baronets (1662), a noble family of Great Britain.—Philip Yorke Gore, the fourth earl, was born Nov. 23, 1801, and succeeded his uncle in 1837. The dukes of Hamilton in Scotland also have the title of earls of Arran.

Arran, South Isles of, three small islands at the entrance to Galway Bay, about 4 miles from the W. coast of Ireland, and 27 miles W. of the city of Galway. They are named Inishmore, Inismain, and Inishere (or Innishere). Area, 18 square miles. They once contained twenty churches and monasteries, and a church built in the seventh century is still standing in one of them. Here are also remains of cyclopean forts of unhewn stone, supposed to have been built in the first century, and described as among the most magnificent barbaric monuments of Europe.

Arrangement, a musical term, denotes the adaptation of a piece of music to an instrument different from that for which it was originally composed, as when orchestral compositions are adapted to the piano. The arrangements of Franz Liszt are said to be superior to nearly all others.

Arras (anc. *Nemetacum*, afterwards *Atreb'ates*), a fortified city of France, capital of the department of Pas-de-Calais, on the river Scarpe and on the Railway du Nord, 48 miles by rail N. E. of Amiens, and 120 miles by rail N. N. E. of Paris. It was formerly the capital of Artois, and was the seat of a bishop as early as 390 A. D. It was fortified by Vauban, and ranks as a fortified town of the third class. The citadel is separated from the town by an esplanade, but it is enclosed within the same wall. Arras is well built, partly on a declivity and partly on flat ground, and is adorned by fine public buildings, among which are a cathedral, a town-hall, and a theatre. It has a museum, a school of design, and a public library of about 36,000 volumes. Here are manufactures of hosiery, lace, woollen and cotton goods, etc. In the Middle Ages it was so famous for its tapestry that this article was commonly called *arras* by the English. It was the birthplace of Robespierre. The grain-market of Arras is said to be the most important in the N. of France. Pop. in 1881, 27,041.

Arras'tre, a mill used in Spain and the Spanish colonies for grinding gold and silver ores. It is a circular basin of granite or other hard rock, in the centre of which a vertical wooden shaft revolves, with four horizontal arms, to which large flat stones are attached by chains. The ore is broken into small fragments before it enters the arrastre. The revolution of the shaft is produced by two mules. (See Silver, by Prof. W. P. Blake.)

Ar'rawak In'dians, a race or collection of tribes in Guiana, remarkable for the euphony of their language and their mild and friendly disposition towards the whites. They were formerly very numerous and powerful. They have been much benefited by the labors of Moravian missionaries.

Arreoy', or **Areoi,** the name of a licentious society in the Society Islands, composed of both sexes. They were bound to kill all their offspring immediately after birth. The arreoy was first noted by Captain Cook, and more fully described by Ellis in his "Polynesian Researches."

Arrest' [Old Fr.], the apprehension or seizure of a person by lawful authority, usually by the command or direction of some court or officer of justice. It may take place either in civil or criminal cases.

(1) *In Civil Cases.*—In this instance it may be either on *mesne* or final process. The object of the first is to make it certain that the defendant will answer the order of the court. He may either remain in custody or give bail, according to the rules of practice, as security for his appearance. On final process the arrest is in the nature of an execution. The defendant is to be kept in confinement, either in jail or within prescribed limits, until the judgment is satisfied, or until he is discharged by order of the court. In the early common law an arrest was allowed almost as a matter of course, imprisonment for debt being the regular practice. This rule is now greatly modified, and by a statute in England and in a number of the American States an arrest can only be had in special cases and upon a judge's order. The facts necessary to be shown as a basis for the order are presented on affidavit. There are certain persons privileged from arrest by rules of general prevalence, such as members of legislatures, or witnesses while attending the sessions of the legislature or courts, and while going to and returning from the same. The arrest in such cases is irregular, and the party arrested may be discharged on motion. This privilege is secured to members of Congress by the U. S. Constitution. An original arrest cannot be made on Sunday, nor is it lawful to break into a house for this purpose, owing to the legal rule that "a man's house is his castle." This rule does not apply where the defendant has been rescued, and the officer is proceeding regularly to retake him. The common law permits an arrest by night as well as by day. This rule is sometimes affected by statute.

(2) *In Criminal Cases.*—The power to arrest in this class of cases is much less restricted. None are privileged (except ambassadors and their servants), outer doors may be broken open, Sunday is not regarded, and a warrant is not in all cases essential. Such an arrest is made either under a warrant, or by an officer without a warrant, or by a private person without a warrant. A warrant is granted by a magistrate on information in writing and supported by oath, and is executed by the person to whom it is addressed, usually a sheriff or constable. An arrest may be made without a warrant by a peace officer, such as a sheriff or constable, when a felony or breach of the peace is committed in his presence, or where a felony has been committed, or he has reasonable ground to suspect that it has been, though not in his presence, and he has also reasonable ground to suspect the party arrested. The right of a private person to make an arrest without a warrant is much more restricted. He must be prepared to show that a felony has been *actually* committed, as well as reasonable grounds of suspicion that the party arrested was the wrong-doer. A private person is bound to arrest for a felony committed in his presence. In making an arrest necessary force may be used, and in case of felony even life may be taken where arrest is enjoined. An arrest can only properly be made within the jurisdiction of the court. When a person charged with crime escapes from one State to another, his return may be demanded under the laws of Congress. Should he escape to a foreign country, he may in certain cases be retaken under an extradition treaty with that country. (See Extradition.)

The word "arrest" is also used in law in connection with judgment. This means that judgment is not to be entered, although a verdict has been given, on account of some reason appearing upon the record, as where the allegations in the pleadings are not a sufficient basis for an action.

T. W. Dwight.

Arrest', d' (Heinrich Ludwig), an astronomer, born in Berlin in 1822. Died June 14, 1875.

Arrhidæus (Philip). See Appendix.

Ar'rian [Gr. 'Αῤῥιανός; Lat. *Arria'nus Fla'vius*], a distinguished Greek historian, born at Nicomedia, in Bithynia, about 100 A. D., was a pupil and friend of Epictetus. He was a Stoic in philosophy, edited his master's "Manual of Ethics" ("Enchiridion"), and wrote the "Lectures of Epictetus" in eight books, of which four are now extant. In 136 A. D. he was appointed governor of Cappadocia by Hadrian. He is said to have served in the army against the Goths and Alani. He chose Xenophon as his model in composition. His most important work is a "History of the Expedition of Alexander the Great," 'Ανάβασις 'Αλεξάνδρου ("The Ascent of Alexander"), which is the chief authority on that subject, and is highly esteemed for accuracy, good judgment, and impartiality. Among his extant works are "Indica," an account of India, a "Treatise on Hunting," and a "Voyage Around the Euxine Sea." (See Mauermann, "Arrianus Nicomediensis et Quintus Curtius Rufus," 1835; Ellendt, "De Arrianeorum Librorum Reliquiis," 1836.)

Arria′za (Juan Bautista), a Spanish poet, sometimes called **Arriaza y Superviela,** was born at Madrid in 1770. He passed some years in London as secretary of legation, and published in 1803 "Emilia," a poem on the influence of the fine arts. Having returned to Spain in 1807, he took an active part in politics, and wrote in support of absolute monarchy. He obtained an important position in the department of foreign affairs. In 1810 he produced "Poesias Patrioticas." Died in 1837.

Arri′ghi di Casanova (Jean Toussaint), duke of Padua, a Corsican general, was born at Corte in 1778. He entered the French army in early youth, and served with distinction at Marengo, Austerlitz, and Friedland, and was raised to the rank of general of division on the field of Essling in 1809. He lived in exile from 1815 to 1820; was elected to the Legislative Assembly in 1849. Died in 1853.

Arrington (Alfred W.), born in Iredell co., N. C., in Sept., 1810. His father, Archibald, was a member of Congress 1841–45. The younger Arrington was a Methodist preacher (1829–34), winning much distinction for eloquence. In 1834 he became a lawyer, practising in Missouri, Arkansas, and Texas. He was a district judge in Texas (1850–56), and in 1857 removed to Chicago, where his career as a lawyer was very brilliant. He was the author of a celebrated "Apostrophe to Water," often quoted. Died Dec. 31, 1867.

Ar′ris [from the Lat. *aris′ta*, the "beard of an ear of grain," the "prickle of a fish"], in architecture, the edge or angle formed by two surfaces meeting each other, or the line of meeting of two planes in a sharp edge; a term sometimes applied to the edges which separate the flutings of a Doric column.

Arrivabene (Ferdinando), born at Mantua, Italy, in 1770, a jurist and philologist, was president of a court in Brescia. Among his works is a historical commentary on Dante. Died in 1834.

Arro′ba, a Spanish weight and measure, used also in Brazil and the Spanish colonies. There are ten kinds of *arroba* for weight, ranging between $21\frac{82}{100}$ pounds avoirdupois and $32\frac{52}{100}$ pounds avoirdupois. Only two of the number are as great as 28 pounds. There are eleven kinds of *arroba* for liquid measure, ranging from $2\frac{72}{100}$ gallons to $9\frac{91}{100}$ gallons. The arroba for Spain generally is (or was, as it is abolished) $4\frac{26}{100}$ gallons.

Arrondissement, a French term, signifies a district or circuit, and is the name of the principal civil divisions of the departments of France. Each department is divided into arrondissements, each arrondissement into cantons, and each canton into communes.

Ar′roo′, Aroo, or **Arru Islands,** a group of islands in Australasia, situated between lat. 5° 20′ and 6° 55′ S., and between lon. 134° 10′ and 134° 45′ E. The largest island is 70 miles long and 20 miles wide. Some of the natives have adopted Christianity. Here is a town called Dobbo, into which British goods are imported annually to the amount of about £30,000. The exports are pearls, trepang, and birds of paradise. Pop. of islands about 60,000.

Ar′row, a long, pointed, and barbed missile formerly much used in war and the chase, and discharged from a bow, cross-bow, or ballista, and even now used by some savage nations. Among the varieties of the arrow were the "cloth-yard arrow" once used by the English archers, and about one yard in length, and the "quarrel," a heavy arrow discharged from the cross-bow. Some South American Indians discharge light poisoned arrows from a blowpipe. Poisoned arrows are used by many barbarous peoples.

Ar′rowhead (*Sagitta′ria*), a genus of aquatic plants of the order Alismaceæ, natives of both cold and tropical climates. They have unisexual flowers, with many stamens and many carpels, which are compressed and one-seeded. The *Sagittaria sagittifolia*, a native of Europe, is a beautiful plant with arrow-shaped leaves, which rise above the surface of the water. The *Sagittaria variabilis* of the U. S. is very similar to it. The *Sagittaria Sinensis* (Chinese arrowhead) is cultivated in China in ponds and ditches for the sake of its nutritious corms, which abound in starch.

Arrow-Headed Characters. See Cuneiform Inscriptions, by Rev. William H. Ward.

Ar′row-Root, the starch or fecula from the root of the *Maranta arundinacea* and other species of *Maranta*. It is much esteemed as an easily digestible diet for infants and invalids. Large quantities of it are imported into the U. S. and Europe from Bermuda and Jamaica, where it is cultivated. It is also raised in Georgia and Florida. The roots, or rather rhizomes, yield about 25 per cent. of this starch, which is in the form of a light, opaque, white powder. It is often adulterated with potato-starch and other substances. The name arrow-root is said to refer to the use of the fresh roots as an application to wounds inflicted by poisoned arrows; and the expressed juice has been recommended as an antidote to poisons, and a cure for the stings and bites of venomous insects and reptiles. Some think that the name is really another form of *ara*, which is said to be the Indian appellation of the plant; but it is not improbable that the scales on the root, resembling the point of an arrow, may have suggested the name. In preparing "arrow-root," the rhizomes of the plant, when a year old, are washed, carefully peeled, and beaten in a wooden mortar or by a mill or wheel-rasp to a milky pulp. The pulp is then diluted with water, passed through a sieve of coarse cloth or hair to separate the fibres, and the starch is allowed to settle. Albumen and salts are held in solution, while the starch settles down as an insoluble powder, which is finally dried in the sun. According to Benzon, the fresh rhizomes contain—

Arrow-root.

Starch	26.00
Cellular fibres	6.00
Albumen	1.58
Gummy substances	0.60
Volatile oil	0.07
Chloride of calcium	0.25
Water	65.50
	100.00

The prepared arrow-root is almost pure starch. It has a peculiar firm feel between the fingers, and when rubbed produces a peculiar crackling sound, like that of dry snow in very cold weather. Like starch from other sources, it is insoluble in cold water, but forms on boiling a gelatinous solution.

The purity of arrow-root is best determined by microscopic examination, as, while the starch granules of different plants (see Starch) are almost identical in chemical composition and properties, they are often very peculiar in size, form, and structure. The granules of the genuine Maranta arrow-root are of a regular ovoid form, of nearly equal size, and smooth on their surface; while the granules of potato starch, one of the most common adulterants, are irregularly ovoid, very variable in size, from $\frac{1}{2000}$ to $\frac{1}{300}$ of an inch in diameter, and streaked and furrowed on their surface. The fecula of many other plants is used either as a substitute or an adulterant for the true arrow-root. *Zamia integrifolia* yields an arrow-root in the West Indies and the neighborhood of St. Augustine, Fla. *Arum vulgare* (wake-robin) yields Portland arrow-root in the isle of Portland. *Curcuma angustifolia* yields East Indian arrow-root. *Jatropha Manihot*, the cassava or tapioca plant, yields Brazilian arrow-root. *Tacca oceanica* yields Tahiti arrow-roots. *Alstrœmeria pallida* yields Talcahuana arrow-root. The *potato* yields, by careful preparation, the English arrow-root. Starch similar to arrow-root is also prepared in the West Indies from the roots of *Dioscorea sativa* or yam, of *Colocasia esculenta*, and from the fruit of *Artocarpus incisa* or bread-fruit tree.

For use, arrow-root should be rubbed to a paste with a little cold water, and while this is stirred a considerable quantity of boiling water should be added. It may be sweetened with sugar and flavored with lemon-juice or with wines and spices. For infants it may be prepared with milk. A table-spoonful is sufficient for a pint of water or milk. C. F. CHANDLER.

Arrowsmith (AARON), an English geographer, born at Winston, Durham, in 1750, became distinguished as a publisher of excellent maps, over 100 in number. Died in 1823.—His son AARON (now deceased), and his grandson JOHN, were also noted for the excellence of their maps.

Arrowsmith (JOHN), D. D., born at Gateshead, England, Mar. 29, 1602, and educated at Cambridge, was one of the ablest Puritan divines of his time; became member of Westminster Assembly 1643, master of St. John's College 1644, vice-chancellor 1647, and was regius professor of divinity 1651–55, and master of Trinity College from 1653 till his death in 1659. Wrote "Tactica Sacra," "Armilla Catechetica," etc.

Arsa′ces I. [Gr. 'Αρσάκης], the founder of the Arsacidæ and of the kingdom of Parthia, lived about 250 B. C. His origin and history are involved in much obscurity. He is said to have been the chief of a nomadic tribe of Scythians or Bactrians. All his successors assumed the name of Arsaces.

Arsaces III., king of Armenia, was a son of Tiridates III., whom he succeeded about 340 A. D. He waged war against Sapor, king of Persia, and formed an alliance with Julian the Apostate about 360. The defeat and death of Julian are ascribed to the treachery of Arsaces, who deserted him in the campaign of 363 A. D.

Arsaces VI., or **Mithridates I.,** king of Parthia, enlarged his dominions by the conquest of Bactria, and extended his conquests to the Indus. In 138 B. C. he defeated Demetrius Nicator of Syria. After a reign of twenty-five years or more, he died about 135 B. C.

Arsac′idæ, the name of a dynasty of Parthian kings which was founded by Arsaces in 250 B. C., and continued to reign until 226 A. D. The last king of this dynasty was Artabanus IV. (Arsaces XXIX.).

Arsamas, or **Arzamas,** a town of Russia, in Nizhni-Novgorod, is on the river Tiosha, 249 miles E. of Moscow. Pop. in 1882, 11,695.

Ar′senals, public establishments designed for the manufacture and storage of arms and military equipments. The name is derived from the Latin *Arx*, applied to the citadel or central tower of a fortified place, as the part best capable of defence. This became the storehouse for spare arms and warlike material, and hence like depositories were called *Arsenals*.

Weapons of war used more than 1700 years before the Christian era are known to us from sculptures upon old monuments and from arms found in catacombs and tombs of that period. The earliest Egyptian sculptures show foot-soldiers armed with swords, javelins, clubs, slings, and the bow and arrow; and kings, or high officers, on horseback or in chariots, with like offensive weapons, and protected by helmets, shields, or shirts-of-mail. As the Egyptians are the first nation known to have had a military system, we may consider their weapons to have been the earliest weapons of war. Succeeding nations changed very slowly; all of those prominent during the period known as the "*warfare of antiquity*" used nearly the same kind and shape of weapons. Thebes, Carthage, Babylon, Athens, Tyre, and Rome were then the great cities of the world whence the warrior-kings started their military expeditions, and must have all been in turn active workshops for the manufacture of weapons.

The warfare of the Middle Ages is usually said to date from the time of the emperor Augustus of Rome, and to extend to the introduction of the use of gunpowder in war. Although this epoch witnessed great improvements in the organization and discipline of the better class of troops, and in the character of some of the warlike implements used by them—especially in the mechanical excellence and skill shown in their construction—the general form and kind of the chief personal weapons appear to have remained much the same as during the period of ancient warfare. Weapons and armor of the Middle Ages have been preserved to our day in numerous Arsenals and Museums, and specimens of the workmanship of many centuries can be found, requiring almost the same words to describe and name them as those we use for the Egyptian arms nearly 3000 years older.

The chief changes in offensive weapons were in the greater length of the horseman's spear and sword, and in the stronger bows (made of steel and hard wood), giving greater propulsive force to the missiles used with the cross, and long, bows. The usual range of this last, we are told, became (in the hands of the Scythians and English) from 3000 to 4000 yards, and experts could shoot *three arrows per minute*.

In the fifteenth century defensive armor for man and horse had reached the highest point of excellence and embellishment. The trade of the armorer was in great repute, and personal contests for prowess and display were the chief occupation of the Nobles. Foreign wars were mere invasions by hosts hurriedly marched into unprepared countries, where, like an army of locusts, they devoured and destroyed all they met. Surrounding walled cities not anticipating attack, the besiegers could by mere numbers shut off assistance, starve the inhabitants into submission, and by the use of catapults, ballistas, and battering-rams, destroy the walls, or by towers, overleap them. Cities thus attacked were often found so helpless against their fate that the besiegers at Rhodes were enabled to construct and move against its walls, without successful opposition, towers 240 feet high by 47 feet wide, and having twenty stories for troops; and, by the use of towers, the Crusaders captured Jerusalem after only two months' siege.

The cities of Europe now most famous for possessing valuable military relics of the Middle Ages are Dresden, Vienna, Delft, Berlin, Paris, Madrid, and London; possibly, interesting and valuable collections may still exist, unvisited by travellers, in some of the once famous cities of Persia, India, China, and Japan, which more intimate intercourse may soon make known to us.

Although gunpowder was used in cannon about the fourteenth century, it was not until near the middle of the sixteenth century, that the first arm light enough to be carried and handled by a single soldier was introduced upon the battle-field. This became the signal not only for a general change in arms and warfare, but in the whole constitution of civil society. Spears, javelins, and bows and arrows were useless to oppose the musketeer; helmets, breastplates, and coats-of-mail could not resist the bullet. Hence, personal armor became a useless encumbrance, as the drilled peasant, with his arquebuse, was found to be superior to the mail-clad warrior and his host of spearmen. The supremacy of the Knights could no longer exist, and the defence of states soon passed from their hands to those of the peasant. War now became a science wherein skill and discipline and *preparation* conquered; not mere numbers, artifice, and brute force. Standing armies and well-supplied arsenals became a necessity for every nation aiming at conquest or independence, for none but the experienced could wage war.

It was near the close of the seventeenth century before all the nations of Europe were supplied with firearms which could be handled with facility and aimed from the shoulder. At this period the Dutch, Spanish, French, and English were the most efficient in war; soon Prussia became distinguished in discipline and organization, and France surpassed others in systematizing its military manufactures and improving its weapons. Each nation sought by drill in the field and skill in the workshop to devise and adopt a *special* system of military organization and of war-material. The French, Prussians, Spaniards, and English established arsenals, armories, foundries, and powder-works, many of which have been diligently improved and extended to our day.

At the time of the Revolutionary war, the U. S. had few arms and no Armories or Arsenals. The arms used at first were gathered from citizens; soon after, supplies were obtained by purchase in France. The earliest manufacture of war-material mentioned is that of powder in Virginia in 1776. Springfield (Mass.) was selected by Gen. Washington as a site for a foundry and laboratory in 1777, and supplies were sent from there to Gen. Schuyler's army in Western New York in July of that year. Brass cannon (chiefly howitzers) were cast in Philadelphia in 1777 (some of which are now at Watervliet Arsenal), and an arsenal was established about this year in Carlisle, Pa. Small-arms were manufactured at Springfield Armory prior to 1787. An armory was commenced at Harper's Ferry (Va.) in 1795, and "three or four additional arsenals and magazines" authorized by Congress at the same time, and others in 1808.

During the war of 1812 small-arms were procured from Springfield and Harper's Ferry, and other ordnance stores, by purchase in the country, or manufacture at the Arsenals. After that war, with the policy apparently of having U. S. Arsenals in each State, several more were authorized, so that in 1847 there were two armories and seventeen arsenals in operation. Of the arsenals, *five* were "Arsenals of construction," and the others "Arsenals for repairs and deposit."

In 1838 Congress authorized a new organization of the Ordnance Corps, and in 1842 placed the Armories (previously under civil superintendence) under the charge of its Officers. The advantages of the change were soon apparent in the publication of a regular "System of Construction—with Drawings," and the "Ordnance Manual," descriptive of the material and dimensions for every article of war-material, and the adoption of patterns which proved efficient and satisfactory during our next war. The siege and field guns, carriages and mortars, friction-primers for cannon, and harness of U. S. MODELS, used in Mexico *for the first time in war*, differed in important details from other systems. The mortar-firing and siege-equipage were especially satisfactory. The advantage of the U. S. system of small-arms (made chiefly by machinery, and of interchangeable parts) was very great. They were promptly repaired in the field, using spare parts ready fitted. The arms, as well as other articles of equipment in the hands of the troops, were kept in serviceable order by Ordnance Soldiers, who, serving siege-guns in action, also opened shops after each day's halt, and established an active arsenal at the citadel of Mexico during the occupation of the city, where many supplies were manufactured as well as repaired.

In 1860 there were twenty-three Arsenals and Armories, and during the civil war nine of the Northern and Western Arsenals were enlarged and employed as "Arsenals of construction," and the working capacity of the Springfield Armory was extended to complete 1000 muskets per day. In addition, a large number of private workshops—for the manufacture of guns and carriages and stores of all kinds—were kept employed, and twenty-five private armories, under charge of the Inspector of Contract Arms, made muskets, carbines, pistols, and swords, according to gauges verified at the National Armory, so that like parts were interchangeable with armory work. A daily product of 1000 muskets was obtained from those making these arms, in addition to the arms made at Springfield.

The Ordnance Department has devoted much attention to the manufacture of cast-iron cannon and powder for use in large guns, improving greatly the endurance and certainty of cast iron in cannon. The results obtained both in smooth-bore and rifled guns have been so favorable that other nations have either adopted or are experimenting with like methods. Great credit is due to the late Gen. Rodman for the many successes achieved in guns and carriages by him, and his name is now inseparably connected both with the mode of *casting cannon cooled from within*, and with the use of *mammoth-grain powder* for large cannon, first suggested and made by him.

It has been proposed to reduce the number of Arsenals, and concentrate all ordinary operations at three or four, so that all (or nearly all) ordnance manufactures could be conducted at each. Rock Island Arsenal, in course of building on this plan, is to include an armory, arsenal, powder-works, and foundry. A similar one is proposed for Cal., and another E. of the Alleghenies, either in connection with, or in addition to, the Springfield Armory. Ordnance and ordnance stores deposited at arsenals are issued in time of peace, by direction of the Sec. of War, through the chief of ordnance; but to meet the current wear in service of arms and equipments dépôts have recently been established in each military department, from which issues are made upon approval of department commanders.

List of Arsenals, Powder and Ordnance Dépôts in the U. S.	Post-office.	Date of building or authorized.	Kind and extent of work.	Present condition.
Springfield Arsenal	Springfield, Mass	1777	Making ammunition, etc	Armory in operation.
" Armory	" "	1785 (about)	Small-arms	
Carlisle Arsenal	Carlisle, Pa	1777	Ordnance stores	Broken up.
Harper's Ferry Armory	Harper's Ferry, Va	1794	Making small-arms	"
Schuylkill Arsenal	Philadelphia, Pa	1800	Laboratory	Transferred to quartermaster's department.
Rome "	Rome, N. Y	1814	Depository	Sold.
Pikesville "	Pikesville, Md	1808	"	Occupied.
Washington "	Washington, D. C	1808	Arsenal of construction	Broken up.
Watertown "	Watertown, Mass	1808	" " "	In operation.
Watervliet "	West Troy, N. Y	1813	" " "	" "
Bellona "	Richmond, Va	1815	Foundry and Arsenal	Broken up.
Champlain "	Vergennes, Vt	1827	Depository	"
Allegheny "	Pittsburgh, Pa	1814	Arsenal of construction	In operation.
Frankford "	Bridesburg, Pa	1816	Arsenal of construction and laboratory for metallic cartridges, caps, and primers for cannon	" "
St. Louis "	St. Louis, Mo	1827	Arsenal of construction	Broken up.
Augusta "	Augusta, Ga	1826	Depository and arsenal for repairs	In operation.
Kennebec "	Augusta, Me	1827	" " "	" "
Baton Rouge "	Baton Rouge, La	1819	" " "	Broken up.
Mount Vernon "	Mount Vernon, Ala	1830	Depository	"
Apalachicola "	Chattahoochee, Fla	1832	"	"
Detroit "	Dearbornville, Mich	1832	"	Occupied.
Fort Monroe "	Old Point Comfort, Va	1826	Arsenal of construction	In operation.
Fayetteville "	Fayetteville, N. C	1836	Depository	Broken up.
Little Rock "	Little Rock, Ark	1837	"	"
San Antonio "	San Antonio, Tex	1857	Depository and arsenal for repairs	In operation.
Charleston "	Charleston, S. C	1836	Depository	Broken up.
Leavenworth "	Fort Leavenworth, Kan	1858	Depository and arsenal for repairs	In operation.
New York "	Governor's Island, N. Y. H	1835	Depository and repairs	Occupied.
Liberty "	Liberty, Mo	1837	"	Broken up.
Columbus "	Columbus, O	1863	"	"
Indianapolis "	Indianapolis, Ind	1863	"	Occupied.
Fort Union "	Fort Union, N. M	1854	Depository and arsenal for repairs	Broken up.
Vancouver "	Fort Vancouver, W. T	1859	" " "	Occupied.
Rock Island "	Rock Island, Ill	1862	Arsenal of construction, armory, and foundry	Building.
Benicia "	Benicia, Cal	1852	Arsenal of construction	In operation.
St. Louis Powder Dépôt, Jefferson Barracks, Mo				In operation.
U. S. Powder Dépôt, Dover, N. J				" "
Cheyenne Ordnance Dépôt				In operation for issues.
Fort Abraham Lincoln Ordnance Dépôt				" " "
Fort Leavenworth Ordnance Dépôt				" " "
Vancouver Barracks Ordnance Dépôt				" " "

P. V. HAGNER, U. S. A.

Ar'senic (symbol As, equivalent, 75), [Lat. *arsen'icum*, from the Gr. ἄρσην, "masculine," "strong," so named on account of its power as a poison], the common name of arsenious acid or white oxide of arsenic, a virulent poison. (See ARSENIOUS ACID.) The name arsenic is limited in scientific language to the metal. Arsenic is found native to a limited extent, but occurs usually in combination with metals or with sulphur, or both. Mispickel or arsenical pyrites ($FeAsS$) is the most abundant arsenical mineral; other minerals containing arsenic are domeykite, Cu_6As_2; algodonite, $Cu_{12}As_2$; whitneyite, $Cu_{18}As_2$; niccolite, $NiAs$; kaneite, $MnAs$; smaltite, $(Co,Fe,Ni)As_2$; skutterudite, $CoAs_3$; cobaltite, $Co(S,As)_2$; gersdorffite, $Ni(S,As)_2$; ullmannite, $Ni(S,As,Sb)_2$; leucopyrite, $FeAs_2$; rammelsbergite, $NiAs_2$; lœlingite; glaucodot, $(Co,Fe)(S,As)_2$; pacite, $FeS_2,4FeAs_2$; alloclasite; sartorite, PbS,As_2S_3; binnite, $3Cu_2S,2As_2S_3$; dufreynoisite, $2PbS,As_2S_3$; proustite, $3Ag_2S,As_2S_3$; tetrahedrite or fahlerz; tennantite; geocronite; polybasite; enargite, $3Cu_2S,As_2S_5$; realgar, AsS; orpiment, As_2S_3; dimorphite, As_4S_3; arsenolite, As_2O_3; mimetite, $3Pb_3(AsO_4)_2,PbCl_2$; berzelite; carminite; pharmacolite, $Ca_2H_2(AsO_4)_2.5H_2O$; hoernesite, $Mg_3(AsO_4)_2.8H_2O$; roesslerite, $Mg_2H_2(AsO_4)_2.12H_2O$; symplesite, $Fe_3(AsO_4)_2.NH_2O$; erythrite, $CO_3(AsO_4)_2.8H_2O$; annabergite, $Ni_3(AsO_4)_2.8H_2O$; cabrerite; köttigite; chondrasenite; trichalcite; olevenite; adamite; conichalcite; bayldonite; euchroite; irroconite; erinite; cornwallite; tyrolite; clinoclasite; chalcophyllite; scorodite; pharmacosiderite; chenevixite; arsenosiderite; pitticite; bendantite; lindadserite. The most important arsenical minerals are those in which arsenic is combined with iron, cobalt, and nickel. Arsenic also occurs in small quantities in many other minerals, specially in antimony ores, iron pyrites, etc., hematite iron ores, the soil, mineral waters, etc. Arsenic is in fact one of the most widely diffused elements in nature.

Owing to its occurrence in antimony ores and iron pyrites, it is liable to find its way into the various preparations of antimony, into sulphuric acid, and the various chemical products of which this acid is the basis, as sodic sulphate and carbonate, hydrochloric acid, superphosphates, etc. In the chemical examination of the bodies of persons supposed to have been poisoned the greatest care is necessary to procure reagents entirely free from arsenic.

Metallic arsenic is prepared by sublimation: (1) from arsenical pyrites; (2) from a mixture of arsenious acid and charcoal.

Arsenic is a brittle metal, of a steel-gray color. On the fresh fracture it exhibits a bright metallic lustre, which soon tarnishes. Its specific gravity varies from 5.62 to 5.96. Its atomic weight is 75. Its vapor density is 10.3995 (air = 1) or 150 (hydrogen = 1); this is double the atomic weight. Hence, the atomic volume is anomalous, being only half that of hydrogen. (See ATOMIC VOLUME.) It crystallizes in rhombohedra. It volatilizes at a dull red heat without previous fusion, with a peculiar odor, described as resembling that of garlic. When heated in the open air it burns with a bluish flame.

Arsenic belongs to the group of elements which includes nitrogen, antimony, and phosphorus. It forms two principal series of compounds: (1) those in which it is triatomic, as $As'''H_3$, $As'''Cl_3$, As'''_2O_3, As'''_2S_3; (2) those in which it is pentatomic, as $As^{v}_{2}O_5$,$As^{v}_{2}S_5$.

(For the detection of arsenic see ARSENIOUS ACID.) With oxygen, arsenic forms two important compounds—arsenious oxide, As_2O_3, and arsenic oxide, As_2O_5, which give rise to arsenious acid, $HAsO_2$, and arsenic acid, H_3AsO_4. With sulphur, arsenic forms three important compounds—realgar, AsS, orpiment, As_2S_3, and As_2S_5. Besides these there is a subsulphide, $As_{12}S$ (?), and a persulphide, AsS_9. Arsenic combines with metals in the same manner as sulphur and phosphorus, which it resembles, especially the latter, in many respects; so much so that it is hardly proper to consider it a metal. Its compound with hydrogen, arsine, AsH_3, is analogous to ammonia, NH_3, and like ammonia is the type of a class of bases, arsines, which correspond to the AMINES (which see).

Metallic arsenic is rarely used in the arts. Lead containing a small proportion of arsenic is used for the manufacture of shot, and iron containing a little arsenic is very fluid when melted, and better adapted for fine castings for which strength is not essential. C. F. CHANDLER.

Ar′senic Ox′ide (symbol As_2O_5), a compound of oxygen and the metal arsenic; in its hydrated state it constitutes arsenic acid. It is found in nature in combination with iron, cobalt, lead, etc., in the minerals symplesite, erythrite, mimetite, etc., mentioned under ARSENIC. It is prepared by heating arsenious oxide with nitric acid. It is deliquescent and very poisonous. It is extensively used in calico-printing, in place of tartaric acid, for developing white patterns on colored grounds in the chloride-of-lime vat. It is also extensively used in the manufacture of aniline red. Combined with metals, it forms an important class of salts, called arseniates, which are analogous to the phosphates.

Arsenious Oxide (or **Anhydride**), As_2O_3, in the hydrated state **Arsenious Acid.**

Occurrence.—It is found native, as the mineral arsenolite, in silky, crystalline crusts on ores of silver, lead, nickel, antimony, etc., in the Hartz Mountains and other localities.

Preparation.—At Reichenstein, in Silesia, arsenious oxide is prepared by roasting arsenical pyrites (mispickel), FeAsS, in a muffle furnace. The vapors pass into a condensing chamber, and are deposited as a powder. This is then twice purified by resublimation from iron pots, being condensed first in powder in a chamber, finally in vitreous masses in the upper part of the subliming vessels. At Ribas, in Catalonia, mispickel is roasted in reverberatory furnaces without muffles, the crude product being subsequently purified, as at Reichenstein. At Andreasberg, in the Hartz, native arsenic is roasted for the silver it contains, the arsenious oxide being obtained as an incidental product. Much arsenious oxide is produced in the roasting of tin and cobalt ores at Altenberg, in Saxony, and of tin ores in Cornwall.

Properties.—Arsenious oxide appears crystallized in one of two different forms, or amorphous: (1) in octahedral crystals, as usually sublimed and condensed on cold surfaces, or as crystallized from its solution in water or hydrochloric acid; (2) in right rhombic crystals, obtained occasionally by sublimation or solution in potash; (3) amorphous, vitreous, or glassy, produced when arsenious oxide is sublimed and condensed on a hot surface, so that before solidifying it passes through a semi-fluid state. It is transparent when first prepared, but gradually becomes opaque and crystalline.

Arsenious oxide usually appears as a very heavy, white, gritty, crystalline powder. It has no decided taste. At 218° C. it volatilizes to a heavy, colorless, odorless vapor, of a specific gravity of 13.85, which condenses to octahedral crystals on cool surfaces. When heated with charcoal, it is reduced to metallic arsenic, with a peculiar odor like that of garlic. In its common octahedral form it is soluble in about 30 parts of cold or 10 parts of boiling water. When thrown into water, a portion floats like wheat flour, while the portion which sinks rolls itself into little round pellets, dry within. It is nearly insoluble in alcohol, absolutely insoluble in ether. It is soluble in hot dilute acids to a greater extent than in water, but it mostly separates on cooling, possessing but little basic power. It dissolves readily in alkalies, forming *arsenites*. It acts as a reducing agent on nitric, manganic, chromic, and hypochloric acids, being changed by them to arsenic acid. It reduces gold from its terchloride. To potassium, carbon, sulphur, phosphorus, and zinc it gives oxygen, with the liberation of metallic arsenic. Distilled with acetates, it yields cacodyl, $As(CH_3)_2$, a compound of a peculiar intolerable odor.

Effect of Arsenious Oxide on the Animal Economy.—Arsenious oxide when taken into the stomach is soon absorbed into the blood, and circulates with that fluid, exhibiting power over certain diseases, especially intermittent fever and skin diseases, as psoriasis, lepra, eczema, etc. It is also classed among the tonics, and is given for nervous disorders, especially those which are periodic. Among the remedies for chorea (St. Vitus's dance) it holds a prominent place. The usual method of administering arsenic is in small doses (from three to five drops) of the *liquor arsenicalis*, largely diluted with water, twice or thrice in the day. It is frequently administered in small granules, which should not contain more than one-tenth of a grain each. Numerous other arsenical preparations are in use in medicine. Externally, arsenious oxide is a powerful caustic, and is considerably used in destroying cancers and malignant growths. Arsenic is sometimes given combined with iodine and mercury (Donovan's solution). Caution is necessary in its use.

The quantity necessary to destroy life varies considerably. Under circumstances favorable for its operation the fatal dose for an adult is from two to three grains. Death from a poisonous dose of arsenic may occur in a few hours, or after the lapse of many days. Arsenic has been used as a slow poison, the symptoms being attributed to inflammation of the bowels from natural causes. In most cases its detection is easy. Arsenic is used by anatomists as an antiseptic, but is dangerous, as it is apt to get into cuts on the hands, and cause disagreeable symptoms. In some countries, especially in Styria, arsenic is taken by the young female peasants to increase their personal attractions. That arsenic can be taken habitually for any length of time would seem an impossibility; and yet such statements are made on unquestionable authority. (See JOHNSTON'S "Chemistry of Common Life.")

The most effective chemical antidote for arsenic is the hydrated sesquioxide of iron, prepared by the rapid precipitation of a solution of a per-salt of iron (as the persulphate or terchloride) by an alkali (as ammonia). The mixture of ferric hydrate with magnesia, obtained by precipitating the iron solution with an excess of calcined magnesia, is still more efficacious. In case of an overdose or of intentional poisoning the following treatment is recommended: Evacuate the stomach by the stomach-pump, using lime-water; administer large draughts of tepid sugar and water, magnesia and water, or lime-water; avoid the use of alkalies, but administer charcoal and hydrated sesquioxide of iron. If the fatal symptoms be averted, let the patient for a long time subsist wholly on farinaceous food, milk, and demulcents.

The Detection of Arsenious Oxide.—Hydrosulphuric acid merely imparts a yellow color to the aqueous solution. If hydrochloric acid be added, a yellow precipitate of tersulphide of arsenic is formed, soluble in sulphide of ammonium, from which it is reprecipitated by acids. The sulphide of arsenic is soluble in carbonate of ammonia, especially on heating. Acids reprecipitate it from this solution. It is readily dissolved by hot nitric acid; also by hydrochloric acid, with potassic chlorate. Argentic nitrate causes no precipitate in the aqueous solution of arsenious acid, but if ammonia be cautiously added, a yellow precipitate of argentic arsenite is produced, readily soluble in an excess of ammonia and in nitric acid. In making this test, add the argentic nitrate, and then (inclining the test-tube) let one or two drops of ammonia run down, so as to form a layer on the surface of the liquid to be tested. Where the two liquids are in contact a bright yellow ring of argentic arsenite will be seen. Cupric sulphate causes no precipitate in the aqueous solution of arsenious acid; but if ammonia be added, as in the last experiment, a yellowish-green cupric arsenite (Scheele's green) is precipitated.

Reinsch's Test.—Metallic copper boiled in a solution containing arsenic, to which hydrochloric acid has been added, becomes coated with a gray incrustation of metallic arsenic, which, if present in considerable quantity, may be detached in scales by long boiling. If the copper, with the incrustation, be removed, dried between pieces of filter-paper, and introduced into a tube closed at one end, the application of heat causes the arsenic to sublime as a shining black ring if much is present, or as a white crystalline ring of arsenious acid if the quantity is small. Metallic zinc precipitates arsenic if the solution be previously acidulated with hydrochloric or sulphuric acid. At the same time arseniuretted hydrogen (AsH_3) is evolved.

Marsh's Test.—This experiment is best conducted in a flask provided with a funnel tube, and an exit tube containing calcic chloride to dry the gas evolved. Into the flask containing granulated zinc and distilled water dilute sulphuric acid is introduced. Hydrogen is liberated, which, passing through the chloride-of-calcium tube, where it is dried, escapes at the extremity of the apparatus. As soon as the air is completely expelled the hydrogen may be ignited. If the solution containing arsenic be now poured into the flask, arseniuretted hydrogen will be evolved, and the color of the flame changed to a livid blue. 1. If a piece of cold porcelain (the cover of a porcelain crucible) be held in the flame, a black deposit of metallic arsenic is produced. This stain disappears when moistened with calcic hypochlorite. 2. If one or two drops of strong nitric acid be poured on an arsenic stain, and then gently evaporated, it is converted into arsenic acid. By adding a drop of argentic nitrate solution, and cautiously neutralizing with ammonia, a brick-red argentic arseniate is produced. An excess of ammonia dissolves the red arseniate. 3. If the exit tube (which should be of hard glass and free from lead) be strongly heated beyond the calcic chloride tube, the arseniuretted hydrogen is decomposed, metallic arsenic being deposited in the form of a shining black mirror on the cold part of the tube. 4. If a short tube be adjusted, by means of a caoutchouc connector, to the extremity of the exit tube, and the gas passed into a solution of argentic nitrate, a black precipitate of metallic silver is produced, while the arsenic passes into solution. On neutralizing the filtered liquid with ammonia, the yellow argentic arsenite is precipitated.

Fleetman's Test.—If a solution containing arsenic be mixed with a large excess of a concentrated solution of potassic hydrate, and boiled with granulated zinc, arseniuretted hydrogen is evolved. A piece of filter-paper, moistened with a solution of argentic nitrate, assumes a purplish-black color if exposed to this gas. This experiment may be conducted in a small flask or large test-tube supplied with a cork, through which passes a small tube drawn to a point.

Dry compounds of arsenic, when heated with sodic carbonate on charcoal in the inner flame of the blowpipe, emit a peculiar garlic odor. Heated with sodic carbonate and a little potassic cyanide in a dry tube, closed at one end, a black mirror of metallic arsenic sublimes.

Arsenites.—Arsenious acid forms with bases a series of salts, which are not very stable, and have been but little studied. "Fowler's Solution" is a solution of equal weights of arsenious oxide and potassic bicarbonate, boiled with water and flavored with spirits of lavender. It contains 64 grains of arsenious oxide in one pint. The sheep-dipping mixtures commonly employed are composed of arsenious acid, soda, sulphur, and soap, which, when used, are dissolved in a large quantity of water, and thus constitute essentially dilute solutions of arsenite of soda. Arsenite of copper, or Scheele's green, is a pigment largely used as a pretty and cheap green paint. The same substance is extensively employed in the manufacture of green paper-hangings for the walls of rooms; and recent inquiries would lead to the belief that rooms covered with paper coated with this green arsenite of copper are detrimental to health, from the readiness with which minute particles of the poisonous pigment are detached from the walls by the slightest friction, are diffused through the room, and ultimately pass into the animal system. It is also said that arsenetted hydrogen, H_3As, a very poisonous gas, is generated in damp weather. Another green pigment is named Schweinfurth's green; it contains arsenious acid, oxide of copper, and acetic acid, and is a double arsenite and acetate of copper. With tartaric acid arsenious oxide forms a salt analogous to tartar emetic. Its formula is $K.AsO.C_4H_4O_6$.

C. F. CHANDLER.

Arse'nius [Gr. 'Αρσένιος], SAINT, was born in Rome about 355 A. D. The emperor Theodosius appointed him in 383 tutor to his son Arcadius. Arsenius retired in 394 to a desert in Egypt, where he lived as an anchorite. Died in 449 A. D.

Ar'sie, a town of Italy, in the province of Belluno, 50 miles N. W. of Venice. Pop. 5317.

Arsin'oë, daughter of Ptolemy I., king of Egypt, was born about 316 B. C. About 300 B. C. she was married to Lysimachus, king of Thrace. She instigated Lysimachus to put to death his son Agathocles (born before her marriage), in order to promote the succession of her own son. By this crime Lysimachus was involved in war with Seleucus, king of Syria, and was killed in 281 B. C. Her sons having been murdered by Ptolemy Ceraunus, she fled to Egypt, and became the wife of her brother, Ptolemy Philadelphus.

Arsinoë, an Egyptian princess, was a daughter of Ptolemy Auletes, and a sister of the famous Cleopatra. Cæsar having conquered Egypt (48 B. C.), took her as a captive to Rome, but soon released her. She was assassinated by Mark Antony in 41 B. C.

Arsinoë, an ancient city of Egypt, capital of a nome, was situated near Lake Mœris, about 50 miles S. S. W. of Cairo. It was originally called Crocodilopolis ("the city of crocodiles") because it had a temple devoted to the worship of those reptiles. Ptolemy Philadelphus gave it the name of Arsinoë in honor of his queen. The site is now occupied by the town of Medinet-el-Faium.—Arsinoë was the name of another city of Egypt, situated at the N. W. extremity of the Red Sea, near the modern Suez. It was an important emporium, connected with the Nile by a canal.

Ar'sis and **The'sis** [ἄρσις, θέσις], two Greek words, signifying "raising up" and "laying down." This musical term denotes the rising and falling of the hand in beating time. It is also applied to the elevation and depression of the voice, and the accentuation of syllables in the scansion of poetry, *arsis* being the stress of voice given to strongly accented syllables, and *thesis* the lesser stress given to other syllables.

Ar'son [from the Lat. *ardeo, arsum,* to "burn"], the wilful and malicious burning of the house of another. There must be an actual burning—an unexecuted attempt to fire a house does not constitute the offence. If the act be negligent instead of wilful, the crime is not committed, and the wrong-doer is only liable to a civil action. The English law on this subject has been modified in this country. Arson is in some instances divided into degrees, and cases included in it which were not offences at common law. It is made a crime by statute law to set fire to one's own house with intent to injure another—as, for example, to defraud insurers. The punishment of arson is severe, and in some of its degrees capital.

Ars-sur-Moselle, a town of Germany, in Alsace-Lorraine, 5 miles by rail from Metz, has vineyards and ironworks, manufactures of paper, instruments, and iron goods. Pop. in 1880, 5989.

Art [from Fr. *art,* which is from Lat. *ars, artem*], signifies (1), the systematic application of knowledge in producing a desired result; and (2), a systematic collection of principles and rules for attaining a desired end. Under this last head the arts are divided scientifically into (1), those which are intended to produce material results, termed the useful arts (those useful arts in which the effects are produced entirely or mostly by machinery or by mechanical contrivances are termed MECHANIC ARTS, which see); and (2), those intended to produce æsthetic results, termed the FINE ARTS (which see), The application of æsthetic principles or the laws of taste to works which are intended to produce a religious effect is termed religious art; the application of the laws of taste to works of a material nature is termed industrial art. (See FINE ARTS.) The word *art* is often used as a collective term for any or all of the fine arts (as the "study of art," a "patron of art"); as relating to the fine arts are also used various derivatives and compounds of the word art (as "artist," "artistic," "art-museum"). (For formative arts, arts of design, etc., see FINE ARTS.)

The term "liberal arts" (*artes liberales*) was applied by the Romans to the higher studies, which only freemen were permitted to pursue. They were summed up in the following verse:

"Lingua, Tropus, Ratio, Numerus, Tonus, Angulus, Astra."

The term "servile arts" (*artes serviles*) they applied to trades which were practised only by slaves. They were summed up in the verse:

"Rus, Nemus, Arma, Faber, Vulnera, Lana, Rates."

In modern times, the term "liberal arts" is applied to the collection of studies in philosophy, science, art, and history which compose the academic and collegiate (ante-professional) course of study; hence, to graduate in the arts, bachelor of arts (A. B.), master of arts (A. M.).

G. F. COMFORT.

Ar'ta (anc. *Ambra'cia*), a town of Albania, 46 miles S. S. E. of Yánina, on the river Arta, here crossed by a remarkable bridge. It is the seat of a bishop, and has a large cathedral, a citadel, and manufactures of coarse cottons, woollens, and capotes. Here are remains of ancient Hellenic walls. Pop. estimated at 6000. (See AMBRACIA.)

Arta, Gulf of (the ancient *Si'nus Ambra'cius*), a gulf of the Ionian Sea, in the N. W. of Greece, lies between Acarnania and Albania, and is nearly landlocked. It is about 25 miles long and about 10 miles wide. The naval battle of Actium was fought near this gulf.

Artaba'nus [Gr. 'Αρτάβανος], written also **Ardavan**

or **Ardovan,** king of Parthia, and the last of the dynasty of the Arsacidæ. He began to reign about 216 A. D., and waged war against the Roman emperor Macrinus. He was defeated and taken prisoner by the Persians under Ardshir, who put him to death in 226 A. D.

Artaba'zus [Gr. Ἀρτάβαζος], an eminent Persian general, a favorite of Xerxes, commanded a large division of the army which invaded Greece in 480 B. C. He took part in the battle of Platæa (479 B. C.), after which he retreated with his division by forced marches to Byzantium, and thence crossed into Asia.

Artabazus, a Persian general and satrap, revolted against Artaxerxes III. in 356 B. C. Having been defeated in battle, he took refuge at the court of Philip of Macedon. He was pardoned, returned to Persia, and fought for Darius at Arbela. He was satrap of Bactria under Alexander after 330 B. C.

Artapher'nes [Gr. Ἀρταφέρνης], a Persian satrap and a half-brother of King Darius Hystaspis. He was appointed satrap of the western part of Asia Minor in 506 B. C. He used his power to restore Hippias, who had been expelled from Athens. About 498 B. C. he subdued the Ionians, who had revolted against the king of Persia.

Artaphernes, a general, a son of the preceding, was associated with Datis in the command of the Persian army which invaded Greece in 490 B. C., and was defeated at Marathon. He also served in the army of Xerxes in Greece, in 480.

Artaud (Nicolas Louis), a French writer noted as a Greek scholar, was born in Paris in 1794. He became inspector of the Academy of Paris soon after the revolution of 1830. He translated the dramas of Sophocles (3 vols., 1827); the comedies of Aristophanes (6 vols., 1830), and the tragedies of Euripides (1832). He obtained the office of inspector-general. Died in 1861.

Artaud de Montor (Alexis François), Chevalier, born in Paris in 1772. He was for many years secretary of legation at Rome, and became chargé-d'affaires at Florence in 1805. Among his works are "Machiavel, his Genius and Errors" (1833), and a "History of the Sovereign Pontiffs" (8 vols.). Died in 1849.

Artax'ata, the former capital of Armenia, on the Araxes, was destroyed by the Roman general Corbulo, rebuilt by Tiridates, and was captured by the Persians in 370 A. D. It is now a mass of ruins.

Artaxerx'es I., Longimanus [Gr. Ἀρταξέρξης Μακρόχειρ; Pers. *Ardsheer Darâzdŭst*], a king of Persia, was a son of Xerxes I., whom he succeeded in 465 B. C. He was called Longimanus ("long-handed") because his right hand was longer than his left. The Egyptians revolted against him about 460, but they were reduced to subjection about 455 B. C. In 449 the Persians were defeated by the Athenian forces of Cimon, near Salamis, in Cyprus. Artaxerxes died in 425 B. C., and left the throne to his son, Xerxes II.

Artaxerxes II., surnamed Mnemon, because he had a good memory, was the oldest son of Darius II. of Persia. He became king in 405 B. C. His younger brother, Cyrus, who was governor of Asia Minor, revolted and raised a large army, in which were 10,000 Greeks. The king, commanding in person, defeated the army of Cyrus at Cunaxa in 401. Cyrus was killed in this action, which was followed by the famous retreat of the Ten Thousand. (See Ten Thousand, Retreat of.) Agesilaus, the Spartan, invaded the dominions of Artaxerxes, and gained several victories, but this war was ended by the peace of Antalcidas (387 B. C.). He put to death Darius, his eldest son, for a conspiracy. He died in 362 B. C., aged about ninety-four, and was succeeded by his son, Artaxerxes III. (See Plutarch, "Life of Artaxerxes;" Diodorus Siculus; Thirlwall, "History of Greece.")

Artaxerxes III. (or **Ochus**), king of Persia, was a son of the preceding. He began to reign in 361 B. C., and disgraced himself by his cruelty and sensuality. Among the important events of his reign was the subjugation of Egypt, which he effected about 350 B. C. Died in 338 B. C. It is supposed that he was poisoned by his eunuch, Bagoas.

Arte'di (Peter), [Lat. *Pe'trus Arcte'dius*], a Swedish naturalist, born at Anund Feb. 22, 1705. He was educated at Upsal, where he formed an intimate friendship with Linnæus. They co-operated on the principle of a division of labor in the field of natural history, and Artedi chose the department of ichthyology, in addition to physiology and mineralogy, which they both cultivated. He visited England in 1734. Soon after his return he was drowned in a canal at Amsterdam in 1735. He left a Latin work on fishes, which Linnæus published in 1738, and which is highly commended. (See Linnæus, "Life of Artedi," prefixed to the work mentioned above.)

Ar'temis [Ἀρτεμις], the Greek name of the goddess Diana (which see).

Artemis'ia [Gr. Ἀρτεμισία], a martial queen of Halicarnassus, was a tributary or ally of Xerxes I., king of Persia. She commanded in person her fleet, which fought for Xerxes against the Greeks, and she displayed skill and courage at the battle of Salamis (480 B. C.). According to tradition, she jumped from the Leucadian rock into the sea and was drowned, because she was disappointed in love.

Artemisia, an Oriental princess celebrated for her conjugal affection and her grief for the loss of her husband, Mausolus, prince of Caria, who died in 352 B. C. She erected to his memory at Halicarnassus a magnificent mausoleum (so called in honor of Mausolus), which was considered one of the seven wonders of the world. Remains of it still exist. According to tradition, she mingled his ashes with her wine and died of grief. (See J. C. Avenarius, "Dissertatio de Artemisia et Mausoleo," 1714.)

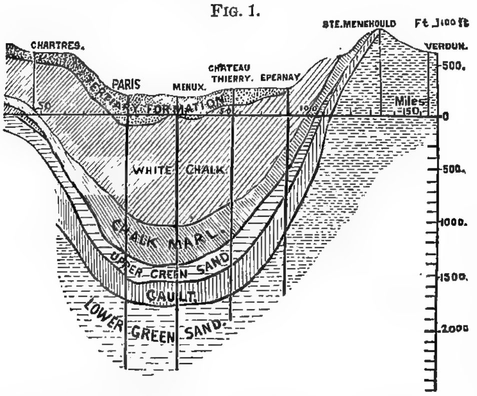
Artemisia, a genus of plants of the order Compositæ, sub-order Tubulifloræ, comprises numerous species of herbs and shrubs, natives of the temperate regions of Asia and Europe. They generally have an aromatic odor, and a warm or acrid and bitter taste. The *Artemisia Absinthium* (or wormwood) grows wild in England and the U. S., is perennial, and has bipinnatifid leaves. Containing a bitter principle and an essential oil, both very strong, it is used in medicine as an anthelmintic or vermifuge. Among the other species which have medicinal properties are the *Artemisia santonica* (Tartarian wormwood or southernwood), a native of Tartary; *Artemisia Indica* (Indian wormwood), which grows on the Himalaya Mountains; *Artemisia arborescens* (tree wormwood), which is a native of the Levant; and *Artemisia vulgaris* (mugwort), which is a native of England. The dried flower-buds of several species of *Artemisia* are sold under the name of wormseed, *semen contra*. The great western plains and arid tablelands of Nevada, Utah, and Colorado are overgrown with the *Artemisia* (*tridentata* and other similar species, popularly called sage brush), which indicates a soil impregnated with alkaline or saline substances.

Ar'tery [Lat. *arte'ria*, plu. *arte'riæ*, from the Gr. ἀήρ, "air" or "spirit," and τηρέω, to "keep" or "preserve," the arteries, until Galen's time, having been supposed to contain air]. Arteries are the vessels which convey the blood passing from the heart to the various parts of the body. The arterial tube is divided into three layers, called the coats of the artery—an external, which is elastic; a middle, which is muscular with elastic layers; and an internal, smooth and lined with fusiform epithelium. The tube is also enveloped in a fibrous sheath. When an artery is completely divided by a sharp instrument, its walls do not collapse, but the orifice contracts, and also retracts into its sheath; a clot then forms and stems the flow till the cut edges of the artery have time to throw out lymph, and heal. All the arteries of the human body (with the exception of the pulmonary) are branches more or less direct of the aorta. Each main trunk divides into two principal divisions—one, the artery of *supply*, which breaks up into branches for the supply of the tissues in the vicinity; and another, the artery of *transmission*, which passes to the parts beyond. These, however, anastomose freely. Thus the femoral artery divides into the *deep* femoral, to supply the thigh, and the *superficial*, to supply the leg below the knee; the common carotid divides into the *external* carotid, to supply the neck, scalp, and face, and the *internal* carotid, to supply the brain. Although arteries have generally in different persons the same distribution of branches, they occasionally vary, and thereby are apt to perplex the anatomist. Wounds of arteries can be detected by observing that the escaping blood is of a bright-red color, and flows in jets or spirts at each pulsation; while blood from a vein is dark, and flows in a steady current. Arterial bleeding is controlled by tying with a thread, by acupressure, by compression between the heart and the wound, or by the application of styptics, etc.

Arte'sian Wells are holes of small diameter (usually between three and six, and rarely exceeding twelve, inches) sunk into the earth, through which the water of subterranean reservoirs or streams rises near to or above the surface. Their name is derived from the province of Artois in France (ancient *Artesium*), where they have long been used; but they were known to the ancients, by some of whose writers they are occasionally mentioned. They were also used in China at a very early period, not only as sources of water, but also of combustible gas and petroleum. A well at Lillers, Pas-de-Calais, bored in 1126, still flows undiminished.

Artesian wells are most readily obtained where the geological formations possess a moderate inclination or "dip," and are composed of strata of materials impervious to water (rock or clay), alternating with such as, like sand or gravel, allow it to pass more or less freely. The rain-water falling where such strata approach to or reach the surface will in great part accumulate in the pervious strata, rendering them "water-bearing." Thus are formed sheets of water confined between two inclined, impervious walls of rock or clay, above as well as below, and exerting great pressure at their lower portions. Where water so circumstanced finds or forces for itself natural outlets, we shall have springs; when tapped artificially by means of a bore-hole, we have an artesian well, from whose mouth the water may overflow if its surface-level be below that of the head of pressure as shown in the figure; the principle being substantially the same as that upon which artificial fountains are constructed. Even in the absence of properly water-bearing pervious strata, accumulation of water may take place or subterranean streams may exist in crevices and fissures. These occur with especial frequency in limestone beds, whose material is more or less dissolved by water; thus very commonly caves and subterranean channels are formed in such regions, and if the beds be sufficiently inclined, head for the rise of water in artesian bores may thus be furnished.

FIG. 1.



Geological section from Chartres to Verdun through the Paris basin. Horizontal scale, 90 miles to the inch; vertical scale, 1500 feet to the inch.

In regions where unstratified rocks prevail, or where the stratified rocks are much disturbed, the finding of artesian water becomes a matter of great uncertainty, and can in general be expected only at considerable depths and at low surface-levels. In formations possessing but a slight inclination or "dip" the head of water-pressure may be many miles distant, and a difference of level between its locality and that of the well may not be at all apparent to ordinary observation. It is thus obvious that the study of the geological structure and general surface-conformation of a region is primarily needful in determining the probability of success in obtaining artesian water in any given locality. Not only can the practicability, as well as the difficulties to be met, be thus in a great measure foreseen, but it can also be ascertained how far the experience acquired in one bore may serve in other cases, and what allowance must be made for difference of location with reference to the head of pressure, as regards depth and the kind of strata to be penetrated. Sometimes a single well-conducted experiment will thus demonstrate the feasibility of artesian wells over extensive areas.

As a matter of course, artesian water brings up with it such other solid, liquid, or gaseous substances as are present in the contiguous rocks, and are either soluble in it, or, like petroleum, will float on it. And as from the depth from which it is brought it is liable to have come in contact with a great variety of materials, and at a temperature which increases with a certain degree of regularity as we descend (on an average at the rate of one degree Fahrenheit for every 60 to 70 feet), it is very common to find artesian water more or less strongly impregnated with a variety of mineral matters, amongst which common salt is perhaps the most frequent. In this respect artesian wells are quite analogous to natural warm springs.

The manner of sinking a bore for artesian water varies with the depth and with the nature of the material or materials to be penetrated. In the surface-soil stratum or other loose alluvial deposits pipes of wood or iron are very commonly driven down by means of a pile-driver. In the alluvial region of the lower Mississippi "drove" wells obtained in this way are quite common, being formed of gas-pipe one and a half to two inches in diameter, whose lower end is a sharp steel cone, perforated for the passage inward of the water, which is struck at depths varying from 20 to 70 feet, and even more. The same mode of obtaining water quickly and easily has been extensively employed during the building of the Pacific Railroad, the pipes being withdrawn and carried forward as the work progressed. It is but rarely, however, that water thus reached rises above the surface.

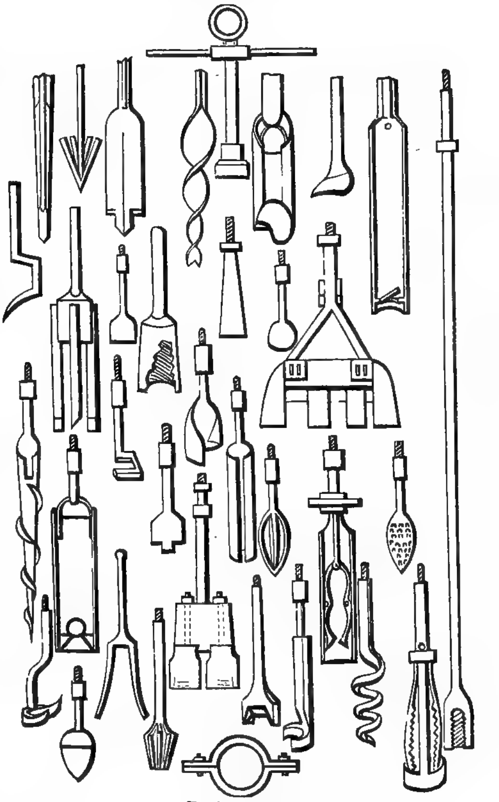
When the material is of a more resisting character, and greater depth has to be attained (as is usually the case), the soil-pipe, whether driven in or set into a hole previously bored by means of an earth-auger, serves to prevent the loose earth from falling in, and as a guide to ensure the verticality of the bore, which is of the utmost importance.

The boring tools are of very various shapes, adapted to the different kinds of rock, clay, or sand of various degrees of consolidation. For hard rock the most generally useful tool is a flat chisel; for clay and soft rock, a long, scoop-shaped bit with a slanting cutter, or with a tapering, twisted, spiral band (somewhat like a "gimlet screw") at the lower end; for sand, the same, or, should it be very clean and damp, a bit resembling a common wood auger, with broad spiral flanges.

In the case of soft rock, clay, and sand, the auger-bit is attached to stiff bars of wood or iron connected by screws, and provided with a cross handle at the mouth of the well, whereby they can be revolved by the workmen. The whole is suspended by a rope working over a pulley attached to the top of a tall tripod or other scaffold or derrick, and winding on a windlass or whin; the connection between the head of the auger and the rope being so arranged that the latter is not twisted by turning the former. Thus, whenever by boring the auger has become so full as to threaten clogging, it is readily hoisted out with its contents, and the latter discharged. Whenever the depth of the bore exceeds the height of the derrick, it becomes necessary to unscrew successively the sections of poles or bars as they are drawn up, while a collar attached to the pole at the mouth of the well prevents it from falling back. When working at great depths the operation of discharging the borings thus becomes a very tedious one, consuming far more time than actual boring.

The presence of water in the hole generally facilitates operations materially; it is therefore poured in from above when not naturally present. Sand, especially, can thus be discharged more readily and boring continued for longer intervals of time. The auger being drawn up, the "sand-pump" can then be sent down at the end of a rope. The sand-pump is a long tubular bucket of sheet iron, with a

FIG. 2.



Boring Tools.

light valve at the bottom opening inward, enabling it to sink down into the semi-fluid mass of water and sand until it is full, the valve closing when the pump is raised. The same implement serves to clear the bore of quicksand, when met with in moderate quantities.

When hard rock has to be penetrated it must be pecked through with chisels, in the same manner that blast-holes are drilled by quarrymen and miners. The bits may then be attached either to stiff poles, as is done in boring soft materials, or, preferably, they may be altogether suspended by a rope. The rapid deterioration of the screw connections by repeated heavy shocks, the liability to deviate from the vertical, and the greater difficulty encountered in withdrawing the boring tool and discharging the borings, have caused the former mode of suspension to be almost altogether superseded, in this country, by rope-boring—a method extensively adopted by the Chinese long since in sinking their numerous deep bores.

When boring in rock by hand the upper end of the rope or pole bearing the drill is attached to a spring pole or bar, vibrated by the workmen, who at the same time give a slight turn to the cross-bar at each stroke, so as to complete the circle in from twenty to thirty strokes, varying with the kind of rock and the diameter of the hole. The lift varies, usually, between ten and twenty inches.

When boring by steam-power the boring-rope is connected with a walking-beam vibrated by the engine, which also works the whin or windlass (the "bull-wheel") when required. To obviate the necessity of too frequently lengthening the rope as the bore deepens, it is attached to the walking-beam by means of a long screw working in a stirrup-shaped nut, by turning which the rope can be let out to the extent of fifteen to eighteen inches.

The drill, also, is not directly attached to the rope's lower end, but first to a long and heavy stem of iron, connecting at its upper end with a long stirrup-shaped piece, which can be made to slide upward into another similar one attached to the rope in the reverse position. This arrangement, expressively called the "jars," serves to facilitate the loosening of the tools when they get fast by the jarring motion that can thus be given. At the Pennsylvania oil-wells the entire length of such a set of tools is about thirty feet; its weight, 800 to 1000 pounds.

A most valuable improvement made of late years in the boring of hard rock is the diamond-pointed drill of Leschot. In this implement diamonds are firmly set into the conical, concave, or annular end of a steel bar, so as to present cutting edges to the rock when turned right-handed. It is usually worked by steam or compressed air, and by its means the hardest granite may be bored at the rate of several inches per minute. It is, of course, equally applicable to the boring of artesian wells in hard rock as to mining and tunnelling operations, in which it is now extensively employed. When an annular bit is used, sample cores of the rock penetrated may be brought to the surface and examined. As in most labor-saving implements, its somewhat considerable prime cost is soon covered by the gain in time and cost of repairing other drilling tools.

It is not often, on the whole, that the sides of an artesian bore are sufficiently solid and impervious to remain unprotected throughout. Such is the case, *e. g.*, in the cretaceous limestone region of the States of Mississippi and Alabama, whose soft, chalk-like rock is commonly bored with the earth-auger, being solid and almost uniform even to the thickness of twelve hundred feet. No tubing save the soil-pipe is here ordinarily required, even in flowing wells. In most cases, however, the use of tubing becomes necessary, either to prevent the walls from "caving," or to exclude undesirable veins of water or quicksand; the latter especially being a frequent and most troublesome source of difficulty. The cheapest and most durable tubing is the wooden, but the great diminution of clear diameter resulting from its employment greatly limits its practical usefulness. Most commonly, wrought-iron tubes (gas-pipes, and for larger diameters tubing made of sheet iron and riveted) are used, although not very durable; more rarely, cast-iron, bronze, or copper ones, the former being rather cumbrous, the latter, though very durable, too easily collapsed or deformed by outside pressure, and rather costly. Yet they should be used at great depths in bores of great cost and importance and difficulty of repair.

The outside diameter of tubes should ordinarily be three-fourths to one inch less than that of the bore-hole, to allow for inequalities of surface inside. It is important, on several accounts, that they should not fit too closely, except for excluding quicksand. The tubes are made in lengths of about six feet, screwing into each other or connected by outside "thimbles" riveted to the lower, and successively attached by screw-rivets to the upper section as the tube is lowered into the well.

If after tubing any portion of a well the boring is to be continued below, it must ordinarily be done with a correspondingly diminished diameter, both of drills and tubing if the latter be required. A deep well thus sometimes contains three or four different successive sets of tubing, and even more, so that, although begun with a clear diameter of eight or nine inches, it may be diminished down to two or three. It may then become necessary to extract all the tubing, and widen the bore by "reaming." Expanding drills are sometimes used to undercut a set of tubing, and thus lower it, but this is a slow process, and somewhat uncertain of success.

The accidents to which the well-borer is liable are very numerous in kind and of very frequent occurrence. The most common one is that the tools get "jammed" in the well, whether in consequence of a deviation of the bore-hole from the vertical, or from the falling in (whether from the sides of the well or from its mouth) of some fragment or boulder, or perhaps a hard fossil, or from the breaking of a joint or the "stripping" of a screw, by which the tools themselves have fallen in.

The first cause mentioned is the most formidable, as it is rarely possible to correct fully a material sidewise deviation of a bore-hole; this accident, therefore, frequently causes the final abandonment even of deep bores. The jamming of the tools by an object fallen from above is also often a very serious matter; hence a double-hinged valve is commonly placed on top of the soil-pipe as a measure of precaution. A large number of most ingenious implements for extracting bodies of various kinds and shapes has been devised, yet not unfrequently a special tool must be constructed to suit a particular case. All possible precautions should be taken to prevent such accidents, as their cure is but too frequently impossible.

Among the most noted of deep-flowing wells is that of Grenelle at Paris. The latter city is situated in the lowest portion of a basin-shaped mass of formations, so that the strata slope towards the city. It was begun in 1833 under the auspices of the government, and, advancing slowly, was completed on Feb. 26, 1841, when, at the depth of 1792 feet, the auger, penetrating a ledge of rock, fell suddenly several yards, evidently into water. In a short time the water rose 112 feet above the surface in an immense volume, bringing up sand and mud. It exerts a pressure equal to a rise of 812 feet above the surface (in pipes), and discharges half a million of gallons per day of very pure water, which is distributed to that part of the city. Since, however, its temperature at the mouth of the well is 82° F., it requires to be cooled for drinking purposes, and is used for warming the hospitals at Grenelle. A large number of other wells have since been sunk in and near Paris, as well as London, which is similarly situated as regards geological structure. Among the most remarkable of the locality is that of Passy, which was sunk with a diameter of two feet to a depth of nearly 2000 in the years from 1855 to 1860, inclusive. It discharges 5,660,000 gallons of water per day; the yield of the Grenelle well having, at the same time, diminished by one-fourth.

Among the noted deep artesian wells of Europe is that of Kissingen in Bavaria, completed in 1850. It is 1878½ feet in depth, the last 138½ feet being sunk in pure rock-salt. Hence the water is strongly salt; its temperature is 66° F., and the discharge is 100 cubic feet per minute; it will rise to the height of 58 feet above the surface. Wells have been sunk to greater depths in Germany since then; the deepest of all, and doubtless the deepest in the world, being that lately sunk at Sperenburg in Prussia, to a depth of 4162 feet.

In the U. S. artesian wells are numerous, especially in New York, Pennsylvania, Virginia, Alabama, and Mississippi. In the latter two States they alone furnish the supply of water without which the fertile prairie regions would suffer severely in summer. It has frequently happened here, as elsewhere, that the discharge from the wells first sunk has been seriously diminished or altogether stopped by the opening of other bores in the same neighborhood or at a lower level. A nine-inch bore made at the foot of the hill on which the city of Columbus, Miss., is situated caused the sudden cessation of the discharge from the numerous wells in the town, while itself emitting a stream copious enough to run a mill. On the partial closing of the orifice the wells above resumed their flow.

The numerous bored wells of Western Pennsylvania, West Virginia, and adjoining parts of Ohio are chiefly remarkable as the source of the world's largest supply of petroleum, which flows or is pumped from them, accompanied by salt water and combustible gas. Their spontaneous flow seems frequently to be caused not so much by water-pressure as by that of the combustible gas, which is sometimes emitted by them in vast volumes, spouting to the height of 60 to 100 feet a mixture of water and petroleum. Disastrous conflagrations have at times resulted from such inordinate manifestations of energy. These wells rarely exceed 500 feet in depth. At Cleveland, O., as well as at a few other points, the natural gas is used both for lighting and heating purposes by the proprietors.

The oil-region of Pennsylvania, with its numerous wells, has its parallel in North-eastern China, where the wells are said to count by tens of thousands, some of them approaching a depth of 3000 feet. They are not, however, as productive of petroleum as those of the U. S.

A number of wells of moderate depth (not exceeding 500 feet) have also been sunk at the city of New York. The structure of Manhattan Island is exceedingly unfavorable to their success; but good water has been obtained in large quantity, and rising to within twenty feet of the surface.

Among the deepest bored wells in this country are two at St. Louis, Mo. The first was bored by the Messrs. Belcher, sugar-refiners, between 1849 and 1854, 300 feet from the river-bank, and 420 feet above the sea-level, down to 2199 feet, discharging per minute 75 gallons of water at 73.4° F. The other well, at the Insane Asylum, 180 feet above the former, was sunk at the expense of the county, to the depth of 3843.5 feet (the last 40 feet in granite), in the course of 3 years 5½ months from Mar. 31, 1866, and working day and night, excepting Sundays. Diameter of bore, 4½ inches from 1022 feet to bottom. Both wells furnish saline sulphur water; in the second it does not rise to the surface; temperature, 105° F. These wells are remarkable for having been mainly sunk in hard rock—limestone, sandstone, and shale—and almost throughout by steam-power. The same applies to the Louisville artesian well, 2066 feet in depth; its water is likewise strongly mineral.

At Terre Haute, Ind., several wells have been sunk to depths varying from 1600 to 1900 feet. One of these yields only a strong sulphur water; two others also yield petroleum. Water quite similar to that of the Terre Haute wells, and likewise connected with a petroleum-bearing formation, though of much later date, is spouted by the artesian well near Lake Charles in Calcasieu parish, La. The main stream comes from the surface of the great sulphur-bed of that locality, at a depth of 440 feet, at the rate of about sixty-five gallons per minute, and with a rise of twelve feet above the surface.

One of the deepest bores in the U. S. is the well sunk at the State-house, Columbus, O. Its depth is 2775½ feet, but the water struck (which is salt) does not rise above the surface; its temperature at the bottom is 91° F., or that of hot summer weather.

In the vicinity of Chicago artesian water of great purity is readily obtained at a moderate depth and in great abundance, rising to convenient heights above the surface. It is of material importance as furnishing a supply both fit for domestic use and adequate for manufacturing purposes.

Among the artesian wells which have encountered great difficulties in their construction we may mention those sunk at Charleston, S. C., to the depth of 1250 feet, and at New Orleans to that of 630. The strata penetrated here being but little consolidated, and alternating with quicksand layers, the auger had to be closely followed by tubing, which itself was very liable to sidewise displacement and collapse. At New Orleans no satisfactory result was obtained at the depth mentioned; at Charleston, a somewhat saline, yet soft water, of a temperature of 87°, rises ten feet above the surface, at the rate of twenty gallons per minute; it is used for steam-boilers.

The boring of artesian wells is likely to become a matter of capital importance in the arid regions of the West, where both surface and spring water is so frequently not only very scarce, but undrinkable. An expedition under the command of Capt. (now Major-General) Pope was sent out by the U. S. government in 1855 for the purpose of testing the feasibility of sinking artesian wells on the waterless plateau of the Llano Estacado, which forms a formidable obstacle on the most direct route between the South-western States and Mexico. It was shown that water would rise to within an available distance of the surface in bores between 800 and 900 feet in depth.

In California artesian wells are largely used in providing water for irrigation. The same is being done in the Sahara desert of Africa, where such wells have been sunk to the depth of 1200 feet, each one creating around itself an oasis.

Bore-holes are sometimes sunk from the surface into sand or other pervious strata for the discharge of waste water that would otherwise prove a nuisance. These are called absorbent or drain wells.

E. W. Hilgard.

Ar'teveld' (or **Artevelde**), **van** (Jacob), a famous Flemish demagogue, born at Ghent, became a rich brewer. By his talents and eloquence he acquired much influence and popularity. The people of Ghent, who had revolted against the count of Flanders, chose Arteveld as their commander. He banished a number of Flemish nobles and knights, and adopted a despotic and arbitrary policy. As an ally of Edward III. of England, he waged war against France. Having formed a design to give the sovereignty of Flanders to the English Black Prince, he provoked a revolt of the Flemings, who killed him July 9, 1345. (See Froissart, "Chronicles;" J. de Winter, "J. van Artevelde," 1846.)

Arteveld, van (Philip), a son of the preceding, was born at Ghent in 1340. He was also a popular favorite, but passed many years of his mature life as a private citizen. When Ghent was besieged by the count of Flanders in 1381, and reduced to a desperate condition, Arteveld was appointed to the chief command. In May, 1382, he defeated the count, and then assumed the title of regent. Charles VI. of France intervened in favor of the count of Flanders with an army, and Arteveld was defeated and killed Nov. 27, 1382. (See Froissart, "Chronicles.")

Arthritis [from the Gr. *ἄρθρον*, a "joint"], literally, "inflammation of a joint;" a term inclusive of gout and rheumatism, though properly applicable to inflammations of the joints of whatever character.

Arthro'dia [Gr. *ἀρθρωδία*, from *ἄρθρον*, a "joint" or the "socket of a joint"], a connection of bones, in which the head of one is received into a very superficial cavity in another, so as to admit of motion in almost all directions, as in the joint between the humerus and the scapula.

Ar'thur, Ar'tur, or **Ar'tus,** a semi-fabulous British hero and king of the Silures, is supposed to have flourished about 500 or 550 A. D., after the Romans evacuated the island of Britain. He is celebrated as the hero of the romances of the Round Table, and his exploits were favorite themes of mediæval bards and romancers. According to the popular legends, he defeated the Saxon invaders in several battles, and bravely defended the independence of the Britons, but was finally killed in a battle fought at Camlan against his rebellious nephew Modred. His fame and adventures were magnified and embellished by writers of various nations in the Middle Ages. Some of these affirm that his residence was at Caerleon, on the Usk, in Wales, where he lived in grand state, surrounded by multitudes of knights and ladies—that twelve knights of eminent valor formed the centre of this retinue, and sat with the king at a round table. Another of his capitals was Camelot, identified by tradition with Queen's Camelot in Somersetshire. The name of his wife was Guinivere. (See Turner, "History of the Anglo-Saxons;" Ritson, "Life of King Arthur," 1825; Tennyson, "Idyls of the King." See also Sir Thomas Malory's "Byrth, Life, and Actes of Kyng Arthur," London, 1485; new ed. by Southey, 1817, 2 vols. quarto.) The Arthurian romances were probably thrown into their present form, if not largely invented, by Walter Map. (See Morley's "Writers before Chaucer," *sub voce.*)

Arthur (Prince), duke of Connaught, son of Queen Victoria of England, was born May 1, 1850, and married Mar. 13, 1879, to Princess Louise of Prussia.

Arthur (Chester Allan), b. in Franklin co., Vt., Oct. 5, 1830; graduated at Union College, N. Y., in 1849; taught school afterwards for two years in Vt., studied law in New York City, and was admitted to the bar; delegate to the convention at Saratoga which founded the Republican party. Before the civil war he was judge-advocate of the second brigade of New York State militia, and afterwards engineer-in-chief on staff of Gov. Morgan of New York. In 1861 inspector-general of New York, and subsequently quartermaster-general of New York until expiration of Gov. Morgan's term of office. Collector of port of New York under Pres. Grant from 1871 to July 12, 1878, and was chairman of the Republican State committee of New York. He was nominated for Vice-President of the U. S. by the Republican convention at Chicago, Ill., June 8, 1880, and elected Nov. 2, 1880. Upon the death of President Garfield, Sept. 19, 1881, Vice-President Arthur became the 21st President of the U. S.

Arthur (Timothy Shay), an American writer of tales, was born near Newburg, Orange co., N. Y., in 1809. He became a resident of Philadelphia in 1841, and published many popular tales having an excellent moral tendency. Among his works are "Lights and Shadows of Real Life," "Library for the Household" etc. D. Mar. 6, 1885.

Arthur (William) was born in Ireland in 1819, educated at Hoxton College, and went to India in 1839 as a Wesleyan missionary, where he was engaged for some years. He resided in France 1846–48. He became secretary to the Methodist Missionary Society, and was president of the Methodist college at Belfast, Ireland, for some years, retiring in 1871. Among his works are "A Mission to the Mysore, with Scenes and Facts illustrative of India, its People, and its Religion."

Arthur (William). See Appendix.

Arthur's Seat, a rocky hill which rises in the environs of Edinburgh to the height of 822 feet above the level of the sea, and commands a prospect of great extent and superlative beauty. It is supposed to derive its name from King Arthur. It is formed of several varieties of trap-rock upheaved through the carboniferous strata, and presents on the southern and western sides perpendicular precipices.

Ar'tichoke [supposed to be a corruption of *al-kharciof*, the Arabic name of the plant], (*Cyna'ra scol'ymus*), a perennial herbaceous plant of the natural order Compositæ, is nearly allied to the thistle. It is a native of Southern Europe, and is cultivated for food. The genus is distinguished by the bracts of the involucre being fleshy at the base, and emarginate with a hard point. The part which is eaten is the succulent receptacle of the flower-head, gathered before the flowers expand, and boiled or made into a salad. The Jerusalem artichoke (*Helian'thus tubero'sa*) is an entirely different plant, which is sometimes cultivated for its tubers.

Ar'ticle [Lat. *artic'ulus*, literally signifying a "joint" or "single part"], a word used in various senses, usually denoting a distinct part of a systematic work. It may signify a single clause in a contract, treaty, or other written document, a particular, separate charge or item in an account, or a point of faith. In grammar, it is a part of speech, usually the shortest and simplest of all; in mercantile language, a particular commodity; in journalism, the principal editorials are called *leading articles.*

Articles, in law, a word used to denote various kinds of instruments drawn up under distinct heads or divisions. Instances of the use of the word are a libel in admiralty, where the libellant (or plaintiff) is said to "articulately propound;" "articles of agreement," "articles of impeachment," "articles of partnership," or of peace or of war. "Articles of Confederation" is a phrase employed to designate the compact made between the original thirteen States of the U. S., forming a general government before the present Constitution, and which, having gone into effect Mar. 1, 1781, continued in force until the first Wednesday of Mar., 1789.

Articles, The Six, were imposed on the English nation by Parliament in 1539 during the reign of Henry VIII. They asserted the doctrine of transubstantiation, condemned the marriage of priests, enjoined the continued observance of vows of chastity, and sanctioned private masses and auricular confession.

Articles of Confederation. See CONFEDERATION, ARTICLES OF, in APPENDIX.

Articles of Faith, an expression usually employed to denote the particular points of doctrine which together make up the sum of Christian belief. The various churches of Christendom, not being agreed upon all these points, have for the most part set forth their own exposition of them; and it is to these creeds, symbols, or confessions that the term Articles is most commonly applied. The Articles of the English Church, formerly forty-two in number, are now reduced to thirty-nine, and by the Methodist Church to twenty-five. (See THIRTY-NINE ARTICLES.)

Articles of War, a name applied to an act of Congress approved April 10, 1806, to establish rules for the government of the U. S. army. Separate articles (those now in force, approved in 1864, to supersede the old articles of 1802) establish rules for the government of the navy. Also applied to the code of military law embodied in the Mutiny Act annually passed in the British Parliament. For the enforcement of such Articles of War power is given to the Crown to establish courts-martial to try and punish offences according to the Articles themselves. Another annual Mutiny Act embodies "Articles of War for the Marine Forces," which relates exclusively to the royal marine forces *while employed on shore.* The navy is not controlled by any annual Mutiny Act, but the Articles of War relating to it are contained in an old act of Parliament, the 22d Geo. II., c. 33.

Articula'ta [the plu. neuter of the Latin past part. *articula'tus*, "jointed" or "furnished with joints," from *artic'ulus*, a "joint"], or **Artic'ulated An'imals,** one of the four primary or grand divisions of the animal kingdom according to the system of Cuvier, which is generally adopted by naturalists. The Articulata are characterized by bilateral symmetry and an external skeleton composed of a series of rings or segments. These rings in some cases appear externally as mere transverse folds in a soft skin, but are often covered with a bony or horny substance. They are also characterized by an internal gangliated nervous system, the ganglia being arranged symmetrically along the ventral aspect of the central or median line of the body. Optic nerves and other nerves of special sense proceed from a ganglion in the head, which is sometimes called the brain, but is not much like the brain of vertebrate animals. The Articulata have no proper heart, but instead of it a *dorsal vessel*, a tube carried along the central line of the body near the back. The blood is usually white. They surpass all other animals in muscular performances in proportion to their size. Many of the Articulata have articulated members or legs, symmetrically arranged in pairs. By most recent naturalists they are divided into three classes—Insects, Crustaceans, and Worms. Huxley subordinates the Articulata under the name of Arthropoda, and introduces the divisions Annulosa and Annuloida, to include some classes of animals otherwise placed by Cuvier.

Artific'ial Butter. See BUTTER.

Artificial Horizon, a horizontal mirror, usually the surface of a basin of mercury, used to determine the altitude of a star, etc. when the sensible horizon is ill defined.

Artificial Limbs. See LIMBS, ARTIFICIAL.

Artificial Stone. See CEMENT; STONE, ARTIFICIAL.

Arti'gas (JOSÉ), a South American general, born at Montevideo in 1755, became in early life a leader of the Gauchos, a class of outlaws. In 1811 he entered the service of the Junta of Buenos Ayres, for which he fought against the Spaniards or royalists. He defeated the latter in several battles, and became in 1815 master of the Banda Oriental. Aided by the democratic party, of which he was the leader, he conquered Buenos Ayres in 1820, but was removed from power about the end of that year. D. 1851.

Artil'lery [Fr. *artillerie*, remotely from the Lat. *ars, artis*, "art," "ingenuity," implying that it is the product of skill]. The term "artillery" was in early times used to designate all kinds of missiles employed in warfare and the machines by which they were propelled.

The artillery engines in use by the ancients were chiefly the ballista and catapult, for throwing stones and heavy darts, and the battering-ram, for effecting breaches or demolishing walls. These engines were rude, bulky, heavy, clumsily constructed, and required many men and much time and labor for their transportation, placing in position, and manœuvring; but for the period and purpose they were doubtless of great power and sufficiently destructive. The effective range of the ballista and catapult did not exceed 100 or 150 paces, but at this distance they were capable of discharging missiles of 300 pounds weight. In the Middle Ages the cross-bow came into military use, and gradually supplanted the catapult. It is probable that an engine of similar construction took the place of the ballista. These engines were constructed of tough, fibrous wood, and in some instances of steel. By their introduction greater portability and some increase of range were obtained.

Since the introduction of gunpowder the term "artillery" is understood to denote all firearms other than those used as hand-weapons. It therefore includes all guns, howitzers, mortars, and machine-guns, and excludes muskets, rifles, and pistols. It is synonymous with *ordnance*, and is generally used in a plural sense; when in the singular, it is usual to say *a piece of artillery.* Carriages upon which pieces are mounted or transported, together with the ammunition, implements, equipments, etc. employed in the service of pieces, are called *artillery material*, and are always mentioned with the prefix "artillery" or its equivalent. Troops employed in artillery service are called *artillery troops.* In speaking of artillery, the term "cannon" is frequently used, signifying always the piece, and nothing more. (See ORDNANCE.)

Previous to 1846 all cannon were made with smooth cylindrical bores; their sizes were then designated by the weight of their solid shot, in pounds, or by the diameter of the bore, expressed in inches or centimeters. This latter method is now used for all rifled cannon, except in England, where the size is often, but very imperfectly, expressed by the weight of the piece in tons or hundredweights.

The birth of artillery, as we to-day understand it, dates from the introduction of gunpowder into Europe. The earliest record of the construction of cannon is about the middle of the fourteenth century, but contemporaneous mention is obscure, and refers to cannon more as curiosities than as engines of war. The first well-authenticated use of cannon in battle was by Edward III. of England in the battle of Cressy, A. D. 1346. Even on this occasion it would appear that their effect upon the French was due more to astonishment than to any inherent power of the novelty itself. From this date, however, the construction and use of cannon increased with great rapidity. At the very first they were of small calibre, throwing stone or leaden balls of only 3 or 4 pounds weight, but before the close of the century they were capable of throwing stone projectiles of 40 or 50 pounds for field-guns, and of 200 pounds for siege- or fortification-guns. In fact, their excessive size and weight not only seriously interfered with, but actually prevented, their general use. The earliest cannon were constructed of iron bars joined together longitudinally and strengthened by exterior hoops of iron. Wood wound with rope, and sometimes with wire, was also used upon the exterior to strengthen them. One of the most interesting of ancient *monster* cannon still extant is the "Mons Meg," made in 1486 at Mons, Brittany, and now in the castle of Edinburgh. An inscription on the carriage states that it was employed at the siege of Norham Castle, in 1513. It burst in 1682 in firing a salute. It is made of iron bars hooped together, and its bore is 20 inches in diameter. (Fig. 1.) Another superb specimen of early cannon—of much later date than the preceding—is the "Tsar Cannon" (or "King of Cannon"), in the arsenal of the Kremlin, Moscow. It was made early in the seventeenth century under the emperor Theodore. It is of bronze, with a calibre of about 30 inches. The carriage upon which it stands is merely an ornamental support. Cast without trunnions, it was probably laid in permanent position for firing. (Fig. 2.) Still more curious are the famous Turkish guns defending the Dardanelles. The diameter of the shot is 36 inches; length of gun, 15 feet. These pieces likewise were without trunnions, and also without means for lateral motion. It was impossible, therefore, to train them upon moving objects; consequently, after being loaded they awaited the arrival of the hostile vessel at the spot where the shot would strike before being fired. So recently as 1807 these clumsy weapons were brought into requisition against the British fleet under Admiral Duckforth in its passage up the Dardanelles. A shot from one of these pieces, on that occasion, struck the Windsor Castle. Ancient cannon were in some instances made of *leather*, and, as so made, were used to some extent by Charles XII. of Sweden, A. D. 1697.

FIG. 1.

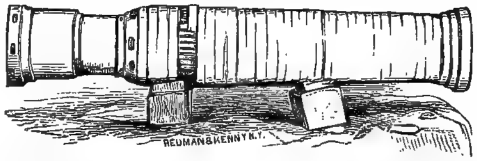
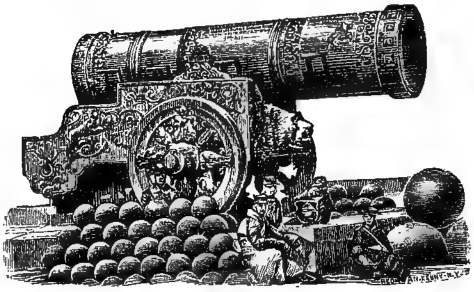

REDMAN&KENNY N.Y.

FIG. 2.



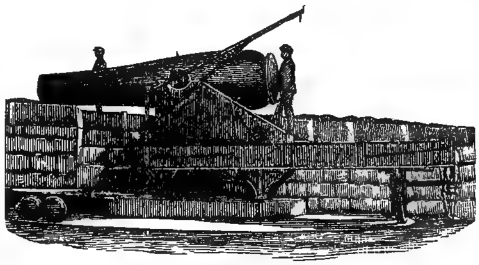
The Tsar Cannon.

In the very infancy of cannon-construction the breech-loading principle suggested itself, and was made use of in a crude manner; but the low state of the mechanic arts forbade the exact mechanism necessary to perfect the idea. About the middle of the fifteenth century cannon began to be cast in iron, and toward the latter portion in various alloys. A. D. 1477, Louis XI. of France caused many cast-iron cannon to be fabricated for use against the cities of Picardy and of Flanders. About this period the projectiles for large cannon, which had hitherto been of stone, were made of cast-iron; but to some extent stone balls continued in use for a number of years afterward. Shells were also introduced at this time, and we have a record of their use by Charles VIII. of France at the siege of Naples, A. D. 1494. Brass cannon were first cast in England by John Owen, 1535, and a few years later in Scotland by order of James IV. During the last half of the sixteenth century mortars for throwing shells were introduced in Germany, and in the first half of the seventeenth century in France. Mortars were at first discharged by igniting the shell before it was introduced, and then igniting the charge in the mortar. The great danger of such a practice caused its abandonment, but not until it had been followed for half a century. Toward the latter part of the seventeenth century a short cannon, called, after its inventor (the German Haubitz), a *howitzer*, was introduced for the purpose of using large shells by direct fire. In 1799 there was introduced a short cannon of large relative calibre called a *carronade*, named from the Carron iron-works, where it was first cast. No long guns for firing hollow projectiles at long range by direct fire were known until 1812, when Colonel Bomford of the U. S. Ordnance Department invented a gun for that purpose, which he improved in 1814 and called a *columbiad*. Some years afterward this invention was introduced into France by General Paixhans, and was generally called in Europe by his name. In 1841 a gun of this character, but of somewhat different model, and called a *sea-coast howitzer*, was introduced into the U. S. service, and three years later these were followed by columbiads of altered model, increased weight, and greater power.

After a long series of experiments for the purpose of determining the best form and distribution of metal in guns, Admiral (then Lieutenant) Dahlgren, U. S. navy, produced, in 1856, the gun bearing his name. These pieces are of cast iron, cast solid and cooled from the exterior; they are of great thickness at the breech and as far forward as the trunnions, and from thence to the muzzle rapidly diminishing in thickness, so that their external configuration is not unlike that of a champagne bottle. They are adapted exclusively for hollow projectiles, and are chiefly of 9-inch and 11-inch calibre. Previous to the introduction of rifled cannon they were considered a most serviceable gun. They continue to form the principal armament of the U. S. navy.

For several years previous to 1860, General (then Captain) Rodman, U. S. army, was engaged upon investigations for the improvement of gunpowder and for the better casting of heavy ordnance. In that year he produced the gun now bearing his name. These guns are of cast iron, and his invention was the process by which heavy ordnance is cast hollow and cooled from the inside by means of a stream of cold water flowing through a hollow core occupying the place of the bore of the gun, the exterior being, in the meanwhile, kept from rapid cooling by fires around the gun in the casting-pit. Rodman guns are further distinguished by great thickness of metal at the breech, by graceful curves of their exterior lines, and by the absence of all exterior ornamentation, sharp angles, or edges, and of the cascable and swell of the muzzle, and by having the trunnions at the centre of gravity, thus doing away with preponderance and greatly facilitating the service of the gun. With the exception of a "siege" 4.5-inch rifle, all the Rodman pattern are smooth-bore guns, having calibres of 8, 10, and 15 inches respectively. A couple, for experimental purposes, were cast having a calibre of 20 inches. All Rodman guns are adapted to the use of solid as well as hollow projectiles. The 15-inch gun (Fig. 3) weighs 25 tons, the solid shot 450 pounds, and the charge is 100 pounds of mammoth powder. The piece is mounted on an iron carriage provided with two pneumatic buffers for checking recoil. At the time of the adoption of the Rodman 15-inch gun it was the most powerful piece of artillery in existence. In its employment against iron-clad vessels its shots are intended to have a racking effect, in contradistinction to the punching effect of rifle projectiles. By many it is still considered a serviceable gun capable of great execution against the powerful armor of modern ships. Improvements are now in progress whereby a more powerful charge can be used and a still greater efficiency secured. In almost every other nation of the world except the U. S., smooth-bore guns have been superseded by rifles.

FIG. 3.



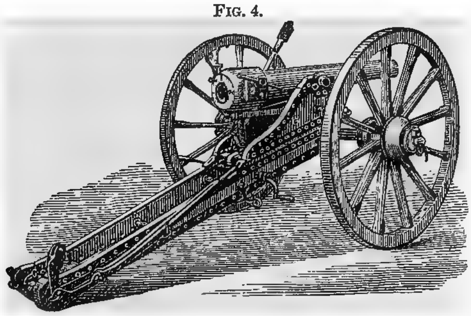
15-inch Rodman Gun.

Soon after the rifle-principle had been applied to small-arms, experiments commenced to be made with a view to applying it to cannon; and in 1846 cast-iron rifled pieces, loaded at the breech, were invented by Colonel Cavlli of the Sardinian service, and Baron Wahrendorf of Sweden, for the purpose of firing elongated projectiles. After two or three years of successive improvements, this invention proved the practicability of applying the rifle-principle to cannon and demonstrated the great advantages to be derived from such application. From that period up to the present time the minds of military inventors and constructors have been actively alive to the subject of rifled ordnance. A great variety of guns have been produced, and long and exhaustive experiments made to determine the best form and construction of piece, number and twist of grooves, character of breech-mechanism, and form of projectile. Each year has added its improvements, and enormous strides have been made during the last twenty-five years in gun-construction, and in that of carriages and projectiles and the manufacture of gunpowder. More is due, probably, to the improvements made in gunpowder than to any other cause.

The history of modern artillery may be divided into three epochs—the first, the introduction of rifled cannon in the Italian campaign of 1859, which showed the advantages of the new weapons; the second, their general adoption by all European powers and their employment in the campaigns of 1866 and of 1870–71; the third, the introduction of the present armaments by the different European powers after the Franco-German war, which showed the necessity for improved and more powerful guns. The increased power, accuracy, and range of the modern rifle-musket called for a corresponding improvement in field-artillery, while the progress made in armor-plating for ships-of-war demanded that heavy ordnance should be constructed with power sufficient to pierce their armor. Passing over the various stages of improvement—which, to a great degree, was that of experiment—the following is the present status of gun-construction among the principal nations of Europe.

First, as regards *Field Artillery*. Commencing with the German guns, as the pioneers along the path of progress, these are made of cast steel of a low quality hooped around the breech with a jacket of the same material. The breech-closing apparatus is that known as the "round-wedge breech-block"—*i. e.* a cylindro-prismatic wedge tightened in the breech of the gun by means of an interrupted screw acting perpendicularly to the axis of the piece. The breech-block is perpendicular to the axis of the bore, and works horizontally in a mortice cut through the breech of the piece immediately in rear of the cartridge-chamber. The breech-block being withdrawn, the projectile and cartridge are inserted from the rear; the block is shoved in, and tightened by means of the screw just mentioned. The piece is fired in the ordinary way, by friction-primers. The gas-check is composed of a ring of soft steel abutting against the steel plate in the surface of the wedge. The ring is fitted into a recess cut into the rear of the cartridge-chamber; and when the gun is discharged, the ring, being instantaneously expanded, and at the same time pressed rearward with tremendous force, hermetically closes the tube of the piece and prevents all escape of gas. A single ring endures a vast amount of firing and seldom has to be renewed. The gun just described is known throughout the world as the "Krupp gun." (A general idea of the field-piece is given in Fig. 4.)

FIG. 4.



The most important detail in the construction of a breech-loading gun is an efficient and durable gas-check: and this was the great desideratum until Broadwell, an American, invented the ring just mentioned, and which is known by his name. There being no demand for his invention in the United States, he patented it in England, and, soon after, it was adopted by Krupp, the great gun-manufacturer of Essen in Germany.

The Russian guns and the Italian 3.43-inch gun are of similar construction, and they, as well as the German guns, are supplied to the various governments by Herr Krupp. Their breech-loading mechanism, as well as that of the Italian 2.95-inch, is similar to that employed in the German guns. The French guns are also of steel, and are strengthened around the breech by six mild-steel rings, which, as in England, are put on hot. The Italian 2.95-inch gun is of bronze; the Austrian guns are made of the so-called steel-bronze, composed of an alloy of 92 parts copper and 8 tin. The guns are chill-cast in iron moulds, and the bore is hardened and compressed by forcing coned steel mandrels through it with tremendous pressure. By this means the material is brought into such a state that from the inside of the bore to the external surface of the gun the metal is brought into the most favorable condition for resisting the explosive force of the powder-charge. The breech-action of the Austrian field-piece is similar to that of the German guns, except that the breech-block has not a round back, but the edges of the rear surface are chamfered off.

The breech-closing mechanism of the French guns presents several peculiarities. It consists of a solid interrupted screw. The surface of the thread of both the male and the female screws being divided into six equal parts, the threads of the alternate parts are removed, so that one-sixth of a turn disengages the thread and allows the breech-screw to be removed. The axis of the screw is coincident with the axis of the bore, and the screw has a diameter greater than that of the bore, so that the square face of the screw abuts against and closes the cartridge-chamber. The screw, having been turned until the threads are disengaged, is withdrawn by hand and swung to one side upon hinges, after the manner of a door. The charge is then inserted, the screw swung back, shoved in, and secured by giving it a slight turn, thereby engaging the threads. This method of closing the breech is known as the "Reffye," or French, system. The interrupted-screw principle was an American invention, patented in 1853 by J. P. Schenkel and A. S. Savoni. Six guns upon this plan were cast at Boston for the British government in 1855. The gas-check of the French gun consists of two parts—viz. a steel mushroom-shaped plate, the long stalk of which projects through the breech-screw and is allowed a certain amount of play backward and forward, and an elastic gas-check, composed of a thick cake of a mixture of asbestos and mutton-fat wrapped in canvas and secured by tin cups and brass rings. This gas-check is strung on the stalk of the mushroom, rests between the posterior surface of the latter and the anterior face of the breech-screw, and serves by its elasticity to close the breech when the charge is fired. The guns are vented through the stalk of the mushroom. The German and Russian guns and the Italian 3.45-inch are vented through the breech-piece, and the vent is so arranged that the charge cannot be ignited till the former is screwed home. The Austrian guns and the Italian 2.95-inch are vented through the metal of the gun.

The English were among the first to adopt a breech-loading field-gun, but after a time dropped it and returned to the muzzle-loader. This was in consequence of the undue importance attached to their East Indian service, where it was feared the breech-mechanism, if out of order, could not be repaired. The breech-loading system which they adopted was that of Sir William Armstrong. The body of the piece was made by welding together several wrought-iron tubes at their ends; these tubes are formed by twisting square bars of iron around a mandrel and welding the edges together, after the manner of a fowling-piece. The part of the gun in rear of the trunnions was strengthened by two additional tubes. The breech was closed with a block slipped by hand into a vertical mortice in the breech of the piece, directly behind the cartridge-chamber, and was held in its place by a breech-screw abutting against it from behind. The axis of this screw was coincident with that of the bore of the gun and was bored out, so as to constitute a prolongation of the bore. The vent was through the breech-block, which worked with a vertical action instead of horizontally, as in the Krupp system. The English are now returning to breech-loaders, using, as before, the Armstrong system, but employing steel instead of iron. The breech fermeture is a modification of the French Reffye mechanism.

With regard to rifling, a diversity of practices obtain concerning the number and the depth of the grooves. The English have but three grooves, while all other nations have from twelve to twenty-eight, twenty-four being the most common number. All have uniform twist, except in the case of the French guns, which have a gaining twist. All use elongated projectiles, solid shot, shell, and case-shot, or shrapnel. The projectiles of the Austrian, French, Italian, and Russian guns take the rifling by means of copper rings; the Germans use a thin lead-coating, the same as used by the English with the Armstrong gun. The muzzle-velocities of guns of the different services vary from 1225 feet with the Russian 4.19-inch gun to 1608 feet with the French 3.15-inch gun. The weight of piece also varies, but averages 800 pounds for light guns and 1100 pounds for the heavier class of field-pieces.

The carriages of the Austrian guns are of steel; those of the German, Russian, and Italian smaller gun are of iron. The French gun-carriages are partly iron and partly steel—principally, however, of the latter metal, of which the trail-cheeks are made. The Italian 3.45-inch has a wooden carriage. The limbers of all the above are of the same material as the gun-carriages. The ammunition-chests open to the rear like a cupboard in all except the French and heavy Italian limbers, in which they open chest-fashion.

The whole of the foregoing guns and carriages are driven by pole-draught, except in the English service, where shafts are used. All the wheels have naves after the pattern known in the United States as the "Archibald wheel." Fifty-five inches is the average diameter of the wheels, and the average track is 60 inches. The weight of a piece on its carriage, fully equipped, with ammunition-chests filled, varies from 4784 pounds for the Russian heavy gun to 2744 pounds for the light Italian piece; the average, however, is about 3600 for light guns and 4500 for heavy. The light Italian gun is drawn by four horses; all other nations use six, except for the English heavy piece, where eight are used. All caissons have six horses, except for that of the light Italian piece, for which four are used. The Austrians and the Italians have eight pieces to a battery, and so likewise do the Russians, except for their horse-batteries, in which six are used. All other nations have six pieces to a battery.

The Armstrong breech-loader now being introduced into the British service consists of a steel tube with a wrought-iron jacket. Its breech is closed somewhat after the French plan—viz. by an interrupted screw. The gas-check is a shallow steel cup attached to the face of the breech-screw.

In the United States nothing has been done toward keeping pace with other nations in field-artillery, excepting a battery of six pieces now in process of construction, and which is intended as the commencement of a new system. These guns are breech-loaders upon the Krupp pattern, converted from the wrought-iron 3-inch gun used during the late civil war (1861–65). This piece is reamed out and rifled to a calibre of 3.20 inches. The carriages are of steel and iron, except the wheels, which are of wood, with the Archibald nave.

Previous to the late civil war the field-artillery of the U. S., in common with that of other nations, was smooth-bore 6- and 12-pounder guns and 12-pounder howitzers, all of bronze, mounted on wooden carriages of excellent pattern. At the outbreak of the late civil war rifled muzzle-loading pieces were introduced. Mr. Parrott of the West Point foundry introduced a 10- and a 20-pounder—3-inch and 3.67-inch respectively. These guns had a cast-iron body, of the usual form and dimensions of guns, strengthened by shrinking a band of wrought iron over that portion of the piece surrounding the charge. The grooves had an increasing twist. The projectiles were solid shot, shell, and case-shot, all of a pattern devised by the inventor of the gun. An iron cup or ring attached to the bottom of the projectile, and expanding by the effect of discharge, caused the projectile to take the grooves. The smaller of these two guns proved to be an excellent weapon, and did good service; the larger gun, from some occult cause, was a failure. At the same period another rifled gun was introduced by the U. S. Ordnance Department. This piece had a bore of three inches and was of wrought iron, constructed by wrapping boiler-plate around an iron bar, so as to form a cylindrical mass, which, being brought to a welding heat, was passed through rollers, so as to unite it solidly; the trunnions were afterward welded on and the piece bored, rifled, and turned to its proper size and shape. The method originated at the Phœnixville iron-works, Pennsylvania. This gun fired solid shot, shell, and case, and both it and the Parrott used canister for close quarters. A variety of patterns of projectiles were used, but that which proved most serviceable was the Schenkel, which consisted of a cast-iron body with a *papier-maché* sabot surrounding the rear part of it. The force of discharge swedged this sabot into the grooves and caused the projectile to rotate. This also proved a most excellent gun, and was extensively used during the war. The carriage for both this and the Parrott 10-pounder was that of the old smooth-bore 6-pounder. In addition to these two rifles, a bronze smooth-bore 12-pounder of the Napoleon pattern was also much used, and did good service.

The Parrott and Napoleon guns, although still in existence, are not *now* "regulation;" the other, although entirely out of date, still continues, with one exception, to be the armament of the field-batteries of the U. S. This exception is a battery of four pieces of Hotchkiss revolving cannon, calibre 1.45 inch. The Hotchkiss revolving cannon is a machine-gun resembling in exterior aspect the Gatling. It fires explosive shells and has a range and accuracy equal to modern field-artillery, with a rapidity of sixty to eighty shots per minute. The projectile weighs one pound. The piece, mounted for field-service, weighs about the same as an ordinary light field-gun.

In addition to this revolving cannon, there is another pattern of Hotchkiss rifle-gun recently introduced into service, and which finds great favor on account of its wonderful range and accuracy and the facility with which it can be transported over difficult or mountainous country. It is simply a miniature Krupp gun of 1.65-inch calibre. Its weight is only 116.6 pounds, and one man is able to place it upon the back of a mule. The weight of the carriage being but 220 pounds, the packing, unpacking, and mounting of the gun and its carriage require only two men. The construction of the piece is based upon the use of a metallic cartridge, by which the obduration of the breech is accomplished. The extraction of the cartridge-case is effected automatically by the opening of the breech. The ammunition is composed of a metallic case (brass), which contains the powder and is united to the projectile (an explosive shell) by "choking," in the same manner as the cartridge for modern small-arms. The cartridge-case is not primed, but is ignited by the ordinary friction-primer. In the base of the cartridge is a valve, which is opened by the gas from the primer, and is again closed automatically by the pressure of the gas from the ignited charge. The shells are of cast iron, and weigh, when charged, 2 pounds 10 ounces. They are fitted with percussion-fuzes of the Hotchkiss pattern.

During the late civil war a 4.5-inch rifle-gun (known in the U. S. classification as a siege-piece) was to some extent used as a heavy field-piece, and, although somewhat cumbersome for bad roads, proved a useful weapon. Its use in this manner corresponded to that of the heavy field-batteries of European armies. It is of cast iron, and in exterior form is of the Rodman model.

Certain patterns of machine-guns were taken into the field during the late civil war, but were little used. One of these—called, in derision, the "coffee-mill"—had a hopper, in which the cartridges were dropped, and from which they were fired through a single barrel by means of a hand-crank. Another pattern of machine-gun was an improved form of the vibaudequin, or organ-gun, of the fifteenth century, known during the war as the "Requa rifle-battery." This piece received favorable notice at the siege of Charleston, in 1863. It consisted of twenty-five barrels arranged side by side in a horizontal plane and secured by an iron frame, a sliding-bar in the rear worked by two levers forcing the cartridges into the chambers. The Gatling gun was adopted just too late to be used in this war, and the French mitrailleuse saw its first service in the Franco-German war of 1870–71.

The Gatling gun is a machine-gun, invented by R. J. Gatling of Indiana in 1861. The first gun was made by him in 1862; in the following year he caused it to be brought to the notice of the French Artillery Committee. This was before the invention of the French, or the Montigny, mitrailleuse, and may therefore be considered the first practical military machine-gun. The perfection to which it has been brought in all its mechanical appliances has caused it to be introduced into the military service of most nations, and it has proved the forerunner of the Gardiner, the Lowell, and the Hotchkiss—all guns of American invention; and of the Nordenfeldt, of Swedish invention.

In the late civil war the armies of the Confederate States used rifled cannon (obtained chiefly from England) of the Armstrong, Whitworth, and Blakely patterns. The Whitworth field-piece is forged solid from low steel; the larger guns are built up with coils or hoops forced on by hydraulic pressure. The cross-section of the Whitworth bore is a hexagon with rounded corners, and the twist is very rapid. The projectiles are quite long, those intended for armor-punching being made of hardened iron or steel with very thick flat heads, to prevent glancing. The projectiles are manufactured hexagonal, of the form and dimension of the bore, and are thus made to take a rotary motion when fired. This gun had an extraordinary range and great accuracy. The Blakely gun is also a built-up gun, combining in its construction the principles of initial tension and varying elasticity, the object being to bring the strength of all the metal of the piece into simultaneous play to resist the explosion of the powder-charge. The inner tube is of low steel, and the rings, also of steel, are of varying quality. The piece is rifled with one-sided grooves and fired with projectiles having an expanding base-ring. The Confederates also used a rifle known as the "Brooke gun," made after the plan of Captain Brooke of the Confederate service. It somewhat resembles the Parrott in shape and construction; the rifling is similar to that of the Blakely.

Rifled guns have entirely superseded smooth-bores for field-service, and breech-loaders have, except in the U. S., taken the place of muzzle-loaders. This class of artillery has now stood the test of three great wars—viz. the Austro-Prussian, the Franco-German, and the Russo-Turkish; to which may be added the recent Anglo-Egyptian and many other minor struggles. It is estimated that four-fifths of all breech-loading field-pieces in existence are upon the Krupp plan. The French, for obvious reasons, were compelled to adopt another system, and the English adhere to the Armstrong, somewhat modified. Armstrong has produced a 2.5-inch gun, and Krupp one a trifle larger, intended for use in mountain-warfare; it is constructed in two parts screwed together. By this means the piece is divided into two lengths convenient for mule-packing. When the parts are screwed together—which can be done with great facility and quickness—a gun is obtained far surpassing in power anything that can be obtained from a mountain-gun of ordinary construction, limited, as it must be, in weight to the mode of transportation on mule-back. The Armstrong gun, just mentioned, has been used with considerable effect in Afghanistan.

The tendency of modern warfare has been to give greater value to a more powerful field-artillery. Infantry-fire has become so terrible, and its range has been so much prolonged, as to make necessary a like increase of the power of field-artillery fire. To this end inventive energy has been directed toward the production of guns of much larger calibre, but of such improved pattern, both of piece and of carriage, as to secure the desired end without increasing the weight to be drawn by the teams or impeding the mobility of batteries on the field.

In the early stages of artillery the *personnel* of it consisted of mechanics and laborers hired for the handling of the pieces and the management of the trains. These persons served a regular apprenticeship and had a guild of their own; when war broke out, the different monarchs hired as many as they required or could get. Their pay was considerably greater than that of an enlisted soldier. Guns were hauled to the field on cumbersome carriages and placed in position as best they could be; here they remained stationary, and, in case of disaster, nearly always fell into the hands of the enemy. At this period there were no tactical manœuvres. A step in advance of this system consisted in attaching one or more pieces to each regiment of infantry, from which men were detailed to serve the guns. During the Thirty Years' War the cannoneers, with regularly-appointed officers, became recognized in Germany as a component part of the army. For a long period, however, after this, artillery-drivers were hired as before. The horses were strung out in single file, and the drivers walked by their side. A great variety of calibres existed, producing infinite confusion in ammunition and equipments. In the early part of the seventeenth century Maurice and Henry Frederick of Nassau made many improvements, among which was a reduction in the number of calibres, restricting them to 6-, 12-, and 24-pounders for field service. The dimensions of these pieces were fixed, while handles and cascables, shaped for the attachment of ropes, facilitated mechanical manœuvres. The gun-carriages, which had limbers, and the ammunition-wagons were similarly reduced to four varieties, and their dimensions made so uniform that wheels and other parts were interchangeable. About the same time Gustavus Adolphus, perceiving the advantage that would result from field-guns capable of quick motion and rapid fire, introduced light pieces made of thin copper wrapped with rope and leather; these, not proving durable, were replaced by iron 4-pounders weighing 650 pounds and drawn by a single pair of horses. Rapidity of fire was attained by the use of cartridges, the slow process of inserting the powder with a ladle being thus gotten rid of. Two of these guns were attached to each regiment of infantry. Gustavus did much, also, toward developing the tactical powers of the arm by massing the heavy guns in strong batteries on the wings and centre and doing away with the old fashion of stringing them along the line at regular intervals. As guns have improved in range and power this principle of massing them has proved more and more advantageous, and has led to the abandonment of attaching batteries to small subdivisions of an army. In France, toward the end of this century, artillery material was modified and improved, much attention being paid to the character of the gun-metal, to the form of the chamber, and to the proper length and weight of the piece. The calibres for field-service were restricted to 4-, 8-, 12-, and 16-pounders; which calibres were retained until the change to rifles. Gun-carriages were also changed for the better and provided with limbers, while trains of wagons or carts were organized for carrying ammunition; some of the carriages were made of wrought iron. Louis XIV. was the first sovereign to create a special artillery-force; he raised, in 1671, a regiment for artillery-duty, and in 1690 founded the first artillery-school. To his age belong also the important inventions of the elevating-screw, the prolonge, and the priming-tube filled with powder, the old method being to work powder into the vent from a horn.

During the first part of the eighteenth century artillery was generally recognized as an arm, had its regularly incorporated troops, and, in consequence, made very marked progress. Field-artillery performed an important part in the campaigns of Marlborough. In 1747 the French began to fire howitzers in siege-operations without first igniting the shell, it having been found that the flash from the charge would light the fuze if there was no tamping. The gun-carriages and ammunition-wagons were still of various patterns, each arsenal having its own way of constructing them; the axletrees were of wood and the limbers very low, with horses attached in single file. After the Seven Years' War field-guns began to be assigned permanently to brigades in batteries of five to ten guns. In Prussia, Frederick the Great introduced short, light regimental guns of 3-, 6-, and 12-pound calibre; his example was followed by Austria and other countries. He also established howitzer-batteries. Frederick at first looked upon artillery with disfavor, and permitted it to run into a state of great confusion with reference to the models for each calibre. After Rossbach, where it did excellent service, he seems to have gotten over his prejudice, and we are indebted to him for the first horse-artillery, in 1759. It consisted of a battery of ten light 6-pounders, and, though long in a very inefficient condition, and destroyed at Kunersdorf and again at Maxen, was always reorganized. The Seven Years' War opened the eyes of the Austrians to the importance of the artillery arm, which was carefully reorganized and improved under the direction of Prince Liechtenstein, who was created chief of artillery, with rank and authority commensurate with the importance of his position; this gave their artillery an immense advantage and assured its constant superiority to that of most of the contemporary powers. The Russians always attached great importance to their artillery. When they entered Germany in 1758 they had 425 guns to 104,000 men; three light howitzers were attached as horse-artillery to each dragoon regiment. Artillery in that century consisted of guns attached in pairs to each infantry battalion, of guns of position organized into large batteries, and of siege-guns. The number of guns was usually four or five to a thousand men. The regimental guns advanced with the battalions, unlimbered at musket-range, and thence were moved forward by hand. The position-guns were posted at the most favorable points along the line, and generally remained stationary throughout the battle. The bronze cannon of this age were elaborately ornamented with carvings and with the ciphers and crests of arms of the reigning monarchs, the early custom of giving a special name to each piece being retained.

Such was the condition of artillery when Gribeauval appeared upon the stage. This celebrated Frenchman, having served in the Austrian artillery under Prince Liechtenstein during the Seven Years' War, returned to France with a thorough knowledge of all the improvements suggested by the experience of that struggle, and was entrusted in 1765 with the reorganization of the French artillery, then in a very poor condition. He began by creating a distinct material for each service, field, siege, and sea-coast. His field-guns were 4-, 6-, and 8-pounders. By reducing windage and improving the powder he was enabled greatly to reduce the length and weight of field-guns. To these were added a 6-inch howitzer, still retaining a small charge, though proportionately larger than that before used. These pieces were without ornaments, and were cast solid and then bored out, which made their dimensions much more exact than the old hollow-cast cannon; the trunnions were strengthened by rimbases, and copper vent-pieces enabled the guns to be rebushed. The horses were hitched in double file, which greatly facilitated the movements of the carriage, and the draught was made easier by iron axletrees, higher limbers, and travelling trunnion-beds. Fixed ammunition, elevating-screws, and tangent-scales, together with bricoles and prolonges, facilitated the service and increased the mobility of the piece. Stronger carriages were made for the lighter guns, and uniformity was established in all new constructions by requiring the arsenals to make every part of the carriages, limbers, and caissons after certain fixed dimensions, so that parts could be interchangeable and spare material carried into the field exactly corresponding to those in use. An equipment was thus obtained which could be moved and repaired with a facility hitherto unknown. These reforms were so excellent as to secure the permanency of many of them as the basis of the system of the present day.

Gribeauval's reforms did not stop at the material, the *personnel* of the French artillery being completely reorganized in 1765 through his efforts. Two guns were still assigned to each infantry battalion, which were served by detachments from a company of artillery attached to each brigade of four regiments. The rest of the artillery was organized into two or three reserves, each reserve consisting of divisions of eight pieces, to each of which was assigned a company of artillery. Here we have the creation of the artillery unit—the company organization, afterward merged into that of the battery with its horses and drivers, for the first time inseparably joined to its munitions and guns.

The French introduced horse-artillery in 1792 and cut down their batteries to six pieces, eight being found too unwieldy. In 1799 they entirely abandoned battalion-guns, as impairing the mobility of the infantry, one or two batteries attached to divisions taking their places. An artillery-train or corps of drivers, composed of enlisted men, was organized in 1800 and distributed among the French batteries; they had previously depended upon civilian drivers hired with their teams by contractors, the result being that drivers, horses, and harness were always in bad condition. The use of artillery in mass dates from the French camp at Boulogne in 1805, where this important tactical improvement was conceived and taught. The great value of it was made manifest in the battles subsequently fought by Napoleon.

The English artillery, about the beginning of the French Revolution, had been greatly neglected, and was behind that of other nations. There was no reserve artillery, each regiment having two guns, whose horses and drivers were hired. As late as 1799 there were only two 6-pounders to a brigade of infantry; each piece was drawn by three horses tandem, the driver on foot with a long wagoner's whip. Horse-artillery was, however, introduced in 1793, and a drivers' corps established the following year. In 1802 the battalion-guns were abandoned, and were replaced by field-brigades of mounted batteries and troop, or horse, batteries. The detachment of drivers with a field-brigade was an independent organization under its own lieutenant, who had no authority over the cannoneers and took rank after all the artillery officers proper. The drivers' corps was abolished in 1822, and men were enlisted for the Royal Artillery both as cannoneers and as drivers. The troop, or horse, artillery, however, continued to have drivers especially enlisted for that purpose, and to this faulty system the other batteries reverted after the Crimean War.

The systems of field- and siege-artillery in the U. S. were chiefly derived from those of France. After the war of 1812 with Great Britain the artillery arm was almost entirely neglected; no field-batteries were kept up, and the heaviest gun mounted on the seacoast in 1820 was a 24-pounder. The four regiments of artillery, though mostly garrisoning the forts of the Atlantic coast, performed little other than infantry duty: artillery as a science was not thought of, and as an art was scarcely at all practised. In 1827 the French replaced the two flasks which formed the trail of the Gribeauval system by a single piece, called the "stock," which permitted the carriage to turn in a smaller circle than before. The mode of connecting the limber with the gun-carriage was simplified by employing a hook-shaped pintle to the axletree, instead of an upright bolt; this greatly facilitated the manœuvres of limbering and unlimbering and admitted of an ammunition-chest being placed on the limber, the wheels of which were made interchangeable with those of the gun-carriage. A caisson provided with chests for the transportation of ammunition, constructed upon the general principles of the limber and gun-carriage, admitted of such mobility as to allow it to accompany its piece in all manœuvres. These improvements were soon adopted by all European nations, and in 1832 were introduced into the U. S. service and were the carriages used during the civil war, and still continue to be the regulation model. Within the last twenty years iron and steel have gradually replaced wood in the construction of field-carriages in most European services.

The proportion which field-artillery should bear to other troops in campaign depends upon the nature of the country and of the projected campaign and the character of the troops comprising the army. In a wooded and broken country less artillery can be advantageously employed than in an open country with good communications, and more is required when the field of operations is limited than where long and rapid marches, made more for purposes of invasion than for fighting, are intended. More also is required when the army is composed of raw and inexperienced troops than when of well-instructed veterans. In the Crimean War the proportion of artillery was a fraction less than three guns per thousand infantry; in the Italian campaign of France and Sardinia against Austria, the proportion was between three and four pieces per thousand; in the Seven Weeks' War, the proportion was about the same; in the Franco-German war, the proportion was three guns per thousand; and in the Russo-Turkish war, it was a little greater. During the civil war in the U. S. the proportion was at first a little over three pieces for one thousand infantry, but as the latter became more veteranized this was reduced to about two pieces. Much of this reduction, however, was due to the superior organization given toward the close of the war to the artillery, as hereafter mentioned. The proportion of artillery serving with cavalry is generally a fraction less than that for infantry. Improvements in small-arms have had a tendency to increase the value of artillery-fire, and nations that have had most recent experience are increasing the proportion of their field-guns.

In the U. S. the field-artillery of the army consists at present of ten mounted batteries, two to each regiment of artillery. The other ten batteries of each regiment are armed and equipped as infantry, and serve mostly in forts and garrisons on the seaboard.

During the war of 1812 with Great Britain field-batteries were created by mounting foot-batteries from the artillery regiments; at the close of the war all these batteries reverted to the status of foot-"companies," and none were mounted until 1836, when Captain Ringgold succeeded in having his company organized into a field-battery. This was soon followed by three others—one from each of the regiments of artillery. The pieces for each battery were four 6-pounder bronze guns and two 12-pounder howitzers. The carriages and equipments were of the best-known pattern, and, under selected officers, these batteries soon acquired an astonishing degree of efficiency. One field-battery for each regiment was then the legal number. During the war with Mexico (1846–48) an additional field-battery to each regiment was authorized. These were all mounted during that war, but at the close of it were dismounted, and remained so until a short time before the outbreak of the civil war. When that war broke out (1861), a regiment of *light* artillery was added to the regular establishment, and a vast number of volunteer batteries were called into existence. During the Mexican war the field-batteries were attached, as a rule, to infantry divisions. There were no corps organizations during that war.

During the first year of the American civil war a division of infantry of about five thousand men was the highest organization, and to each division (in the Army of the Potomac, where the organization of all arms was the most complete) were attached three field-batteries, one of regulars and two of volunteers. By thus mingling the instructed batteries with those freshly raised the latter acquired a knowledge of their duties with marvellous rapidity, and in the battles that ensued the field-artillery proved itself the strong point of reliance for the other arms. For a couple of years after the formation of army corps during that struggle, the assignment of batteries to divisions continued. It was soon perceived, however, that this arrangement was faulty in the extreme. The batteries, by being attached to an arm of a different nature, were badly provided for, and soon ran down in material; their services were confined to the operations of the particular division to which they were attached, and frequently, from the nature of the ground or other causes, their full effectiveness was impaired or entirely misdirected, whereas, if they had not been thus trammelled, they could have been more advantageously used in other parts of the field. To a great degree it prevented the massing of artillery and the crushing effect of concentrated fire, and a large division of reserve batteries had therefore to be maintained for this purpose, and also for affording a recuperating place for the deteriorated divisional batteries. Toward the close of the war the divisional batteries of each corps were united and formed an artillery brigade, which was a distinct command, under a field-officer of suitable rank; each of these brigades had its own staff and supply organization, and was thus enabled to maintain the batteries in the highest state of efficiency. This organization admitted of the most effective use of artillery on the field of battle, and consequently the proportion of artillery, which before had been three guns to a thousand infantry, was considerably reduced and reserves almost entirely dispensed with. The horse-artillery portion of the field-artillery was organized upon the same principle. These batteries operated, of course, with the cavalry, opened and maintained the actions for them in regular fields of battle, accompanied that body even on those rapid, and sometimes remote, "cavalry raids" upon the communications of the enemy which constituted so extraordinary a feature of that war. The services of this body of artillery could not possibly be excelled in brilliancy and *élan.*

During peace the mounted batteries of each regiment constituted a school for the purpose of diffusing throughout the regiment instruction in field-artillery service. The captains are changed every three years, and the lieutenants after a tour of two years. In the event of war, all the batteries of a regiment can be mounted at the shortest notice and supplied with instructed officers.

The personal armament of an artilleryman of the field-batteries consists of a sabre and a revolver for the officers and the non-commissioned officers, and a sabre only for the drivers and the cannoneers. During the late civil war it was found that the sabre was an encumbrance worse than useless, and it was therefore dispensed with in the field. The personal armament of artillerymen of batteries not mounted is the rifle-musket and the other equipments of an infantry soldier. The facings of the uniform for artillery are scarlet; otherwise, the dress is the same as that for other troops. The pay of mounted batteries is the same as for cavalry; for all others it is the same as for infantry.

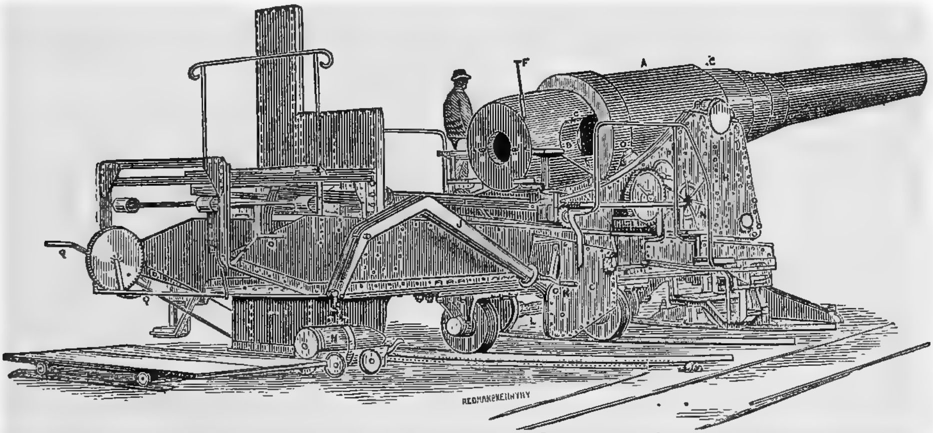
The tactics for field-artillery were originally adopted in 1844 from the French, and, although since revised a number of times, are essentially the same system; for foot-batteries a manual of "Heavy Artillery Service" provides for the handling of heavy ordnance, and the "U. S. Infantry Tactics" serves for all infantry duties.

Second, as regards *Heavy Artillery.* The literature of this branch is voluminous, but it may be summarized by saying that breech-loading rifles are now used by all European nations except the English, who are as yet in a transition state from muzzle-loaders, and the Italian navy, which uses Armstrong muzzle-loaders. In relation to modern improvements in heavy artillery, the U. S. can scarcely be taken into account, as hardly any advance has been made beyond the smooth-bore muzzle-loaders in existence at the close of the late civil war. A few of these—viz. the 10-inch Rodman guns—have been converted into 8-inch muzzle-loading rifles, but this can scarcely be considered an exception to the general statement. Some experimental guns have from time to time been constructed, generally with a view to testing some peculiar invention, but none as yet have been manufactured for the armament of places.

The following list gives the calibres of the heavy guns of the principal European nations:

Germany. — Breech-loading, steel-hooped, 15.75-in., 13.97-in., 12-in., 9.45-in., and 5.87-in., all upon the Krupp system. (Fig. 5.)

FIG. 5.



16-in. (71 tons) Krupp gun, mounted on coast-carriage.

A, 40-centimetre (15.75 in.) gun; length, 32 ft. 10 in.
B, Breech-closer, showing (C) end of driving-screw.
D, D, Studs for hooking on shot-guide.
E, E, Rings for rammer-pulley blocks.
F and G, Tangent- and trunnion-sights.
H, Carriage, wrought iron.
I, Loading-platform.
J, Crane, pivoting vertically on pillar hinged horizontally at K with counterspring on arm L, beneath the carriage.
M, Chilled iron projectile.
N, Hand-wheel for elevation, with train of wheels working on toothed elevating-arc O.
P, Graduated disk, showing quadrant elevation, being set by reverse (inner) edge of elevating-arc.
Q, Q, Q, Q, Handles for working traversing-gear.

Italy.—Breech-loading, cast-iron, steel-hooped, 18.1-in., 12.6-in., and 17.72-in., upon the Rosset system, and 17-in. guns for the navy upon the Armstrong muzzle-loading system. These latter are known as 100-ton guns. The heaviest calibre for land-service is also known as a 100-ton gun.

France.—Breech-loading, steel-hooped, 18.11-in. gun, weighing 124 tons, and 12.6-in. cast-iron gun, hooped and lined with steel, Reffye system.

England.—Muzzle-loading, wrought-iron, hooped, lined with tube of cast steel, 16-in. and 12.5-in. upon the Frazer principle, and 17.72-in. (100-ton gun), 8-in., and 6-in. upon the Armstrong principle.

Russia has 12-in. and some other calibres of breech-loading steel-hooped cannon of the Krupp model.

The French and Italian are the only considerable military powers that still cling to cast iron as a material for gun-construction; all others use iron or steel, from which they construct ordnance by the *built-up* method. Cast iron is a much less expensive material for gunmaking than steel or wrought iron, and for this reason the little that is done in the U. S. toward providing a more serviceable and efficient ordnance is directed toward the use of cast-iron.

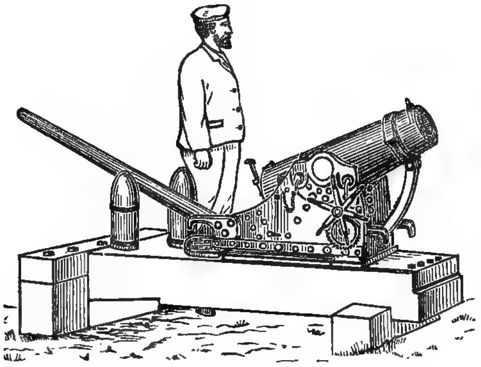
About ten years since Palliser introduced into England a method of converting smooth-bore cast-iron guns into rifles. This he did by inserting a tube of wrought-iron or steel into the bore of the piece and rifling the tube. The rifled piece thus formed has a less calibre than the original gun, and in order to secure the requisite thickness of tube the original bore of the piece is reamed out to a greater diameter. The tube consists of two parts, called the A and B tubes. The former extends the entire length of the bore, and contains the rifling; the latter, or B, tube is shorter, envelops the rear part of the long tube, and is shrunk upon the latter, which is cut away for that purpose. The two tubes thus united have the same exterior diameter from end to end, and are made to fit accurately the bore of the cast-iron casing. The bottom of the tube is closed by a steel or iron cup-shaped plug screwed into the A tube. The tube is secured from slipping forward by a muzzle-collar screwed into the face of the piece, and from turning by a steel pin tapped through the casing into the tube. Formerly the tubes were inserted from the muzzle, but more recently the gun has been bored through the breech and the tube or tubes inserted from that end and closed by a screw breech-plug. This system of conversion worked so favorably in England that soon after its adoption there it was taken up in the U. S., with a view to utilizing the large stock on hand of smooth-bores. The 10-inch guns are converted into 8-inch rifles, and it is contemplated to convert the 15-inch pieces into 12-inch rifles. It is also proposed to make these converted pieces breech-loading by squaring off the breech of the piece and attaching thereto a steel breech-piece carrying the breech fermeture, which is to be of the Krupp pattern. The gun is to be strengthened by a steel band around the breech. An experimental 10-inch smooth-bore converted upon this plan to an 8-inch rifle has given good results.

At the commencement of the late civil war (1861), Mr. R. P. Parrott, proprietor of the West Point foundry, New York, produced his system of guns. These guns are of cast iron, of about the usual dimensions, strengthened by a band or ring of coiled wrought iron shrunk over that portion of the breech surrounding the charge. The bodies of the larger Parrott guns are cast hollow, on the Rodman plan. Parrott guns consist of 300-, 200-, 100-, 30-, 20-, and 10-pounders, the diameters of the bores being respectively 10, 8, 6, 4, 4.2, 3.67, and 3 inches, and weights of projectile 200, 150, 86, 28, 19, and 10 pounds. A large number of these guns were used during the late civil war, on both sea and land, and the amount of work done by them was very great. They were, in fact the first rifles used in any country for bombardments and the breaching of masonry. The Lancaster gun at Sebastopol was scarcely an exception to this. Large numbers of Parrott guns were employed in the siege of Charleston (1863). These pieces successfully bombarded the city at a distance of 7000 yards, and demolished the walls of Fort Sumter at distances varying from 3500 up to 4300 yards.

In the hasty preparation for hostilities consequent upon the outbreak of the late civil war, a number of old-pattern 24-, 32-, and 42-pounders were rifled, but proved of little service. At the siege of Fort Pulaski, Georgia, in 1862, five of these, together with five 4.2-inch Parrotts, effected a breach in the heavy masonry of that fort in a few hours firing from a distance of 1650 yards. The Parrott guns, although in many instances showing wonderful endurance, are, nevertheless, liable to burst; especially was this the case with those supplied to the navy. This fact has caused them to be omitted from the system of artillery established for the U. S. service. There are, however, many of them still mounted in works.

Following closely upon the introduction of rifled guns was that of rifled howitzers and mortars, and the results obtained were no less wonderful than for guns. So far as now known, the mortar was the first form in which artillery of a large size was used. At first they were employed to throw stone balls at great angles of elevation, which produced effect merely by their crushing force. About 1480 cast-iron shells were invented, and first used by the Turks at the siege of Rhodes. Since their first introduction as engines of war mortars have had various forms, chiefly as to shape and dimensions of the powder-chamber. Until 1861 all mortars had their trunnions cast upon the breech, and the elevation was given by means of a wooden quoin under the muzzle; since the above date all mortars made for the U. S. service, excepting the small coehorn, have been cast with their trunnions at the centre of gravity, thus greatly facilitating their service. Mortars of very large calibre have from time to time been fabricated, but the largest is that now at Woolwich, England, constructed in 1857 by Mr. Mallet. It is made in six sections (so as to be transported), which are fitted gas-tight and bound together by six staves; the breech is a solid forging set in a cast-iron base. This mortar has fired shells weighing 2481 pounds, containing a bursting-charge of 480 pounds, to a distance of two miles. A small mortar (called the "coehorn," after its inventor) of such lightness as to be readily carried by a couple of men has proved of great service in the field and in siege-operations. A similar mortar has been devised for mountain-service, arranged so as to have the piece carried by one mule, while another carries the bed. Smooth-bore mortars have inherent defects as to accuracy of fire; it was to overcome these, and also to secure greater range for curved fire, that rifled mortars were devised. (Fig.6.) Armstrong in 1864 constructed one—a muzzle-loader—of 6.4-inch calibre which gave such good results that other nations were encouraged to take up the subject. Breech-loading methods were soon introduced, and rifled mortars upon this plan are now everywhere taking the place of the old style smooth-bore muzzle-loaders. The calibres used are approximately 6, 8, 10, and 11 inches, and the lighter are in some instances mounted on carriages for field-service. (Fig. 7.) The siege of Paris and the bombardment of Alexandria by the British are recent instances of the work of which rifled ordnance is capable.

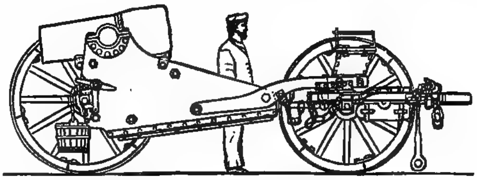
FIG. 6.



5.9-inch Krupp Rifled Mortar.

Wrought iron, and in some instances steel, have entirely superseded wood in the construction of carriages for heavy ordnance. Various plans for checking recoil have been invented, but that most generally adopted is what is known as the "hydraulic buffer," but which in reality works with oil, glycerine, or some other non-freezing or corroding fluid. Between the front ends of the chassis-rails are attached two cylinders about 9 feet long, with an interior diameter of about 14 inches. A piston works in each cylinder; the rods of the piston pass out of the rear cylinder-heads, and are attached to a heavy transom on the rear of the top-carriage. The piston-head is pierced with several holes, permitting the fluid to pass freely from one side of the piston to the other, but so regulated by the size of the holes as to require an appreciable time, varying with the pressure brought upon it by the piston, to accomplish the passage. When the piece is fired, the sudden jar of recoil is taken up by the action of the fluid, and the top-carriage glides back with an easy motion. Pneumatic buffers upon the same principle are used in the U. S. for the 15-inch gun.

FIG. 7.



6-inch Krupp Rifled Mortar.

Various plans have been proposed of late years to secure a practicable depressing gun-carriage—*i. e.* a carriage so constructed that the piece can be raised to a height sufficient to fire over a parapet, and then lowered so as to be loaded in a secure position behind the parapet. The Moncrieff counterpoise gun-carriage, designed to effect this object, having given satisfactory results upon trial, has been extensively adopted by the English. In the U. S., Major King of the Engineers has invented a depressing-carriage which upon trial has given good results. This carriage consists of a chassis which has an inclination to the rear of about 30°. The top-carriage is attached to a counterpoise by a band composed of wire ropes. The counterpoise is a heavy mass of metal descending into a well in front of the chassis. When the piece is fired from the usual position, the top-carriage slides back and downward, where it is caught by a brake and held until the piece is reloaded. A slight movement of the lever of the brake releases the top-carriage, and the gun ascends to the firing position. Depressing-carriages are intended to protect the piece and carriage as well as the cannoneers. The accuracy of modern artillery-fire increases the danger to the guns with which a work is armed, and the disabling of a piece is of greater moment now than formerly, when works were garnished with a great number of pieces, but of such small size as to be readily replaced when injured.

The artillery troops of the regular army of the U. S. consist of five regiments, each composed of 1 colonel, 1 lieutenant-colonel, 3 majors, 1 adjutant, 1 quartermaster, 1 sergeant-major, 1 quartermaster-sergeant, 2 principal musicians, and 12 batteries. Each battery consists of 1 captain, 2 first lieutenants, 2 second lieutenants, and 150 enlisted men (sergeants, corporals, artificers, musicians, and privates). In time of peace the President is authorized to reduce the battery organization to 1 captain, 1 first lieutenant, 1 second lieutenant, and 60 privates; practically, this number is but about 35. The law requires that one battery in each regiment shall be "mounted"—*i. e.* equipped with guns, horses, etc.—and gives the President discretion to mount as many of the others as the exigency of the public service may seem to him to demand. When not thus mounted, the remaining batteries of artillery serve as heavy or garrison artillery, principally in the seacoast fortifications.

JOHN C. TIDBALL.

Artillery, Schools of. Special schools for instruction in artillery have for many years been organized and maintained by the various nations of the civilized world as a component part of their military establishment. As early as A. D. 1515 such a school was organized by the Venetians. A few years later Charles V. established a school of artillery in Spain and another in Sicily. Toward the end of the next century (1679) a school of application for artillery was founded at Duai by Louis XIV. The engineers had a school at Mézières. Both of these schools passed through many vicissitudes and removals until 1802, when the two were combined at Metz, and continued there until that place passed into the hands of the Germans. About the same time an artillery school was organized in Saxony, and some years subsequently by the other states of Germany. The Artillery and Engineering School in Berlin is a technical school, and has a course of two years. In Sweden, Austria, and Russia artillery schools were in existence before the close of the seventeenth century. About the middle of the eighteenth century the artillery school at Woolwich was established in England.

In some nations the school is a joint one for artillerists and engineers, but this is exceptional, the general rule being to keep the instruction of these two scientific corps separate and distinct. In the U. S. an artillery school for practice was established at Fort Monroe, Virginia, in 1824, and it continued in existence for about six years, and as a practical school solely, when the exigencies of the military service (due chiefly to Indian wars) caused its discontinuance. In May, 1858, a school for practical and theoretical instruction was organized at the same place. This school languished after the first year and a half of its existence, and was finally brought to an end in 1861 by the great civil war. In Nov., 1867, an artillery school for theoretical as well as practical instruction was again established at Fort Monroe, and has since continued uninterruptedly up to the present date (1883). This school was organized under the command of Brevet Major-General Barry, who remained at the head of it until 1877, when he was succeeded by General Getty. The latter remained its efficient commander until his retirement from active service (Oct., 1883), when General Tidball was assigned as his successor.

The organization of the U. S. Artillery School adopted in 1867 contemplates a course of studies and practical training not limited to what is necessary for merely expert artillerymen, but one which aims to qualify officers for any duty they may be called upon to perform, or for any position, however high in rank or command, to which they may aspire in service. Such an advance is demanded by the progress made in the methods of warfare during the last twenty years, particularly as regards artillery, wherein improvement has been from almost primitive rudeness to the requirements of an exact science, combining with it many cognate branches heretofore considered of but little importance to a military man. With reference to the U. S. Military Academy, the artillery school is a post-graduate institution.

The *personnel* of the school consists of three field-officers of artillery, the senior commanding the post as well as the school. These officers constitute the staff of the school. The adjutant of the post is *ex-officio* secretary of the staff and custodian of all records. The troops are five foot-batteries of artillery (one from each regiment) and such officers and enlisted men as may be ordered to the school for instruction. The batteries are permanently assigned, and are called "instruction-batteries." The officers for instruction are lieutenants, four to each battery, attached thereto for a tour of two years, commencing May 1 of each alternate year. Prior to 1875 the course of instruction was for one year only. Experience proved this to be too short a period in which to accomplish all that was desirable to have taught. The course, as prescribed for one year, was not materially changed upon passing to the two-year programme, but the additional time permitted its being pursued in a more thorough manner.

In addition to the drawback arising, as just mentioned, from want of time, the school was greatly crippled during the first years of its existence for want of proper facilities for instruction. Aside from a few old and worn-out instruments obtained from the Engineer Bureau, there was nothing in that line. Text-books, even, were limited in number, and supplied from small sums received from time to time from the contingent fund of the War Department. In 1878 a small appropriation was granted by Congress. This has been continued annually since that time. By a judicious management of these appropriations, the school-facilities have been increased, until now they may be considered upon a very respectable footing. In the mean while, other improvements were made, adding greatly to the convenience and comfort of the post and school. Among these may be mentioned new barracks for the soldiers and additional quarters for officers; a building for library-, reading-, and school-rooms for enlisted men; a building for a model-room and temporary occupancy of the school library, and another for section-rooms, the accommodation of instruments, and for photographic work. Casemates have been fitted up for chemical laboratory, electrical rooms, and for the instruments to determine velocities, etc.

The school is divided into six departments, viz.:

The Department of Artillery, embracing powder and its effects; material; fire and the effects of projectiles; batteries and artillery emplacement; employment of artillery, foreign artillery. The whole supplemented by exercises in application.

The Department of Engineering, embracing a practical course in topography and surveying and the use of instruments; study of military bridges, roads and railroads; elements of field-fortifications, and their application to ground; sieges; and elements of permanent fortifications.

The Department of Military Art, comprising military policy and instructions; strategy; grand tactics; military hygiene; military administration; didactic study of campaigns and battles, and exercises in application.

The Department of Law, embracing courses in international, constitutional, and military law.

The Department of Applied Sciences, embracing geology and military geography; manufacture of explosives; military pyrotechny; metallurgy of iron; manufacture of cannon and small-arms; electricity, telegraphy, and defensive torpedoes, supplemented by chemical manipulations connected therewith.

The Department of Practical Military Instruction, embracing all drills, and firing exercises of artillery and infantry practised at the school.

Students who pass successfully through the entire course of instruction are awarded a certificate of proficiency, and special reports are made in all cases of failure.

The military policy of the U. S. demands, above that of most other nations, that her means for military instruction should be of the most efficient nature. Unlike the states of Europe, she is not required to stand constantly in an offensive and defensive attitude toward contiguous neighbors. Her wars of magnitude are comparatively rare; those educated in the school of experience by one war pass beyond the period of active service before another occurs, and fresh armies have to be raised from the civil population and compelled to learn the practice of war under the most adverse circumstances. Particularly is this the case with artillery instruction, which, from the very nature of artillery service and material, cannot, like that of other arms, be disseminated among the people by either the militia or the volunteer system. In consequence of the smallness of the regular army, the only means of securing efficient preparation for the use of artillery in war lie in providing for a corps of thoroughly-trained artillery officers; consequently, the necessity of maintaining an artillery school of theory and practical application. JOHN C. TIDBALL.

Artocarpa'ceæ [from the Gr. ἄρτος, "bread," and καρπός, "fruit"], a natural order of exogenous plants, of which the *Artocar'pus inci'sa*, or bread-fruit, is the type; it is regarded by some botanists as a sub-order of Urticaceæ. This order comprises more than fifty species, nearly all natives of tropical countries.

Artois (anc. *Atreba'tes*), a former province of France, bordering on Flanders, is included in the department of Pas-de-Calais. The capital of Artois was Arras. Artesian wells were named from Artois (in Latin, *Arte'sia*). Charles X. of France before his accession was count of Artois.

Artotype. See PHOTOGRAPHS IN PRINTING INK.

Arts, Degrees in. The term arts (in Latin *artes*) or liberal arts (*ar'tes libera'les*), as applied to certain studies, was derived from the ancient Romans, and as early as the ninth century was used in the schools of Paris, which probably received it from Martianus Capella, and on the establishment of universities the term "faculty of arts" denoted instructors in science and philosophy, as distinguished from the faculties of theology, medicine, and law. The number of arts was seven: grammar, logic, rhetoric (the *Trivium*), music, arithmetic, geometry, and astronomy (the *Quadrivium*). The terms master and doctor were applied synonymously to persons teaching by authority from the universities. In process of time the first was restricted to the liberal arts, the other to divinity, law, and medicine. Music, however, had its doctorate, as well as philosophy and letters. (See DOCTOR.)

Art-Union [Ger. *Kunst'verein*], an institution for the promotion of a liberal patronage of the fine arts; a society formed to encourage the fine arts by the purchase of pictures with a common fund raised by subscription. The works they purchase are sometimes distributed by lot or lottery.

Aru Islands. See ARROO ISLANDS.

A'rum [Lat. *a'rum*; Gr. ἄρον], a genus of endogenous herbaceous plants of the order ARACEÆ (which see). This genus has a convolute spathe, the spadix naked at the point. In some of its species a stench like that of carrion is produced during flowering, and in some a remarkable degree of heat.

Arus'pices, or **Harus'pices** [probably from *haru* (= *hira*, "entrails"), and *specio*, to "see" or "examine"], were Roman soothsayers, who foretold future events from the inspection of the entrails of the victims offered at the altars of the gods.

Arvic'ola [from the Lat. *ar'vum*, a "field," and *co'lo*, to "inhabit"], a genus of small animals of the order Rodentia, allied to the rat and mouse. They are distinguished by the prismatic form and fangless structure of the molar teeth. The *Arvicola agrestis* (field campagnol) and the *Arvicola riparia* (bank campagnol) are natives of England. The U. S. have over twenty species, called field-mice.

Arvieux, d' (LAURENT), CHEVALIER, a French traveller and Orientalist, b. at Marseilles in 1635. He negotiated a treaty with the dey of Tunis in 1668, and was consul at Aleppo from 1679 to 1686. He wrote a "Treatise on the Manners and Customs of the Arabs" (1717). From his papers Labat compiled "Memoirs of Chevalier d'Arvieux, containing his travels in Asia" (6 vols., 1735). His works are commended by Niebuhr. Died in 1702.

Arwiddsson (ADOLF IVAR). See APPENDIX.

Arx (gen. **Ar'cis**), a Latin name given to the citadel of an ancient city. The arx was a fortified eminence or rock, either within the walls or close to the city, and sometimes bore a particular name, as the Cadmea of Thebes, the Acrocorinthus of Corinth, the Acropolis or Cecropia of Athens. The arx of Rome was part of the Capitoline Hill.

A'rya, or **Ar'yan,** *Arya,* Sanscrit, meaning "noble," and this probably, from *ar*, "to plough," indicating the superiority of the agricultural to the nomadic life. It was applied to the Sanscrit-speaking people of India, whose ancestors came from Central Asia. The three higher castes of the Hindoos are comprehended under the general term of Arya; the lowest of the four principal castes (the Sudras) belonging to the races whom the Aryas had conquered. *Arya* is supposed to have originally signified "agriculturist," at a time when the most respectable portion of the people of that part of Asia were engaged in cultivating the earth, raising herds of cattle, flocks of sheep, etc., whence it came to signify "respectable." The Aryas were of the same race as the ancient Persians, and it is said that even so late as the reign of Darius Hystaspes the Persians could converse with the light-complexioned Hindoos without the aid of an interpreter. Prof. Bopp of Berlin, in his "Comparative Grammar," has shown that many of the languages of Europe are closely related to the Sanscrit; or, to adopt the words of the late Prof. Wilson of Oxford, "He may be considered to have established, beyond reasonable question, a near relationship between the languages of nations separated by the intervention of centuries and the distance of half the globe, by differences of physical formation and social institutions—between the forms of speech current among the dark-complexioned natives of India and the fair-skinned races of ancient and modern Europe; a relationship of which no suspicion existed fifty years ago, and which has been satisfactorily established only within a recent period." (See Preface to the translation of Bopp's "Comparative Grammar," London, 1845.) All those nations whose relationship has been proved "beyond reasonable question" by a careful comparison of their languages, are designated as the Indo-European (or, less correctly, the Indo-Germanic) family of nations. Their ancestors, we have every reason to believe on purely scientific grounds, were originally one people, and therefore Aryan, as a convenient general term to denote the race, has been applied not merely to the ancestors of the modern Hindoos, and to their nearest of kin, the ancient Persians, but to the whole of this extensive family, whose forefathers, there is reason to believe, once inhabited Central Asia, whence they migrated in search of fresh pastures and more room, some going south-eastward to India, some northward or north-westward to Russia, and others westward to Asia Minor, thence to Southern and Central Europe. (See MAX MÜLLER'S "Science of Language," 1st series; FARRAR'S "Families of Speech.")
J. THOMAS.

Ar'zachel, a Jewish astronomer, who was born in Spain, and lived about 1050–1100. He ascertained the obliquity of the ecliptic, and prepared astronomical tables, called "Toledo Tables."

As (gen. **As'sis**), a Roman weight, also called **Libra,** was nearly equal to the modern pound. It was divided into twelve unciæ, "ounces," and was equal to 10 ounces 18 pennyweights 13$\frac{5}{7}$ grains Troy. *As* was also the name of a brass Roman coin which originally weighed a pound, but in consequence of the increase of the value of metal compared with that of food and other commodities, it was gradually reduced to half an ounce. During the second Punic war the value of the *as* was about two farthings, but its weight and prices in Rome were so variable that its value cannot be accurately fixed. (See SESTERTIUS.)

A'sa Dul'cis (*i. e.* "sweet asa"), a drug highly prized by the ancients as an antispasmodic and diuretic. It was worth its weight in gold, and was obtained from a plant of the genus *Thapsia,* a native of Barbary and Southern Europe.

Asafœtida. See ASSAFŒTIDA.

Asagræ'a (named in honor of Asa Gray, the botanist), a Mexican plant which has bulbous stems, linear, grass-like leaves, and spikes of whitish flowers. The *Asagræa officinalis,* which is said to be the only species of this genus, produces the cebadilla-seeds from which the poison veratria is prepared.

Asan'der [Gr. Ἄσανδρος], a Macedonian general, a brother of Parmenio, was appointed governor of Lydia by Alexander the Great in 334 B. C. After the death of that king he was satrap of Caria, an ally of Ptolemy, and an enemy of Antigonus, against whom he waged war about 314 B. C.

Asarabac'ca (*As'arum Europæ'um*), an herbaceous plant of the natural order Aristolochiaceæ, having kidney-shaped leaves, is a native of Europe. The roots and leaves are stimulant, purgative, and emetic, and contain a bitter principle or crystalline substance called *asarin.*

As'arum [Gr. ἄσαρον], a genus of herbaceous plants of the natural order Aristolochiaceæ, is distinguished by 12-horned stamens, distinct from each other and from the style, and by a bell-shaped, 3-lobed perianth. The *Asarum Canadense,* a native of North America, called wild ginger, is a stimulant and diaphoretic. Two other species grow in the Atlantic States.

As'ben, called also **A'ir,** a country of Central Africa, situated between about 15° and 20° N. lat., and 6° and 11° E. lon., borders on the Desert of Sahara. It includes a large tract of desert, and some fertile land which produces dates. The climate is hot and dry. Capital, Agades.

Asbes'tos, or **Asbestus** [from the Gr. ἄσβεστος, "indestructible"], a fibrous mineral composed of fine, flexible, and easily separable filaments of a silky lustre. It is a variety of actinolite and tremolite, and consists chiefly of silica, magnesia, and lime, or pyroxene. The fibres of a very silky variety of asbestos are called amianthus. Asbestos may be woven into cloth which is incombustible, and if soiled may be cleansed by fire. The ancients wrapped the bodies of the dead in such cloth, in order that when they were burned on the funeral pyre their ashes might be kept separate. It was also used for the wicks of the lamps in the temples. Mountain cork and mountain leather are varieties of asbestos. It is now employed as a material for roofing, boiler-felting, night-lamp wicks, steam-packing, and paper-stock. Asbestos is abundant in Corsica, Savoy, the Valtelline—the best coming from the last-mentioned region—and the Tyrol.

Asbjörnsen. See APPENDIX.

As'boline, a nitrogenous substance to be found in soot.

As'both (ALEXANDER SANDOR), a Hungarian officer, born Dec. 18, 1811, fought in the revolution of 1848, and in 1851 visited the U. S. He entered the Union army on the breaking out of the war in 1861, distinguished himself in various engagements, and was made a major-general in 1864. He was minister to the Argentine Republic in 1866, and died at Buenos Ayres, Jan. 21, 1868.

As'bury (FRANCIS), born at Handsworth, Staffordshire, England, Aug. 20, 1745, of Methodist parents, was converted at the age of thirteen, became a local preacher at sixteen, an itinerant under Wesley at twenty-two, came to America in 1771 as missionary; in 1772 became Wesley's "general assistant" in America. In 1784 he was elected bishop of the new Methodist Episcopal Church, and was consecrated by Bishop Coke. His labors and success in establishing his Church (chiefly in fields where churches were almost unknown) are among the most remarkable of which history bears record. Died in Spottsylvania, Va., Mar. 21, 1816.

As'bury Park, on R. R., a summer resort on Atlantic coast of Monmouth co., N. J. (see map of New Jersey, ref. 4–E, for location of county), about 5 miles S. of Long Branch. Pop. in 1880, 1640; in 1885, 2124.

As'calon (Ἀσκάλων of the Greeks), called *Ash'kelon* in the Bible, one of the five capital cities of the Philistines, a former seaport of Palestine, 14 miles N. of Gaza, 12 S. by W. of Ashdod or Azotus, and 42 W. S. W. of Jerusalem. It was anciently a place of much importance, and was especially so in the time of the Crusades, when its small and insecure harbor was filled with stones by the sultan Bibars, A. D. 1270. It is now a small village called *Asculan,* and has extensive ruins.

As'caris [Gr. ἀσκαρίς], (plu. **Ascar'ides**), a genus of intestinal parasites, of which the most common is the round-worm, *Ascaris lumbricoides,* found in the intestines of man. Children frequently have them, principally in the small intestines. The body of this worm is round, elastic, with a smooth surface, of a whitish or yellowish color; it tapers especially towards the anterior extremity, which commences abruptly by three tubercles which surround the mouth. The body is transversely furrowed with numerous fine lines, and marked also with four lines from head to tail. In the female there is usually a constriction of the body at the distance of about one-third of its length from the mouth. Sometimes, especially in young and weakly children, their accumulation may cause serious disturbance; even convulsions may be thus produced. There are no symptoms (apart from the passage of the worms from the bowels) invariably connected with their presence. Itching of the nose, capricious appetite, swelling of the abdomen, and grinding the teeth when asleep, may all occur, but they may also be produced by other causes. *Ascaris vermicularis* is the small white thread-worm or seat-worm, which, although called ἀσκαρίς by Hippocrates, is by most recent writers called *Oxyuris vermicularis*. Its length is from two-twelfths to five-twelfths of an inch, the female being larger than the male. The head is blunt, widening on each side; the body tapers (at least in the female) to a point. Seat-worms, by the itching they produce, often distress children very much; they are less freqently met with in adults. (For *treatment* of worms, see ANTHELMINTICS.)

Ascawa'na Lake, a beautiful sheet of water, 2 miles long and 1 mile wide, in Putnam Valley township, Putnam co., N. Y. It is a place of summer resort.

Ascen'sion, an island in the Atlantic Ocean, 800 miles N. W. of St. Helena, belongs to Great Britain. It is 10 miles long and 6 miles wide. It is volcanic and mountainous, one peak rising to the height of 2870 feet. It has a fort in lat. 7° 55′ 55″ S. and lon. 14° 25′ 5″ W. Turtles, vegetables, and birds' eggs are procured here. It was discovered in 1501 by the Portuguese on Ascension day, but was uninhabited till Oct. 15, 1815, when the English took possession of it and established a military station there after the arrival of Napoleon Bonaparte at St. Helena. It is used as a station for vessels employed on the coasts of Africa and Brazil. Chief town, George Town, where the garrison was located. Pop. 27.

Ascension [from the Lat. *ascen'sio*, an "ascent"]. In astronomy, the right ascension of a star is the arc of the equator intercepted between the first point of Aries and that point of the equator which comes to the meridian at the same instant with the star. Measured always from west to east, the right ascension of a star corresponds or is analogous to the longitude of a place on the earth. The most convenient mode of designating the position of a star is to refer it to the equator, and to a certain fixed point in the equator. The point chosen for this purpose is the vernal equinox or first point of Aries, from which the degrees are reckoned eastward all round the circle. The right ascension and the declination are thus the two co-ordinates by means of which the place of any star is determined. The right ascension is ascertained by a sidereal clock, and is reckoned or expressed in time. For example: if a star come to the meridan five hours after the first point of Aries passes the meridian, then five hours is the star's right ascension in time, which is equivalent to seventy-five degrees, because one hour corresponds to 15° in space. *Ascensional difference* is the difference between the oblique and the right ascension of a celestial object. On account of almost all astronomical elements being now computed from observations of right ascension and declination, instead of oblique ascensions and ascensional differences, this term is at present but little used.

Ascension Day, or **Holy Thursday,** one of the great religious festivals of the Roman Catholic and Episcopal churches, is held on the fortieth day after Easter, to commemorate the ascension of Christ into heaven. Ascension Day has been observed at least since 68 A. D., and perhaps earlier. Saint Augustine believed it to have been instituted either by the apostles themselves or the bishops immediately succeeding them.

Ascet'icism [from the Gr. ἀσκέω, to "exercise," to "discipline"], a term applied to a voluntary retirement from the world and the practice of acts tending to mortify the body; so called from the rigid discipline to which the devotee subjects himself, the object of the ascetic being to advance the spiritual interests of himself or others. Asceticism was practised among Jewish and pagan nations long before the time of Christ, especially in India. The Essenes in Judæa and the Therapeutæ in Egypt were bodies of Jewish ascetics. At the present day, asceticism is most prevalent among Brahmans, Booddhists, and Christians of the Armenian, Coptic, Greek, and Roman Catholic churches. Early in the second century zealous members of the Christian Church devoted themselves to lives of poverty, celibacy, and abstinence from all sensual gratification. Some of these remained among men, others dwelt apart as hermits. The union of numbers of hermits into one body was first made by Pachomius, 340 A. D. This was the virtual origin of MONASTICISM (which see).

Ascet'ics [for etymology see preceding article], a name commonly given to those who in the early ages of Christianity devoted themselves to a solitary and contemplative life, practising great austerities, with a view to mortify the flesh and withdraw the mind from worldly objects; also applied to those persons in India and other countries who lead a life of ASCETICISM (which see). The ascetics of India are especially celebrated on account of the severe and even terrible austerities which they practise. One man will stand all day in one position exposed to the rays of a burning sun; another will hold his hands clenched till his fingernails grow through them.

Asch, a town of Austria, in Bohemia, 100 miles W. of Prague. It has factories of linen, calico, paper, hosiery, and leather goods, and many dyeing establishments and breweries. Pop. in 1880, 13,209.

Aschaf'fenburg, a town of Bavaria, in the circle of Lower Franconia, on the right bank of the Main, 24 miles by rail E. S. E. of Frankfort. It has a royal castle, a Gothic church, a library of about 22,000 volumes, a hospital, a gymnasium; also manufactures of woollen goods, paper, straw goods, etc. It belonged to the elector of Mentz for many centuries, and was ceded to Bavaria in 1814. A victory of the Prussians over the Austrians was gained here July 14, 1866. Pop. in 1880, 12,152.

As'cham (ROGER), an eminent English scholar and writer, born in Yorkshire in 1515. He graduated at St. John's College, Cambridge, in 1534, and distinguished himself as a classical scholar. In 1544 he published a work in defence of archery, entitled "Toxophilus," which is remarkable as a specimen of pure English style. He was appointed in 1548 tutor to the princess Elizabeth, whom he instructed in Greek and Latin, but he resigned that position in 1550. Soon after this event he was sent as secretary of embassy to the court of the emperor Charles V., and passed three years in Germany. Although he was a Protestant, he was appointed Latin secretary to Queen Mary in 1553, and after her death (in 1558) he was retained at court in the double capacity of secretary and tutor to Queen Elizabeth, who again took lessons in Greek and Latin. He remained at her court until his death, Dec. 30, 1588, having by his prudence or good fortune passed through very perilous times without persecution or dishonorable temporizing. His chief work, "The Schole-Master" (1571), contains excellent advice on the subject of learning Latin. (See DR. JOHNSON'S "Life of R. Ascham," prefixed to his works, 1767; GRANT, "De Vita Rogeri Aschami.")

Asch'bach (JOSEPH), a German historian, born at Höchst, near Frankfort-on-the-Main, in 1801. He obtained a chair of history at Bonn about 1842, and in 1853 at Vienna. His most important works are a "History of the Emperor Sigismund" (3 vols., 1838–45); "Allgemeines Kirchenlexicon" (4 vols., 1846–50), and "Roswitha und Conrad Celtes" (1867). He also wrote a "History of the Visigoths" (1827) and a "History of the Omeyyades in Spain" (2 vols., 1829–30).

Asch'ersle'ben, a town of Prussia, in the province of Saxony, is on the river Eine, 18 miles W. S. W. of Magdeburg. It has about seven churches, one synagogue, and a gymnasium, and is surrounded by a strong wall. Here are manufactures of flannel, frieze, linens, pottery, and brandy. Pop. in 1880, 19,501.

As'çians, or **As'çii** [from the Greek α, priv., and σκία, a "shade" or "shadow"], literally, "without shadow." A term applied to the people of the torrid zone, who have twice in the year the sun perpendicular above their heads, and hence are without shadow.

Ascid'ia, or **Ascid'ians** [from the Gr. ἀσκίδιον (dimin. of ἀσκός), a "leathern bottle"], a group of molluscoids of the class Tunicata. They have no shell, but are enclosed in an elastic tunic with two orifices, and resemble a bottle or jar. Within the external tunic is a muscular membrane, regarded as corresponding to the mantle of the other Mollusca. The greater part of the cavity of the mantle forms a branchial sac, the folded lining of which constitutes the gills (branchiæ). The movements of numerous cilia around the mouth bring into it a current of sea-water, which passes out at the vent or anal orifice. They have no eyes or other organs of special sense, but they have hearts and a circulation of blood, with the remarkable peculiarity that its direction is sometimes reversed. In their mature state they are fixed by the base to some solid substance, as a rock or seaweed, but the young, resembling tadpoles in form, swim by means of a vibratile tail, which disappears when they settle. The group is divisible into solitary or simple (Ascidiadæ) and compound ascidians (of several families), members of which are connected by a tubular stem, and to some extent have a common circulation of blood, though each has its own heart, respiratory apparatus, and digestive organs. In other kinds, more strictly called compound ascidians, the tunics of many are united into a mass, and they form systems like zoophytes. The individuals in these systems have always sprung by gemmation from one, and both the solitary and compound ascidians propagate by eggs. "In the dim obscurity of the past," says Darwin, "we can see that the early progenitor of all the Vertebrata must have been an aquatic animal provided with branchiæ, with the two sexes united in the same individual, and with the most important organs of the body (such as the brain and heart) imperfectly developed. This animal seems to have been more like the larvæ of our existing marine ascidians than any other known form." (See "Descent of Man," vol. ii., p. 372.)

Ascid'ium [from the Gr. ἀσκίδιον (dimin. of ἀσκός), a "small leathern bag or bottle"], a hollow, pitcher-shaped body which occurs on the stems of certain plants, as *Nepenthes* and *Sarracenia.* It usually contains water, and is sometimes furnished with reflexed hairs, which prevent the escape of insects that fall into it. (See NEPENTHES.) *Ascidium* is also a genus of simple tunicaries, which gives name to the family Ascidiadæ and the whole group of ascidians.

Asci'tes [from the Gr. ἀσκός, a "skin," a leathern bag for water, alluding to the shape of the patient's abdomen], dropsy of the abdominal cavity, is most frequently an indication of portal obstruction, caused by "cirrhosis" or other disease of the liver, which hinders the return of venous blood to the heart and causes pressure in the veins, leading to transudation of serum into the peritoneal (abdominal) cavity. In other cases it is a symptom of general dropsy; or it may result from cancer or tubercle of the peritoneum; or, in children especially, it may appear as a temporary and quite inexplicable phenomenon, without serious danger or distress. Ascites must be regarded in almost all cases as a very grave symptom of disease, yet there are not a few cases where the immediate danger passes away, and the patient becomes, for the time, comfortable; but such results are temporary and unfrequent. The treatment is palliative. Diuretics may be useful, but hydragogue cathartics are much more effective in relieving the symptom. Tapping may be practised where the dropsy very seriously distends the abdomen. The diagnosis between ascites and ovarian dropsy is sometimes very difficult. The distinctive marks can be appreciated only by the skilled physician.

Asclepiada'ceæ [so named from *Ascle'pias,* one of its genera], a natural order of exogenous plants, which often have twining stems, and almost always have a milky juice. The leaves are entire; the flowers are monopetalous and regular, but peculiar in their structure. The corolla is divided into five lobes; the filaments of the five stamens are usually united so as to form a tube, which is generally furnished with a crown or coronet of hood-shaped appendages. The fruit consists of two follicles, with many seeds terminating in long down or silky fibres. This order comprises about 1000 species, mostly natives of warm climates. Many of them are used in medicine, and others are cultivated for their beautiful flowers, as the *Stephan'otis floribun'da* and the *Hoya carnosa,* a hothouse climber, to each flower of which a drop of honey is always suspended. The type of the order is the *Asclepias,* several species of which are natives of the U. S. Among the medicinal plants of this order are *Calot'ropis gigante'a,* or mudar, *Tyloph'ora asthmat'ica* of India, and *Vincetoxicum officinale.* Useful fibres are obtained from the stems of several species of *Calotropis,* from *Orthanthera viminea,* and *Ho'ya viridiflo'ra.*

Asclepi'adæ [Gr. Ἀσκληπιάδαι]. This term was first applied, among the ancient Greeks, to those who were reputed to be the descendants of Æsculapius, the god of medicine; afterwards, to those who were trained in his temples (Asclepions) in the science and art of healing. Aristotle, though not a physician, was one of the family of the Asclepiadæ. Young men designed for the medical vocation, if sons of physicians, began their studies before their twentieth year; others, after a preparatory education lasting from the seventeenth to the twentieth year; in both, the special medical training probably did not end before their twenty-fifth year. Much secresy and exclusiveness were observed in their initiation; and after the first ordeal of preparation had been passed, at the commencement of the ceremonies of illumination, the HIPPOCRATIC OATH (which see) was administered to the candidate. At the close of the period of training came the ceremony of coronation, by which the young Asclepiadæ were fully introduced into the profession of medicine. (See WATSON, "Medical Profession in Ancient Times," New York, 1856.)

Asclepiade'an, or **Ascle'piad** [from Asclepiades, a poet who invented this metre], the name of a metre in ancient poetry consisting of four feet, a spondee, a choriamb, and two dactyls (or, according to some, two choriambs and an iambus). The first ode of Horace furnishes an example:

"Mæcēnās ătăvīs ēdĭtĕ rēgĭbŭs."

Asclepi'ades [Gr. Ἀσκληπιάδης], a celebrated Greek physician, born at Prusa, in Bithynia, flourished about 100–80 B. C. He practised at Rome, where he founded a school, and was very popular with the Romans on account of his pleasant and simple remedies. His maxim was, that a physician ought to cure his patients safely, speedily, and agreeably. He relied much on diet, bathing, and exercise or gestation. He wrote several works, of which only small fragments are extant. (See GUMPERT, "Asclepiadis Bithyni Fragmenta," 1798; BIANCHINI, "La Medicina d'Asclepiade," 1769.)

Ascle'pias [named, on account of its medicinal virtues, from Ἀσκληπιός, the Greek name of Æsculapius, the god of medicine], a genus of perennial herbaceous plants, the type of the order Asclepiadaceæ, mostly natives of the U. S. The corolla is wheel-shaped and reflexed, the crown or coronet is fleshy, and each of its hooded appendages has an incurved horn. The *Asclepias Cornuti* (milk-weed or silk-weed), formerly called *Asclepias Syriaca,* is an American plant, abounding in an acrid milky juice, which contains caoutchouc. The seed-vessels are filled with a silky down, which is sometimes used for stuffing pillows. The fibre of the stem is said to be valuable for ropes. The *Asclepias tuberosa,* sometimes called pleurisy-root, has handsome flowers. Its root is used as an expectorant and diaphoretic. Many other species of *Asclepias* grow in the U. S.

As'coli di Satria'no, an episcopal city of Italy, in the province of Foggia, 25 miles by rail S. E. of Foggia, on the eastern slope of the Apennines. Near it, Pyrrhus, in 279 B. C., won a great victory over the Romans, and in 1246 A. D. an imperial army crushed the Apulian insurgents led by Cardinal Rainer. Pop. 5669.

As'coli-Pice'no, a province of Central Italy, is bounded on the N. by Macerata, on the E. by the Adriatic Sea, on the S. by Teramo, and on the W. by Perugia. Area, 808 square miles. The province consists chiefly of mountain-ridges running parallel to each other, the portion on the coast being of superior beauty. Chief town, Ascoli-Piceno. Pop. in 1879, 210,610.

Ascoli-Piceno (anc. *Asculum Picenum*), an old episcopal city of Central Italy, in the province of the same name, is situated on a hill and on the river Tronto, 53 miles S. of Ancona. It commands a fine view of the Apennines, a few miles distant. It is well built, and has a cathedral, a museum, a theatre, a library, and many private palaces. It was annexed to the Papal States in 1426. A battle was fought here between Tancred of Sicily and the emperor Henry VI. of Germany, in which the latter was defeated (1190). Pop. in 1881, 23,225.

Asco'nius Pedia'nus (QUINTUS), a Roman critic and commentator of the first century, was born probably at Padua. He taught at Rome, and is said to have been the master of Quintilian. Among his works were valuable commentaries on Cicero's "Orations." Poggio Bracciolini found in 1416 at St. Gall commentaries on seven orations—viz., "In Verrem," "In Divinationem," "Pro Cornelio," "In Toga Candida," "In Pisonem," "Pro Scauro," and "Pro Milone." He wrote a Life of Sallust, which is not extant. He died, aged eighty-five, about the year 88, in the reign of Domitian.

Ascut'ney Moun'tain, an isolated mass of granite in Windsor co., Vt., 3300 feet above the level of the sea. Its summit affords an extensive and beautiful view of the valley of the Connecticut River.

Asel'li [Lat. *Asel'lius*], (GASPARO), an Italian anatomist and physician, born at Cremona about 1580. He became professor of anatomy at Pavía, and acquired distinction by the important discovery of the lacteal vessels in 1622. He wrote on this subject a treatise entitled "De Lactibus sive Lacteis Venis" (1627). Died in 1626.

Asfeld, d' (CLAUDE FRANÇOIS BIDAL), MARQUIS, an able French general, born in 1667. He served with distinction in Spain, and commanded the French cavalry at Almanza in 1707. He was second in command under Villars in Italy in 1733, was commander-in-chief in Germany in 1734, and became a marshal of France in that year. Died Mar. 7, 1743.

As'gill (Sir CHARLES), a British general, born in 1762. He served against the U. S., and having been captured at Yorktown, was selected by lot from the prisoners to be hung in retaliation for the death of an American officer, but he was saved by the intercession of the French court. Died in 1823.

Ash (*Frax'inus*), an important genus of trees belonging to the family Oleaceæ, distinguished by imperfect flowers, sometimes destitute of corolla, and leaves unequally pinnate. The fruit is a *samara*, a winged pericarp. It comprises about fifty species, mostly natives of Europe and North America, and valuable for timber, for fuel, and shade trees. The *Fraxinus excelsior*, the common ash of England, is a beautiful ornamental tree, and the timber is much esteemed by carpenters, joiners, coachmakers, and wheelwrights. It grows to the height of 100 feet or more. Cultivation has produced several varieties of it, among which is the weeping ash, the branches of which droop nearly to the ground. The *Fraxinus Ornus*, or flowering ash, a native of Southern Europe, has more perfect flowers than the other species. A saccharine substance called manna is obtained from it by making incisions in the bark, and sometimes exudes spontaneously. Among the noblest trees of the genus is the *Fraxinus Americana*, or white ash, which is abundant in the Northern and Middle U. S. It leaflets are petiolate, ovate, or lance-oblong, entire, acuminate, and in autumn are changed to a dark brown or purple tint. The timber is tough, and valuable for the same purposes as the *Fraxinus excelsior*. In the forests of the U. S. occur also the *Fraxinus pubescens* (black or red ash) and *Fraxinus quadrangulata* (blue ash), and others. The black ash (*Fraxinus sambucifolia*) is small, with tough wood separable into thin layers, and is used in basket-making. The mountain ash, conspicuous for its clusters of red berries, is a species of *Pyrus*, having no affinity with the genus *Fraxinus*.

Ash (Joseph P.), an American officer, born in Pennsylvania. On the outbreak of the civil war he entered the army as a lieutenant of volunteers, was appointed a second lieutenant in the Fifth U. S. Cavalry April 30, 1861, and a captain Sept., 1863. In the action near Warrenton, Va., he was wounded in six places before leaving the field; on recruiting service during convalescence. In the campaign of 1864 of the Army of the Potomac, while endeavoring to rally a wavering division of troops at the action of Tod's Tavern, he was killed May 8, 1864. (Brevet major and lieutenant-colonel U. S. A. for conspicuous gallantry.)
G. C. Simmons.

Ashan'tee, written also **Asiente,** an extensive kingdom of Western Africa, on the Gold Coast, Upper Guinea, is between lat. 5° and 9° 30′ N., and between lon. 0° 55′ E. and 4° 7′ W. It is bounded on the N. by the Kong Mountains, on the E. by Dahomey, on the S. by the Atlantic, and on the W. by Liberia. Area, about 75,000 square miles. It is generally mountainous, well watered and fertile, and covered with dense forests, which are almost impenetrable. The staple products are maize, rice, sugar, yams, tobacco, cocoanuts, gums, and dyewoods. Gold is said to be abundant here, and the chief articles of export are gold-dust, palm oil, and slaves. The people are warlike and fierce, and human sacrifices are common. They have some skill in the manufacture of sword-blades, cotton cloths, and golden ornaments. The government is a despotism. Capital, Coomassie (or Kumassi). The British, who have a fort on the coast at Cape Coast Castle, were involved in a war with the Ashantees, which began in 1807 and continued until 1825. The Dutch also had a colony on the coast until 1871, when they ceded it to the British. In 1873 a war arose between the Ashantees and the British, because the British refused to pay the annual tribute to the king of Ashantee which the Dutch had formerly paid him. The Ashantees first attacked the Fantis, living under British protection, entirely defeated them, and subsequently succeeded in driving all the natives friendly to the British into the two forts Elmina and Cape Coast Castle. The British troops under Sir Garnet Wolseley then invaded Ashantee, and as it soon became evident that no treaty could be made and confided in, on account of the treacherousness of the Ashantees, the British pushed forward directly towards Coomassie; and after some fighting they took the capital and burned it. The king of Ashantee agreed to pay an indemnity to the British, and the war ceased. The population is estimated at from 1,000,000 to 3,000,000.

Ash'borough, capital of Randolph co., N. C. (see map of North Carolina, ref. 3–F, for location of county), is 78 miles N. W. of Fayetteville and 5 miles S. W. of Deep River. Pop. in 1870, 182; in 1880, 299.

Ash'bourne, or **Ashburn,** a market-town of England, in Derbyshire, near the river Dove, 12 miles N. W. of Derby. It is on the S. slope of a high hill, and has a large church, built about 1240; also manufactures of cotton goods and lace. Pop. in 1881, 3485.

Ashburnham, Earls of, and Viscounts St. Asaph (1730, in the peerage of Great Britain), barons of Ashburnham (1689, in the English peerage), a noble family of England.—Bertram Ashburnham, the fourth earl, was born Nov. 23, 1797, and succeeded his father in 1830.

Ash'burton (Alexander **Baring**), Lord, an English diplomatist, born in 1774, was a son of Sir Francis Baring, an eminent merchant. He was employed in his youth in mercantile affairs in the U. S., and married a daughter of Senator William Bingham of Pennsylvania. In 1810 he became the head of the firm of Baring Brothers & Co. of London, and in 1812 was chosen to represent Taunton in Parliament, in which he acted with the Liberal party until 1831, when he became a supporter of Sir Robert Peel and a moderate Conservative. He was returned to Parliament for North Essex in 1832, and was created Baron Ashburton in 1835. In 1842 he was sent as a special ambassador to the U. S. to settle a dispute which had long been pending in relation to the north-eastern boundary. He was selected for this mission because he was acquainted with the American people and institutions, and was inclined to a pacific policy. Lord Ashburton and Mr. Webster negotiated this important treaty, which was signed at Washington in Aug., 1842, and was called the Ashburton Treaty. Died in May, 1848. He left a son, William Bingham Baring, who inherited the title.

Ashby (Turner), a Confederate general, born in Fauquier co., Va., about 1824. He was appointed a brigadier-general in 1862, and was greatly distinguished as a cavalry commander. During Banks's pursuit of Jackson in the Shenandoah Valley, Gen. Ashby was in command of cavalry covering the rear of Jackson's army, and in an engagement near Harrisonburg, June 5, 1862, he was shot through the body and killed. His loss was severely felt by the Confederates, he being one of their ablest and bravest cavalry leaders. G. C. Simmons.

Ashby-de-la-Zouche, a market-town of England, in Leicestershire, 20 miles by rail N. W. of Leicester. It has a ruined castle in which Mary queen of Scots was once confined, and an ancient church in which was the burying-place of the Hastings family. Here are iron smelting-works and manufactures of hats and hosiery. Coal-mines and salt-springs occur in the vicinity. Pop. in 1881, 7465.

Ash'dod, or **Azo'tus** (modern *Asdood* or *Esdûd*), an ancient city of the Philistines, in Palestine, about 3 miles from the Mediterranean and 12 miles N. E. of Ascalon. It was an important city and stronghold of the Philistines, who, after defeating the people of Israel in the time of Samuel, captured their ark and carried it to the temple of Dagon in Ashdod. It was dismantled by Uzziah, besieged by Psammetichus, and destroyed by the Maccabees. It is called *Azotus* in the New Testament (Acts viii. 40). Near its site is a village of mud houses, called *Asdood* or *Esdûd*, on the sea 21 miles S. of Jaffa.

Ashe (John), a general and patriot of the Revolution, born in England in 1721, emigrated to North Carolina in 1727. He took an active part in the political movements which preceded the Revolution, and served as a brigadier-general during the war. Died, a prisoner of war, Oct. 24, 1781.

Ashe (Samuel), a brother of John, mentioned above, was born in 1725. He became chief-justice of North Carolina in 1777, and governor of that State 1795–98. Died Feb. 3, 1813.

Ash'e, Ashi, or **As'ser** (Rab or Rav), a celebrated Jewish rabbi of Babylon, was born in 353 A. D. He was eminent for his learning and genius, and was the reputed author or compiler of the "Babylonian Talmud," a vast collection of traditions and legal documents, which was regarded among the Jews as the highest authority on legal questions. Died in 427 A. D.

Ash'er, a tribe of ancient Israelites, descended from Asher, eighth son of Jacob by the handmaid Zilpah. They were assigned a portion of land in the N. W. of Palestine, but never dispossessed the Canaanites and Phœnicians who dwelt there. The tribe furnished but one noteworthy person, the prophetess Anna, who lived during the infancy of Christ (Luke ii. 36–38). The territorial boundaries and the history of this tribe are very obscure.

Ash'es, the solid or earthy residuum left after the combustion of wood, coal, or other organic substances. The most important ingredient of the ashes of land-plants is potash, or a salt of potash with a portion of lime and silica. The potash is extracted from ashes by a process called lixiviation—leaching. By dissolving the salt contained in the ashes the water is converted into ley, which is afterwards evaporated by boiling. The insoluble part of the ashes remaining after lixiviation is called leached ashes, which is composed of carbonate of lime, phosphate of lime, oxide of iron, etc. The ashes of marine plants, and those that grow near the sea, contain soda instead of potash, with a small portion of iodine. The soda is also separated from the insoluble mass by lixiviation. Wood ashes are extensively used in the manufacture of soap, and are useful as manure. The salts obtained from them by lixiviation are called potash and pearl-ash, which latter is a carbonate of potassa. Bone ashes consist mostly of phosphate of lime, which is a valuable manure. (See Potash, Soda, and also Agricultural Chemistry, by Prof. S. W. Johnson, A. M.)

Ashes, Volcanic, pulverulent lava, thrown out by volcanoes, consisting of minute fragments of various minerals, as mica, felspar, magnetic iron ore, augite, etc.

Asheville, R. R. centre, capital of Buncombe co., N. C. (see map of North Carolina, ref. 3–C, for location of county), is 1 mile E. of French Broad River, 255 miles W. of Raleigh, and has one female college, three academies, and important trade and manufactures. Pop. in 1870, 1400; in 1880, 2616.

Ashkelon, or **Askelon.** See Ascalon.

Ashland, capital of Clay co., Ala. (see map of Alabama, ref. 4–E, for location of county), 75 miles N. E. of Montgomery. It has abundant water-power. Pop. in 1870, 118; in 1880, 387.

Ashland, R. R. junction, Boyd co., Ky. (see map of Kentucky, ref. 2–K, for location of county), on the Ohio River, 13 miles below Catlettsburg. It has two of the largest blast pig-iron furnaces on the Ohio River, and also one of the largest and most complete rolling-mills in the country. Iron ore, pig iron, and coal are shipped from this point. Pop. in 1870, 1459; in 1880, 3280.

Ashland, the former residence of Henry Clay, the eminent orator and statesman, is in Fayette co., Ky. (see map of Kentucky, ref. 3–H, for location of county), about 2 miles S. E. of Lexington. The estate of Ashland contained about 600 acres, of which 200 were appropriated to a beautiful park.

Ashland, R. R. junction, Middlesex co., Mass. (see map of Massachusetts, ref. 2–H, for location of county), 24 miles S. W. of Boston. The chief business is the manufacture of boots and shoes, boxes and lasts. Pop. of township in 1870, 2186; in 1880, 2394; in 1885, 2633.

Ashland, capital of Benton co., Miss. (see map of Mississippi, ref. 3–G, for location of county), is near the Tennessee line. Pop. in 1880, 174.

Ashland, Saunders co., Neb. (see map of Nebraska, ref. 7–K, for location of county), is on R. R. and Salt Creek, about 3 miles from its entrance into the Platte River, 24 miles N. E. of Lincoln. Superior magnesian limestone is found here. Pop. in 1880, 978; in 1885, 1315.

Ashland, on R. R., capital of Ashland co., O. (see map of Ohio, ref. 3–G, for location of county), 85 miles N. N. E. from Columbus, and 65 S. W. from Cleveland. It has Ashland College, various manufactories, and several grain-elevators. Pop. in 1870, 2601; in 1880, 3004.

Ashland, Oregon. See Appendix.

Ashland, an important R. R. centre in the Mahanoy Valley, in the centre of the anthracite coal-fields of Schuylkill co., Pa. (see map of Pennsylvania, ref. 5–H, for location of county), is 13 miles from Pottsville, the county-seat. It has large machine-shops, foundries, etc., and is surrounded by a number of the largest coal operations in the region. Pop. in 1870, 5714; in 1880, 6052.

Ashland, or **Ashland City,** capital of Cheatham co., Tenn. (see map of Tennessee, ref. 6–E, for location of county), on the Cumberland River, 20 miles below Nashville. Pop. in 1870, 121; in 1880, 170.

Ashland, on R. R., Hanover co., Va. (see map of Virginia, ref. 6–H, for location of county), 17 miles N. of Richmond. In May, 1864, General Sheridan, in the course of a raid, destroyed a dépôt here. It is seat of Randolph-Macon College. Pop. in 1870, 491; in 1880, 764.

Ashland, R. R. junction, capital of Ashland co., Wis. (see map of Wisconsin, ref. 2–C, for location of county). Its ore dock, on Lake Superior, is immense; capacity, 25,000 tons. Pop. of township in 1885, 4844.

Ash'lar, or **Ashler,** a building-stone squared and hewn; dressed stones used for facing work when it is worked in regular beds and joints. Tooled ashlars are slabs marked with parallel flutings or grooves. Other varieties are called polished ashlar and rustic ashlar, the latter of which has an uneven surface.

Ash'ley, a small river of South Carolina, rises in Colleton county, and, flowing south-eastward, unites with the Cooper River at Charleston.

Ashley, capital of Uintah co., Utah (see map of Utah, ref. 2–H, for location of county). Pop. of precinct in 1880, 799.

Ashley (James M.), born in Pennsylvania Nov. 14, 1824, removed to Ohio in 1849, was a member of Congress from 1860 until 1868, when he became governor of Montana Territory.

Ashley, Lord. See Shaftesbury.

Ash'mole (Elias), F. R. S., born at Lichfield, England, May 23, 1617, was educated at Oxford, and served as gentleman of ordnance under King Charles I. in the civil wars. In 1646 he turned his attention to the study of judicial astrology and Rosicrucianism, and Oct. 16 of that year became a brother of the Free and Accepted Masons. He was Windsor Herald (1660–75), and married as his third wife a daughter of Sir William Dugdale, Garter principal king of arms. In 1659 the younger John Tradescant gave him his collection of curiosities, which Ashmole presented in 1683 to Oxford University. It was the basis of the present Ashmolean Museum. He wrote "Theatrum Chymicum" (1652), "The Way to Blisse" (1758), "History of the Order of the Garter" (1672), "History of Berkshire" (3 vols. folio, 1715), and a whimsical "Diary." Died May 18, 1692. "He was," says Anthony Wood, "the greatest virtuoso and curioso that ever was known in England. . . He did worthily deserve the title of *Mercuriophilus Anglicus.*"

Ash'mun (George) was born at Bradford, Mass., Dec. 25, 1804, graduated at Yale in 1823, became a lawyer at Springfield, Mass., in 1828, was a Whig member of Congress (1845–51), president of the Chicago Republican convention of 1860, and was distinguished as a patriotic and able man. Died July 17, 1870.

Ashmun (Jehudi), an American noted as a promoter of colonization in Liberia, was born in Champlain, N. Y., in 1794, graduated at Bowdoin College in 1816. He went to Liberia in 1822 as an agent of the Colonization Society, and rendered important service to the colony. He died in Boston Aug. 25, 1828.

Ashmun (John Hooker), an American jurist, born at Blandford, Mass., July 3, 1800. He graduated at Harvard in 1818, and became professor of law there in 1829. He acquired a high reputation as a jurist, but died prematurely Apr. 1, 1833.

Ashtabula, an important R. R. centre, Ashtabula co., O. (see map of Ohio, ref. 1–J, for location of county), 58 miles from Cleveland. Its harbor, one of the best on Lake Erie, admits vessels of the largest class, and it is becoming a port of considerable commercial importance, receiving iron ore in transit from Lake Superior to Youngstown and Pittsburgh, and is a point for the shipment of coal on the lake. Pop. in 1870, 1999; in 1880, 4445.

Ashtaroth. See Ashtoreth.

Ash'ton-in-Ma'kerfield, a town of England, in South Lancashire. The inhabitants are mostly employed in cotton-factories and in collieries. Pop. in 1881, 9824.

Ashton-under-Lyne, a town of England, in the S. E. part of Lancashire, on the Tame, 6½ miles by rail E. S. E. of Manchester. It is a great seat of the cotton manufacture, and is remarkable for the rapidity of its growth. It returns one member to Parliament. It has a church built in the time of Henry V., a theatre, a mechanics' institute, etc. Many of the inhabitants are employed in calico-printing, bleaching, dyeing, and the manufacture of machines. Pop. in 1841, 22,689; in 1861, 34,836; in 1881, 37,040.

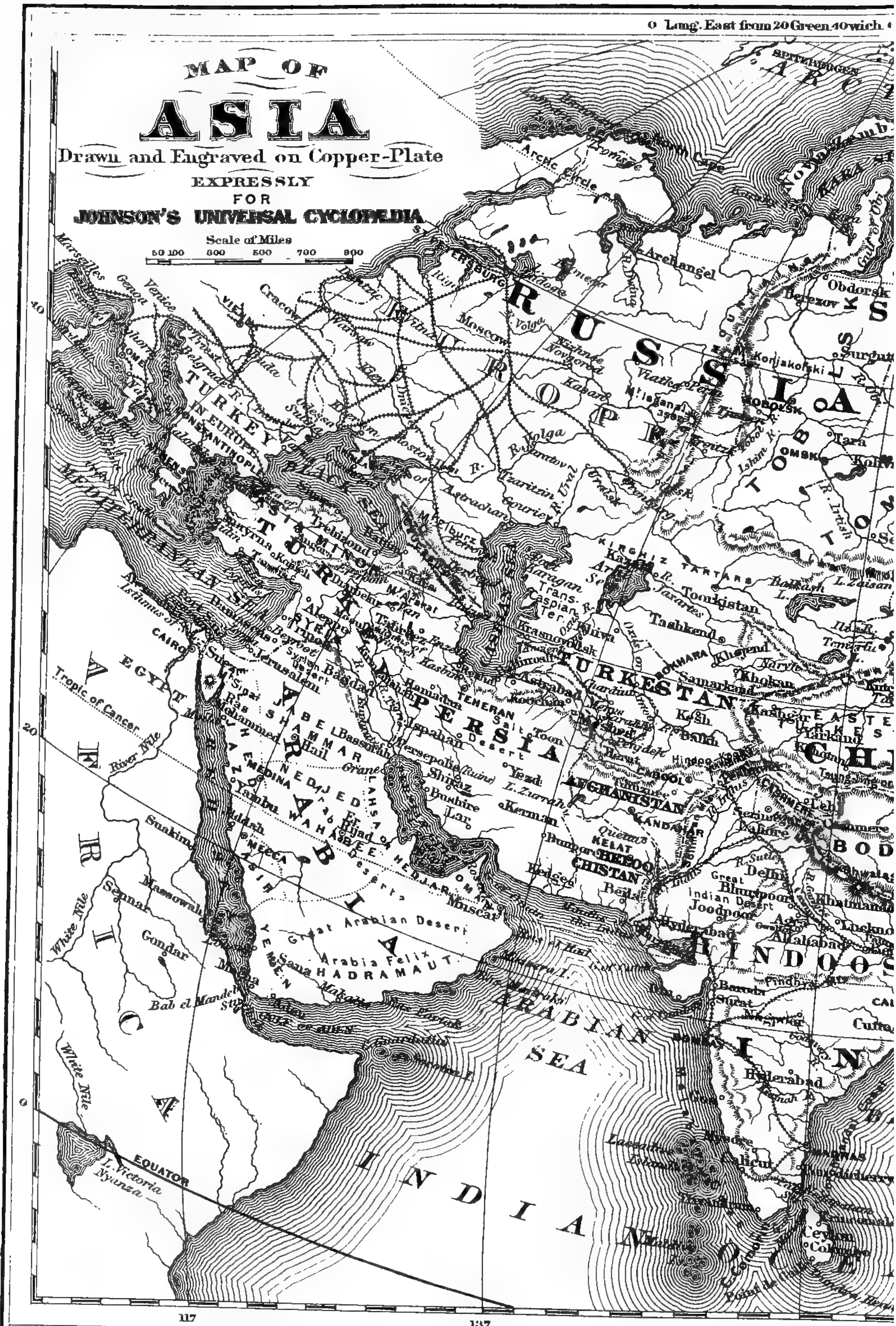
Ash'toreth, or **Ash'taroth,** a Syrian goddess, worshipped by the ancient Israelites and other nations of Western Asia. She was called the Queen of Heaven, and appears to have been a personification of the moon. She is commonly identified with Astarte (which see). Her chief temples were at Tyre and Sidon.

Ash'ville, the capital of St. Clair co., Ala. (see map of Alabama, ref. 3–D, for location of county), 115 miles N. of Montgomery. Pop. of beat in 1870, 922; in 1880, 1443.

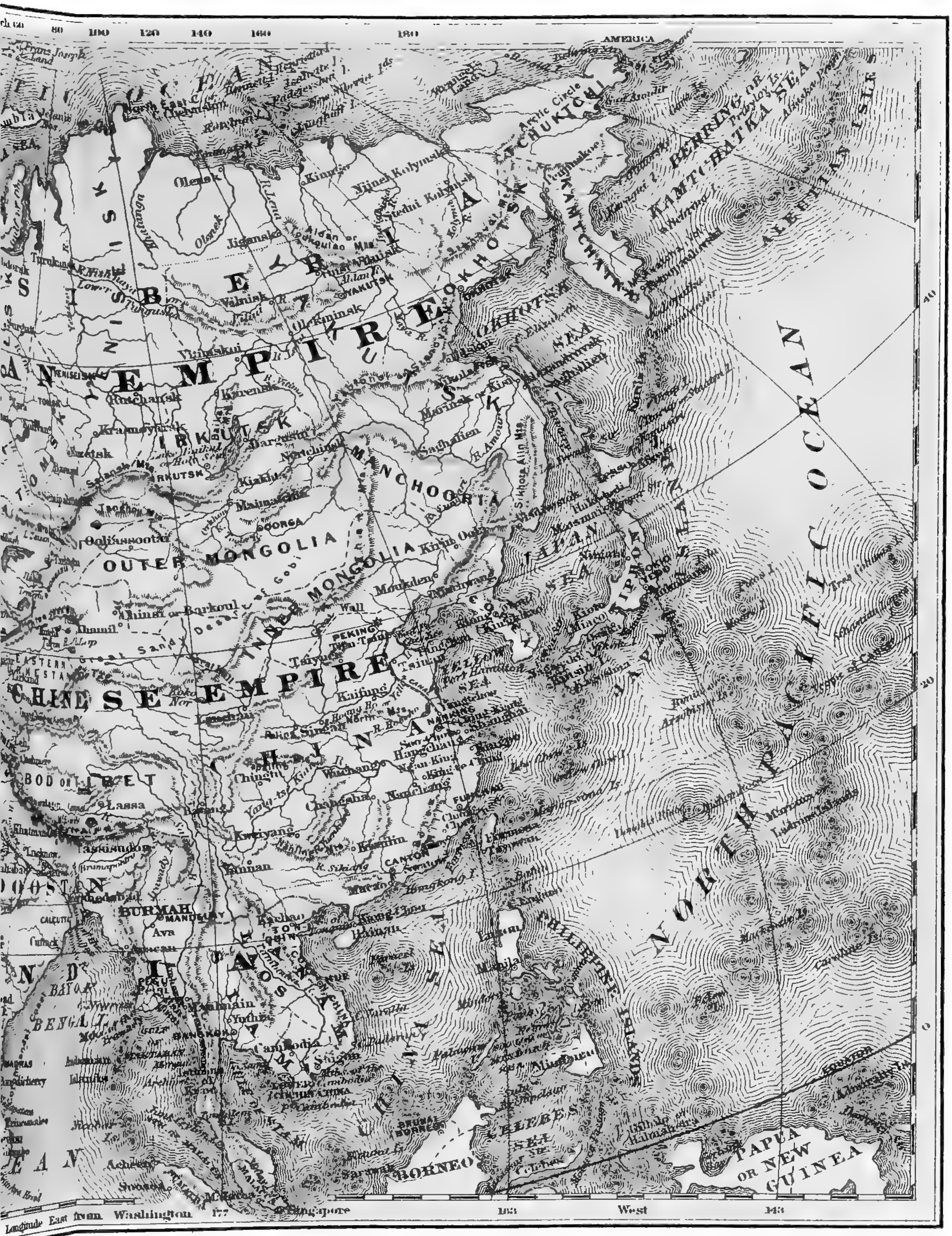
Ashville (North Carolina). See Asheville.

Ash Wednesday [Lat. *Di'es Cin'erum;* literally, "day of ashes"], the first day in Lent, so called because in ancient times it was the custom for penitents to appear in the church covered with sackcloth and ashes.

Asia, ā'she-a, the largest continent on the globe, is also commonly supposed to be the oldest habitat of the human race. It comprises nearly one-third of the land-surface of the earth, having between 16,000,000 and 17,000,000 square miles, and about 804,000,000 inhabitants, or nearly two-thirds of the entire population of the earth. Asia is bounded N. by the Arctic Ocean, touching the 78th parallel N. latitude; on the E. by the Pacific, S. by the Indian Ocean, S. W. by the Red Sea, lying between it and Africa, and W. by Europe and the Mediterranean, Black, and Caspian seas. The coast line exceeds 33,000 miles, and is indented by great bays and gulfs, forming the great peninsulas of Asia Minor, Arabia, India, Siam,



MAP OF
ASIA
Drawn and Engraved on Copper-Plate
EXPRESSLY
FOR
JOHNSON'S UNIVERSAL CYCLOPÆDIA


80
100
120
140
160
180
AMERICA
OCEAN
SIBERIA
RUSSIAN EMPIRE
Olensk
Jiganska
YAKUTSK
Vitimsk
Olekminsk
Nijnei Kolymsk
Sredni Kolymsk
CHUKCHI
KAMTCHATKA
BEHRING SEA
KAMTCHATKA SEA
ALEUTIAN ISLES
Arctic Circle
OKHOTSK SEA
OKHOTSK
IRKUTSK
Turukansk
Kiakhta
Nertchinsk
MANCHOORIA
Sagalien
OUTER MONGOLIA
INNER MONGOLIA
Ooliassootai
OORGA
Moukden
Wall
PEKING
Tientsin
Taiyuen
CHINESE EMPIRE
Kaifung
Lanchau
Singan
NANKING
Shanghai
CHINA
Hangchau
Wuchang
Changsha
Nanchang
FUCHAU
CANTON
Hongkong
Kweiyang
Yunnan
BOD or TIBET
Lassa
HINDOOSTAN
BURMAH
MANDALAY
Ava
Bangkok
Cambodia
Saigon
Hue
Hainan
TONQUIN
Manila
PHILIPPINE ISLES
Mindanao
BORNEO
Brunai
Sarawak
Singapore
CELEBES SEA
PAPUA OR NEW GUINEA
JAPAN
JAPAN SEA
NIPHON
YEDO
YELLOW SEA
Corea
Formosa
Ladrone Islands
Caroline Is.
NORTH PACIFIC OCEAN
Equator
Admiralty Is.
BENGAL
INDIA
Achem
Lucknow
Calcutta
Madras
Longitude East from Washington
177
163
West
143
40
20
0

Anam, Corea, and Kamtchatka. Connected with Africa by the narrow Isthmus of Suez, this has been penetrated by the Suez Canal, uniting the Red Sea with the Mediterranean. On the N. E. the narrow Behring's Strait divides it from America.

Mountains, Rivers, etc.—The mountains of Asia surpass in height those of all other parts of the globe, the loftiest summit being Mount Everest, in the Himalayas, 29,002 feet, while the mean height of the range (running in Southern Asia between India and Thibet) is 18,000 feet. The long chain of Altai Mountains stretches 3000 miles across Northern Asia; the Ural Mountains divide Asia from Europe. The mountains of the Caucasus are 10,000 to 18,000 feet high; Mount Ararat, in Armenia, is 17,000 feet; the Taurus Mountains in Asia Minor, the Kamtchatka range in North-eastern Asia, and many other heights, diversify the whole face of the country. Immense plains or steppes (the plain of Siberia being larger than all Europe) lie between the mountain-ranges. The table-land of Thibet (nearly 15,000 feet high), of Afghanistan and adjacent countries, of Persia (2000 to 6000 feet), of Hindostan, etc., represents other great natural features of Asia. Asia has great rivers flowing hundreds of miles through fertile regions, the Indus, Ganges, Euphrates, Tigris, Hoang-Ho, Amoor, Obi, Yenisei, and Yang-tse-kiang being the chief. Lakes abound, and the great Caspian Sea and Aral Lake are the principal inland bodies of water. Geologists find evidence of great structural changes, indicating the very recent formation of large portions of Asia. Vast areas of dry land were once covered by water. No active volcanoes exist in the interior, but several are found on the E. coast. Traces of glacial action abound on the Himalayas.

Climate, Soil, and Productions.—The extremes of heat and cold are found in Northern and Southern Asia, the mean temperature of upper Siberia being near zero, and the highest mean temperature of India about 82°, with continuous heat, at some seasons, much nearer 100°. A large part of Asia lies in the temperate zone and has a mild climate. The bleak regions of Northern Asia have a sterile soil, with very little rainfall, the earth being frozen constantly to a depth of 300 feet. The hotter regions near the Indian Ocean and China Sea are subject to violent cyclones or typhoons, and the heated air blown over Southern Asia by the S. W. monsoon brings watery vapor and heavy falls of summer rain. The annual rainfall varies from 5 to 100 inches. The great diversities of climate, water-distribution, and soil yield a corresponding variety of natural productions. In forestry, while vast regions of territory have been wholly stripped of trees, pines, birches, and willows abound in the N., balsams, palms, acacias, banyans, bread-fruit, magnolia, cedars, etc., in Southern and Central Asia. Medicinal plants, dye-woods, and spices grow in profusion. China and Japan are the great cultivators of the tea-plant and the camellia. Rice is of Asiatic origin, and in the cooler regions wheat, oats, barley, rye, buckwheat, maize, and millet are grown. Bananas, plantains, yams, sugar-cane, pepper, tobacco, indigo, cotton, hemp, flax, and that baneful plant the opium poppy, are largely cultivated. The orange, lemon, olive, peach, fig, mulberry, vine, etc., all are natives of Asia. Among the animals are the ox, buffalo, sheep, goat, horse, camel, elephant, yak, reindeer, dog, ape, bear, fox, lion, tiger, leopard, boar, rhinoceros, etc. Among birds are the eagle, vulture, raven, owl, heron, swan, goose, duck, flamingo, albatross, pigeon, nightingale, bird of paradise, parrot, ostrich, etc. The cobra and other serpents infest the tropical regions. Fish are abundant in the inland and ocean waters. Insect life is rampant in the warmer regions, and the locust in innumerable swarms often devastates wide areas. The great fertile districts cultivated by native industry sustain the enormous population and yield surplus productions for export, roughly estimated at $450,000,000 per annum. Gold is found in Siberia and Japan; silver, in China, Asiatic Russia, Anam, etc.; mercury, tin, lead, copper, and iron, in Japan, Siberia, India, Persia, and Turkey; coal has been mined in China and Siberia, and salt is abundant. Asia is also rich in various precious gems.

Civilization, Religion, etc.—Asiatic civilization, although differing widely from that of Europe and America, has its own peculiar development. Oriental culture reaches to a certain point, after which civilization is stationary instead of obeying the law of progress as in the Western nations. In Western Asia are the seats not only of Hebrew civilization, but of those great Oriental monarchies of the Babylonians, Assyrians, and Persians, among whom architecture, road-building, and the useful and decorative arts were carried to a high degree of perfection. In India, likewise, are the magnificent remains of an architecture far superior to anything erected by the modern Hindoos. In the N. half of Asia the people live almost wholly by hunting or by keeping flocks in the great grazing regions. They are of a low order of intelligence, but in Siberia are peaceful tribes. The great Tartar race, embracing the Mongols, Manchus, and Turks, are divided into Boodhists and Mohammedans, and are gradually losing their nomadic and predatory habits, becoming more assimilated to Chinese civilization. The Chinese and Japanese are very little migratory, but are a settled people of traders and cultivators of the soil. They are partially Boodhists, though mostly followers of Confucius and Lao-tse. Brahmanism is the religion of India, but in certain regions the Mohammedans are in the majority, while W. of India Asia is almost wholly Mohammedan, except some small districts of Syria and Asia Minor, where there is a population of Christians. The Greek Church has many adherents in Russian Asia, while the Armenians and Nestorians are numerous in Turkey and Persia. Vague estimates place the adherents of the native religions of Asia at 600,000,000, the Mohammedans at 50,000,000, the Christians at 12,000,000 (4,000,000 Roman Catholics, 7,000,000 Greek Church, and 400,000 Protestants, etc.), and the Jews at 350,000. Of savages, properly speaking, Asia holds few, and those in the remote hyperborean regions or in the southern archipelago.

Population, Language, etc.—The inhabitants of Asia are of the Mongolian, Aryan, and Semitic races, and their ancestry runs far back beyond recorded history. The Mongols include the whole of Eastern and South-eastern Asia—viz. the Chinese, Japanese, Tartars, Siamese, Turcomans, Kamtchatkans, Malays, etc. The languages used by this great division are very various, including the Arabic alphabet employed by all the Turkish varieties, the monosyllabic language of the Indo-Chinese, the rude dialects of the Arctic regions, and the Cingalese, Tamil, and Carnatic in Southern Asia. The Aryan race embraces the people of Afghanistan, Beloochistan, Persia, and Northern India. These use the Indo-Germanic languages—viz. Sanscrit, Persian, and Armenian. The third great group includes the Syrian, Hebrew, and Arabian races, speaking the Semitic tongues. Among these various races and languages, between thirty and forty distinct nations are distributed.

Asia: Political Divisions, Area, and Populations.

[Compiled from BEHM and WAGNER, "Bevolkerung der Erde," 6th issue, Gotha, 1880, with later census of British India (1881).]

COUNTRIES.	Square miles.	Population.	COUNTRIES.	Square miles.	Population.
Aden	8	22,707	Hyderabad	80,000	9,167,789
Afghanistan	278,562	4,000,000	Madras	138,674	30,839,181
Anam	170,033	21,000,000	Manipur	7,594	126,000
Arabia	967,856	3,700,000	Mysore	29,325	4,186,399
Beloochistan	106,735	350,000	N. W. Provs.	86,528	33,445,111
Bokhara	92,254	2,130,000	Oude	23,992	11,407,625
Cambodia	32,370	890,000	Punjab	218,874	22,647,542
Caucasia	179,473	5,628,344	Rajputana	130,989	11,005,512
China proper	1,553,530	404,946,000	Sindh	56,599	2,404,934
dependencies	3,006,577	29,680,000	Travancore	6,730	2,401,158
Ceylon	24,694	2,606,930	INDIA—French	196	280,381
Cochin China	22,950	1,600,000	Portuguese	1,295	445,000
Cyprus	3,706	150,000	Japan	146,568	34,338,404
Hongkong	[illegible]	139,144	Kafiristan	19,021	1,000,000
INDIA—British	1,470,207	252,541,210	Khiva	22,311	700,000
Ajmere	2,711	453,075	Macao	5	77,230
Assam	45,302	4,815,157	Malacca	31,459	300,000
Bengal	194,188	68,829,920	Persia	636,203	7,000,000
Berar	17,711	2,670,982	Rus. Cen. Asia	1,283,101	4,401,876
Bombay	139,602	20,920,119	Siberia	4,813,237	3,440,362
Baroda	8,005	2,154,469	Siam	280,564	5,750,000
Burmah	88,529	3,707,646	Straits Sett.	1,444	350,000
Central India	89,098	9,200,881	Turkey in Asia	729,175	16,132,000
Central Provs.	113,042	11,505,149	Samos	212	37,080
Cochin	1,361	600,278	Turk. Cen. Asia	75,000	450,000
Coorg	2,000	178,283	Total	15,948,778	804,087,568

History.—The oldest historical records are of Asiatic origin, and, however obscure, will be studied with increasing interest as time goes on. About 600 B. C. the union of the kingdoms of Babylonia, Assyria, Persia, and Media took place under Cyrus the Persian, whose dominion reached from the Mediterranean to the Indus. About 500 B. C. begin the remarkable records of the Vedic theology in India. The Persian monarchy was destroyed by Alexander about 330 B. C., soon after which his Asiatic empire was dissolved. The Roman invasions of Asia about the beginning of the Christian era, with the conflicts continued for centuries between them and the Persians, made no advance beyond Armenia. Christianity was born in Syria, spread rapidly over Asia Minor and the whole Roman empire, becoming the only religion of Europe, but producing no similar effects in Asia. Mohammedanism, with its spirit of conquest, made great advances and acquired a permanent foothold. The annals of Asia abound in records of tyranny and cruelty perpetrated by the Mohammedans, who have unquestionably obstructed its progress in civilization, and the predatory warfare of the Tartar tribes of the Mongolian race fills many of the bloodiest pages of Asiatic history. The dynasties of India and China have been prolific in wars, but the people, with their fixed customs and productive soil, have remained and multiplied where their ancestors flourished thousands of years ago. A prodigious change was effected in Asia by the modern influx of British and Russian settlement within the last century and a half. The East India Company founded its powerful empire in the E. upon its mastery of the great avenues of trade and shipping, and through the dominant and aggressive character of the British race it has become firmly established as the paramount power in India. At the same time England has competed with Russia in extending the outposts of European civilization farther and farther into Central Asia. A progressive spirit has of late years been manifested in Japan, and measurably in China, and railroads and telegraphs are slowly making their way, especially in the commercial regions of Asia.

AINSWORTH R. SPOFFORD.

Asi′ago, a town of Italy, in the province of Vicenza, 23 miles N. of Vicenza, is in a district called "Seven Communes." It has manufactures of straw hats and turned woodwork. Pop. in 1881, 5534.

A′sia Mi′nor, the ancient name of a peninsula forming the western extremity of Asia, now called ANATOLIA (which see). It was bounded on the N. by the Euxine (*Pon′tus Euxi′nus*) and Propontis, on the S. by the Mediterranean, and on the W. by the Ægean Sea (*Æge′um Ma′re*). The principal divisions were Bithynia, Cappadocia, Cilicia, Galatia, Ionia, Lycaonia, Lydia, Lycia, Mysia, Pamphylia, Phrygia, Pontus, and Paphlagonia, which will be noticed under their own heads. The Mount Taurus range extends through the southern part, and Anti-Taurus through the northern. The principal rivers are the Halys (Kizil-Irmak), which rises in the eastern part and enters the Euxine; the Sangarius (Sakareeyah), which also flows into the Euxine; and the Meander, which enters the Ægean Sea. Here flourished many famous and powerful kingdoms of antiquity, and here many conquerors in successive generations contended for supremacy. "We are now," says Malte-Brun, "to tread upon a soil rich in interesting and splendid recollections, with an existing population completely debased by ignorance and slavery. The glory of twenty different nations which once flourished in Western Asia has been extinguished; flocks wander over the tombs of Achilles and Hector; and the thrones of Mithridates and Antiochus have disappeared, as well as the palaces of Priam and Crœsus. The merchants of Smyrna do not inquire whether Homer was born within their walls; the fine sky of Ionia no longer inspires either painters or poets; the same obscurity covers with its shades the banks of the Jordan and the Euphrates. . . . The wandering Arabian comes, indifferent and unmoved, to rest the poles of his tent against the shattered columns of Palmyra. . . . If, however, European arts and civilization were, by some new arrangement of Providence, to revisit this ancient cradle of the human race, we should still find there the charming coast of Ionia, with its picturesque islands; the fertile shores of the Euxine, shaded by inexhaustible forests; and in the distance the numerous chains of Mount Taurus, crowned with upland plains, representing on a small scale the vast plateaux of Central Asia."

WILLIAM JACOBS.

Asiarchs, "certain chiefs of Asia" (Acts xix. 31), were wealthy citizens selected by the council of Proconsular Asia, from a list of candidates recommended to it from the several cities, for the purpose of presiding at the public games and watching that the customary rules and regulations were not infringed upon. Their number was ten. It is not clear, however, whether they were priests or a kind of civil magistrates; nor has it been made out whether the title of "Asiarch" was ascribed to the president of the board only, or to all the members.

Asiat′ic Soci′eties, societies formed for the promotion of the knowledge of the language, literature, and history of the Asiatic nations. The first society of this kind was established by the Dutch at Batavia in 1780. The next was the Royal Asiatic Society of Bengal, founded at Calcutta by Sir W. Jones in 1784. Among those of more recent date are the Société Asiatique, founded at Paris in 1822; the Royal Asiatic Society of Great Britain and Ireland, 1823; the Asiatic Society of Ceylon, 1845; the German Oriental Society in 1845; the Asiatic Society of China, established in 1847; and the American Oriental Society in 1842.

Asimago′my, a lake in Canada (Ontario), is about 12 miles long and from 2 to 4 miles wide. It discharges itself into the eastern extremity of Lake Superior by a stream about 36 miles long.

Asinarii, a nickname originally given to the Jews because they were said to worship an ass, but afterward also applied to the Christians, against whom the same accusation was made. The story is told us by Tertullian ("Apology," 16; "Ad Nat.," 1, 14), and has been most curiously illustrated by a drawing scratched in mockery on the walls of the pedagogium in the palace by some pupil, and representing another pupil worshipping an ass hanging on a cross.

As′kew (ANNE), a gentlewoman of high distinction in the reign of Henry VIII., and an intimate court-friend of his queen, Catharine Parr. She was the daughter of Sir William Askew of Kelsey, Lincolnshire. Falling a victim to the craft of Gardiner, she was attainted of heresy as a "fanatical Anabaptist," after an examination by Christopher Dare and Sir Martin Bowes, lord mayor of London. In the Tower she was tortured by the rack, Wriothesley, the lord chancellor, and Rich, inflicting this inhumanity with their own hands. Finally, being unable to walk to Smithfield, she was carried there in a chair, and her body chained to the stake, at which she was burnt in 1546.

As′mannshau′sen, a village of Germany, in Nassau, on the right bank of the Rhine, 2 miles N. W. of Rüdesheim. The red wine of Asmannshausen is highly esteemed, having a rare aromatic flavor and uncommon strength. It retains its fine qualities only about four years.

Asmai, or **Asmayi,** born in 741, died in 830, was the preceptor of Harun-al-Raschid, and the most celebrated representative of Arab scholarship not only at that court, but in that century. The most widely known of his many productions are his synchronous history of Persia and Arabia before Islam (which Rawlinson has characterized as "the most valuable and authentic historic volumes in the whole range of Arabian literature") and his romance of "Antar," the "Iliad" of the desert. But besides these he wrote a great number of other works, poetical and scientific, and founded a literary school which has produced many renowned pupils, such as Thâlob, Ibn-el-Anberi, Sakkari, and others.

Asmode′us, or **Asmo′di,** a demon, who, according to the Apocryphal book of Tobit, killed the seven husbands of Sara upon the wedding-nights, until Tobias, under the direction of Raphael, married Sara and drove away the demon by burning in the bride's chamber the heart and liver of a fish he had caught in the Tigris. When the demon smelled the fumes, "he fled into the uttermost parts of Egypt and the angel bound him." In the "Talmud" he is called the prince of demons, and a Talmudic tale tells us how he once drove Solomon out of his kingdom, though at length Solomon got the ascendency over him and compelled him to work for him in building the temple. He is the same with Abaddon and Apollyon, though the etymology of the name is somewhat uncertain.

As′monæ′ans, or **Asmoneans,** a family of Jewish princes, partially identical with the Maccabees. The name was derived, according to Josephus, from a certain Asmonæus who lived about 300 B. C., but who otherwise is unknown to history; which makes the derivation somewhat doubtful. His great-grandson, Mattathias, was a distinguished patriot and leader of a revolt against the king of Syria. He had several sons, who ruled over Judea and were called MACCABEES (which see).

Asô′kă, Açoka, or **Ashoka,** an ancient king of Maghada, in India, was a grandson of Chandragupta (or Sandracottus). He reigned about 250 B. C., was converted to Buddhism, and erected a great number of monasteries. His dominion extended over the greater part of Hindostan.

Asotin, W. T. See APPENDIX.

Asp, or **As′pic** [Lat. *as′pis;* Gr. ἀσπίς], a species of venomous serpent mentioned by ancient writers. Some of these describe its bite as inevitably fatal, and as producing speedy death without pain. Modern naturalists identify it with the *Naja haje*, a species of hooded viper which is found in Egypt, and is from three to five feet in length. When it is irritated it dilates its neck. The figure of the *Naja haje* occurs on the sculptured monuments of the ancient Egyptians. The jugglers of modern Egypt cause it to dance to their music, and throw it into a cataleptic state. The name of asp is also applied to the *Vi′pera as′pis*, common in many parts of Europe, and frequent in Sweden and the neighboring countries. It is much dreaded on account of its bite.

Aspar′agus [Gr. ἀσπάραγος], a genus of plants of the order Liliaceæ, natives of Southern Europe and Africa. Its species are partly shrubs and partly herbaceous. They have a 6-parted perianth, six stamens, one style, and the fruit is a berry. The most important species is *Asparagus officinalis*, the common asparagus of gardens, which is a native of Europe, and is generally cultivated in Europe and the U.S. It was used as food by the ancient Romans. It grows to the height of four feet, and thrives best in a rich and deep soil. This plant is raised from the seed, and should not be used until about three years have elapsed after the planting of the seed. The perennial roots continue for many years to send up every spring a crop of tender shoots, which, after having attained the height of a few inches, are cut a little below the surface of the ground. A peculiar principle called *asparagine*, $C_4H_8N_2O_3$, is obtained from these shoots, and also from the root of the marshmallow.

Aspar′tic Ac′id ($C_4H_7NO_4$), an acid obtained by the decomposition of asparagine, or by the action of heat upon ammonic malate, maleate, etc.

Aspa′sia [Gr. 'Ασπασία], a celebrated woman of ancient Greece, remarkable for her genius, beauty, and political influence, was born at Miletus, in Asia Minor. She became in her youth a resident of Athens and the mistress of Pericles. Her house was a celebrated resort for the most eminent Athenians, including Socrates, who professed to be her disciple. She had a high reputation for talent, and a report obtained currency that she composed part of the great funeral oration which Pericles pronounced over the Athenians who fell in battle about 430 B. C. Having been accused of impiety by Hermippus, a comic poet, she was defended by Pericles and acquitted. After the death of Pericles she was married to Lysicles. There is extant an antique bust inscribed with the name of Aspasia. (See BURIGNY, "Vie d'Aspasie;" PLUTARCH, "Life of Pericles.")

Aspasia the Younger, an Ionian lady whose original name was MILTO. She became the favorite mistress of Cyrus the Younger, who changed her name to Aspasia. She was distinguished for beauty and intellect. She was taken captive by King Artaxerxes at the battle in which Cyrus was killed, 401 B. C., and was consecrated by him as a priestess of Anaitis.

Aspa′siolite, a greenish mineral from Krageröe, Norway. It is a hydrated silicate of alumina and magnesia, and is a variety of fahlunite.

As′pe, a town of Spain, in the province of Alicante, 15 miles W. of Alicante. Here are numerous flour-mills, about twenty oil-mills, several soap-factories, and distilleries of brandy. Pop. 6700.

As′pect [Lat. *aspec′tus*], look, appearance, countenance. In astrology, the position of one planet with respect to another. Aspect is defined by Kepler as "the angle formed by the rays proceeding from two planets, and meeting at the earth." The ancients reckoned five aspects—namely, conjunction, indicated by the symbol ☌; opposition, by ☍; trine, by △; quartile, by □; and sextile, by ⚹. Planets in conjunction have the same longitude; in opposition the difference of their longitude is 180°; the aspect is trine when they are 120° apart, quartile when they are 90° apart, and sextile when they are 60° apart.

As′pen, or **Tremulous Poplar** (*Pop′ulus trem′ula*), a tree of the natural order Salicaceæ, is a native of Europe and Western Asia. It is remarkable for the mobility of its leaves, which, having long petioles laterally compressed, are caused to flutter by the gentlest breath of air. The wood is soft and light, is used to make trays and pails, and is valuable timber for the interior of houses. The name aspen is also applied to the *Populus tremuloides* and *grandidentata*, natives of the U. S., resembling the European aspen in the proverbial quivering of their leaves.

Aspen, capital of Pitkin co., Col. (see map of Colorado, ref. 3-C, for location of county). Pop. in 1885, 3874.

As′per (HANS), born at Zurich, Switzerland, in 1499, was a painter of landscapes, portraits, etc. Died 1571.

Aspergil′lum, a remarkable genus of tubicular bivalve mollusks, characterized by the soldering of both valves to the inner surface of the calcareous sheath. The shell has the form of an elongated cone, the larger end of which expands into a disk, which is pierced by many small tubular holes. Hence it derives its popular name of "watering-pot." The animals of this genus are borers, which live in sand. They are chiefly found in the Indian and South Pacific oceans. Others have been found fossil in Europe.

As′pern, or **Gross Aspern,** a village of Austria, on the left bank of the Danube, 5 miles E. N. E. of Vienna. Aspern, with the adjacent village of Essling, was the scene of a great battle between Napoleon and the Austrian archduke Charles after the French army had taken Vienna. The French crossed the river by a bridge which they constructed at the island of Lobau, and began the attack on the 21st of May, 1809. After half of the French had crossed the river, the Austrians assumed the offensive. Both of the villages were taken and retaken, and the day closed without a decisive result. The fight was renewed on the 22d, when, after great slaughter, Napoleon retreated to the right bank of the river, having lost about 7000 killed and 30,000 wounded and prisoners. The Austrians lost about 20,500 killed and wounded.

As′phalt [Gr. ἄσφαλτος; Lat. *asphal′tum*] is a solid bituminous substance, often called **Mineral Pitch** or **Native Pitch.** (See BITUMEN, by GEN. Q. A. GILLMORE, U. S. Army.)

Asphal′tic Coal, a name given to certain coal-like substances which are found filling irregular cavities and fissures, generally of the older rocks. They have been often classed as coals, but differ in composition and geological position from all true coals. They are not stratified, but fill fissures into which they have evidently flowed when in a fluid or plastic state. They are, in fact, ancient asphalts, which have become more compact and drier—*i. e.* containing less oil and gas—in the lapse of ages. These asphaltic coals are found in carboniferous rocks in New Brunswick and West Virginia, and in Devonian strata in Ohio and Kentucky.

As′phodel (*Asphod′elus*), a genus of herbaceous plants of the order Liliaceæ and sub-order Asphodeleæ, nearly related to the asparagus and onion. They are natives of Barbary, Sicily, Greece, and other parts of the Levant. Several species are cultivated in gardens for the beauty of their flowers, as the *Asphodel luteus* (yellow asphodel). The *Asphodel ramosus* is said to be the flower which Homer describes as growing in the meadows of Elysium. It is now abundant in Apulia. The ancients imagined that the manes of their friends fed on its roots, and they planted it near their tombs.

Asphyx′ia [from the Gr. α, priv., and σφύξις, the "pulse"], originally meaning cessation of the motion of the heart, has by usage come to signify arrest of breathing (properly *apnœa*) by suffocation or strangulation. It occurs in drowning, by water excluding air from the lungs; in hanging or choking, by the compression of the windpipe, preventing the entrance of air; in the presence of certain gases, as chlorine or pure carbonic acid, by spasmodic closure of the glottis or entrance to the windpipe. It has been proved by careful observations that after death by asphyxia the left cavities of the heart are empty, and the right distended with blood. This is owing to the fact that venous blood, not renewed by exposure to the oxygen of the air, will not circulate through the lungs, thus being forced to accumulate in the right or venous side of the heart. The mode of treatment of asphyxia must depend on its cause. (See DROWNING.) In partial strangulation, abstraction of blood in moderate amount may unload the heart and promote the movement of the blood, after the cause of obstruction has been removed. For asphyxia from irrespirable gases the first necessity is a supply of pure air. When the heart has almost or quite ceased to beat for a few moments, life is sometimes restored by artificial RESPIRATION (which see), or by application of galvanic electricity to the chest.

Asphyx′iants [from *asphyx′ia*, "suffocation"], chemical compounds enclosed in bombs or other projectiles, and designed to suffocate or poison the enemy, especially in naval warfare, where men are confined between the decks of a ship. These barbarous inventions are discountenanced in honorable warfare.

Aspidich′thys [Gr. ἀσπίς, a "shield," and ἰχθύς, a "fish"], a genus of fossil fishes, described by Dr. Newberry, from the Devonian rocks of Ohio, allied to *Pterichthys*, but very much larger. The middle dorsal plate of the carapace is a foot wide and a foot and a half long, more than an inch thick at the centre, and its external surface is studded with smooth enamel tubercles as large as split peas.

As′pinwall (called **Colon** by the natives), a seaport of Central America, is situated on the N. side of the Isthmus of Panama, and on Navy Bay, 48 miles by rail from Panama, on the Pacific Ocean; lat. 9° 21′ N., lon. 79° 54′ W. It was founded in 1852 by the Panama R. R. Company, and is the northern terminus of the Panama R. R., which was opened in 1855. It has a good harbor, which is deep enough for large ships, and has several large hotels. Aspinwall was formerly a great thoroughfare of the travel between California and the Atlantic States. Steamers ply frequently between this place and New York, which is about 2000 miles distant. A ship-canal between Aspinwall and Panama, on the Pacific Ocean, is now in progress. Pop. about 4000. (See SHIP-CANALS.)

Aspinwall (WILLIAM), M. D., born in Brookline, Mass., May 23, 1743, graduated at Harvard in 1764, and subsequently took his medical degree in Philadelphia, became a surgeon in the Revolutionary army, and after the war was a prominent Jeffersonian politician in Massachusetts. He practised medicine with great success, and was distinguished for the practice of "inoculation" and his early adoption of vaccination. Died April 16, 1823.

Aspinwall (WILLIAM H.). See APPENDIX.

As′pirate [from the Lat. *as′per*, "rough"] denotes in pronunciation a rough breathing, similar to the sound of the letter *h*. It occurs with various degrees of intensity, being sometimes almost as strong as the German *ch*, at others so slight as to be scarcely perceptible. In Greek grammar it is commonly called *spiritus asper* ("rough breathing"), and is marked thus (῾), in contradistinction to the *spiritus lenis* ("smooth breathing"), represented thus (᾿). ῾Οι ῾Ελληνες would be represented in English letters thus: *Hoi Hellēnes.*

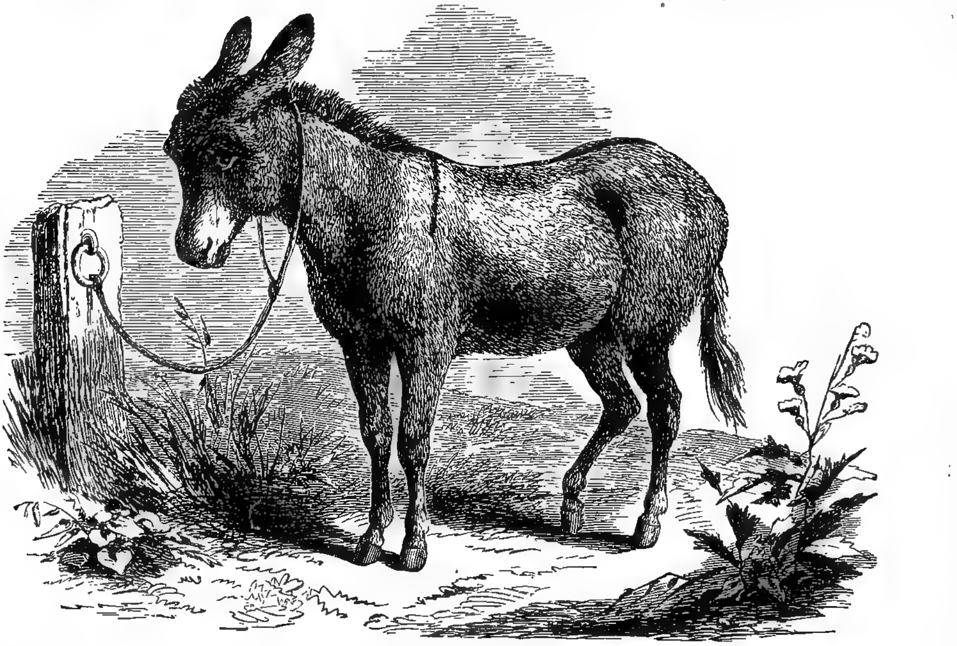
As′pirator [from the Latin verb *aspi′ro, aspira′tum*, to "breathe," or "breathe on or into," from *ad*, "to," and *spiro*, to "breathe"], an apparatus used by chemists to draw air or other gases through bottles or other vessels. It is a tight vessel filled with water, having a tube with a stopcock connected with the upper end, and another tube with a stopcock connected with the lower end. The former tube is attached to the vessel through which the gas is to be drawn; the stopcocks are both opened, and the weight of the water issuing from the lower tube acts as a suction, and draws in the gas.

As′pis, or **Clu′pea,** an ancient and important fortified city of the Carthaginians, on the Mediterranean, about 50 miles E. of Carthage, was founded about 310 B. C. It was the place where Regulus landed in the first Punic war, and was a distinguished episcopal see from 411 to 646 A. D. It was the last spot on which the African Christians made a stand against the Saracens. Remarkable ruins are to be seen there.

Aspromon′te, a mountain at the south-western extremity of Italy, 16 miles E. N. E. of Reggio, 6300 feet high. Here Garibaldi and the greater part of his army were taken prisoners in Aug., 1862.

Aspropot′amo (*i. e.* "white river"), the ancient *Achelous*, the largest river in the kingdom of Greece, rises in Albania. It flows in a S. S. W. direction, and after a course of about 100 miles enters the Mediterranean (or Ionian) Sea nearly 15 miles W. of Missolonghi.

Ass, or **Don′key,** a quadruped of the genus *Asinus* and family Equidæ. It is characterized by long ears, a black cross over the shoulder, and short hairs on the upper part of the tail. It is remarkable for its patience, stolidity, and power of endurance, and has been the domesticated drudge of man from time immemorial. The ass is probably a native of Central Asia, as it is now found wild in that region. Vast numbers of the wild-ass (which the Romans called *onager*) roam over the great Asiatic deserts and steppes, feeding on saline herbage. They also inhabit Persia, Asia Minor, and Syria. An interesting notice of this animal is given in the thirty-ninth chapter of Job. The wild-ass is a high-spirited animal of extraordinary speed, and is one of the principal objects of the chase in Persia, where its flesh is highly esteemed as food. This animal (supposed to be the *Equus hemionus* of Pallas) surpasses the horse in swiftness of foot. There appears to be some doubt whether the domesticated ass is descended from this wild animal, so much superior in speed and other qualities. In Oriental countries the custom of riding on the back of the tame ass is very common; and the Old Testament informs us that it was thus used by patriarchs and kings in the earliest times. The asses which are raised in Syria and other parts of the East are a better breed than those of Europe. The animal is not much employed in the U. S., except for the propagation of mules, which are the hybrid progeny of the ass and mare. Being very surefooted and able to live on scanty fare, the ass is well adapted for service as a beast of burden in rocky and mountainous regions. Its milk is recommended as a diet for dyspeptic and consumptive patients. The proverbial stupidity of the ass seems rather due to its patience and endurance than to any particular want of intelligence.


The Ass.

Assafœt′ida, or **Asafœtida** [from *asa*, an Oriental word said to signify "gum," and the Lat. *fœ′tidus*, "fetid"], a gum-resin or the concrete juice of the root of *Narthex assafœtida* (the *Ferula assafœtida* of Linnæus). It is a native of Persia and Afghanistân, has a peculiar and disagreeable odor, and is extensively used in medicine as an antispasmodic. It is considered an efficacious remedy for hysteria, nervous diseases, and spasmodic pectoral affections. In many parts of Asia it is used as a condiment.

Assai, a beverage which is commonly used on the Amazon, and is prepared from the fruit of *Euterpe oleracea* and other species of palm nearly related to the cabbage-palm. The fruit is nearly equal in size to a sloe, and consists of a hard seed enclosed in a thin covering of firm pulp. The assai, a thick creamy liquid of a purplish color, is composed of this pulp and water.

Assal′, a salt lake of Eastern Africa, 25 miles S. W. of Tajura, is about 760 feet below the level of the sea. It is 8 miles long and 4 miles wide, and has an area of 20 square miles. The shores are covered with crusts of salt about a foot thick. Large quantities of salt are carried hence by caravans to Abyssinia.

As′sam, a province or district of Farther India, borders on China, forming part of the valley of the Brahmapootra. It is included between lat. 25° 45′ and 28° 15′ N., and between lon. 90° 35′ and 96° 50′ E. The area is 45,302 square miles. It is well watered by numerous rivers, has a fertile soil, but a large part of it is swampy and subject to inundation. The staple products of the soil are rice, tea, cotton, opium, and mustard. Gold, silver, and precious stones are found here. The rainy season lasts about six months, from April to October, during which time the whole country is inundated. The large and dense forests of Assam are infested by great numbers of elephants, tigers, leopards, rhinoceroses, buffaloes, etc. Assam was ceded to the British by Burmah in 1826. The religion of the Assamese is Brahmanism. Pop. 4,815,157.

Assas′sin [for etymology see below], one who attacks and kills by treachery or surprise a person who is unprepared for defence. The word was originally the name of a fanatical sect or order, the disciples, it is said, of Alo-ed-Deen (Aloaddîn), commonly called Sheikh-el-Jebel, or the

“Old Man of the Mountain.” The founder of the order is said to have been Hassan-ben-Sabah, who flourished in Persia about 1080 A. D. According to some writers, they were called Assassins from their immoderate use of hasheesh (or hashish), an intoxicating drug obtained from Indian hemp. The order consisted of members of several degrees, the lowest of which were *Fedavies* or *Fedais* (*i. e.* the “devoted”), who were not initiated into the secret doctrines and mysteries, but with blind obedience executed the bloody orders of the prince or Old Man of the Mountain, who was their absolute ruler.

Assault, in military language, is a sudden and vigorous attack of a fortified post or camp, or an effort to carry by open force a breach which has been made in a fortress. In the regular routine of sieges (as they *were* formalized, for recent changes in the art of fortification and in the character of firearms have rendered the old rules somewhat inapplicable) the “assault” is one of the last scenes of the drama called a “siege.” In the regular siege the assault (if, instead of gaining the breach by covered “approaches,” it is decided to resort to it) is delivered after the outworks are captured, and one or more “breaches” formed (by “breaching batteries”) in the body of the place. It is usually performed by picked troops or volunteers (sometimes called a “forlorn hope”), who, at a concerted signal (upon which the besiegers’ artillery ceases to fire), issue from the contiguous parallels or places of arms, descend into the ditch, and advance rapidly and without much order, but without firing, upon the breach. “Firing parties” are stationed in neighboring parallels to keep down the fire of the besieged, and “supports” are close at hand to follow up the assaulting party, if successful in effecting an entrance.

Under Louis XIV. commandants of besieged places were forbidden to capitulate before receiving *three* assaults. Under Napoleon it was declared dishonorable and punishable with death to capitulate before receiving at least one assault. According to Vauban and the “schools,” the open assault is a “useless massacre,” which, if successful, results only in the demoralization of the troops, the sacking of the place, and the destruction of resources valuable to the besiegers. Nevertheless, it is sometimes compulsory, as in the case of the assault of Constantine (1837) by the French, with a loss of 500 out of 1750. In Spain the English army delivered terrible assaults, as those at Badajos (1812) and St. Sebastien (1813); the loss at the former (which failed, the place being entered by *escalade*) cost 3700 men, and the latter (successful) 2000, killed and wounded. The bloody assault by which the siege of Sebastopol was terminated Sept. 8, 1855, was necessitated by the fact that the “approaches” could be pushed forward no farther. This so-called siege differed from an ordinary siege in this, that “the difficulty was to *conquer the Russian army* upon a ground prepared beforehand, quite as much as to surmount the material obstacle presented by the fortifications” (*Niel*). The allied loss in this assault (killed and wounded) was nearly 10,000; that of the Russians, 11,700 men; thus terminating a siege of eleven months’ duration, and which cost the besiegers 150,000 and the Russians 84,000 men.

The protracted duration and fearful losses at this siege, though it cannot be taken as strictly typical of the changed character of modern siege warfare, are not without their confirmatory bearing upon the *dictum* of Col. Brialmont, one of the most accomplished and authoritative of European engineers (*Études sur la défense des États*), that “the advantage is no longer on the side of the besiegers, and that in *great places*, where materials, provisions, and men are never lacking, the superiority is incontestably acquired for the defence.” And he adds: “Conclusion most encouraging to small states, and to those which limit their ambition to the worthy aim of preserving intact and developing their independence, their wealth, and their liberties.”

J. G. Barnard.

Assault′ and Bat′tery. An assault is an offer or attempt to inflict corporal injury upon another, accompanied by circumstances which indicate an intent, coupled with a present ability, to do actual violence. If violence be actually inflicted, the act amounts to a battery; but the offer or attempt to do violence is alone sufficient to constitute an assault. It is not necessary that an actual intention to do violence exist; it is enough that there be a sufficiently indicated intent, so that it would appear to a reasonable mind that the apparent purpose was the true one. Moreover, if threats or offers of violence be made, but there is an apparent present inability to carry them into effect, there is no assault committed. Thus, one might vehemently threaten actual violence; but if an impassable barrier, as a ditch or wall, intervened between him and the person menaced, the act would not be an assault. A battery is really the consummation of an assault, and therefore requires that the offer or attempt to do violence be carried into effect by the actual use of violence. An assault and battery is sometimes justifiable, as when it is committed in the reasonable defence of one’s person or his real or personal property. And in exercising this right of defence the person threatened is justified in acting upon reasonable appearances, but in no case should the force used be greater than is properly adequate to repel the assault or avert or prevent the injury apprehended. An assault and battery is also sometimes justifiable when committed in the course of rightful discipline, as where a father or schoolmaster inflicts moderate punishment upon a child, or the master of a vessel upon a seaman; but in these cases also there must be no excess of violence. An assault and battery is both a civil and a criminal wrong, and there may be a civil action for damages by the person injured, and also a criminal prosecution instituted. In criminal law there are also recognized certain forms of aggravated assault which receive severer punishments than common assault, as an assault with intent to kill, with intent to commit rape, etc. George Chase.

Assay′, or **Assay′ing** [from the Fr. *assayer*, to “try”]. This term, which is applied to metals or metallic compounds, is sometimes employed as synonymous with analysis, but more generally restricted to the process of ascertaining the proportion of gold or silver in an alloy, or of pure metal in a metallic ore. Silver plate and manufactured articles of gold and silver generally contain an alloy of copper or other metal. (See Alloy.) In Great Britain, each article, before it is sold, is assayed at Goldsmiths’ Hall, so as to determine the proportion of precious metal in its composition. The process of assaying gold and silver depends on the principle that those metals cannot be converted into oxides by union with the oxygen of the air, while the baser metals with which they are alloyed can be oxidized if raised to a high temperature. The apparatus employed in this process consists of a *cupel*, a small shallow vessel made of bone-ash, and a *muffle*. The latter is made of fire-clay, is about eight inches long, three or four inches in diameter, and is shaped like a railway tunnel (that is, having a flat bottom and an arched top); it is open at one end and closed at the other, and has several apertures in its sides for air to pass through. Weighed fragments of mixed silver and lead are placed on cupels, which, introduced into a muffle, are exposed to the heat of a furnace until the metals are melted. The oxygen of the air unites with the lead, forming an oxide, which is partly volatilized, and partly absorbed by the porous cupel. At the end of this process of *cupellation* there remains a globule of pure silver, which by its diminished weight shows how much alloy was contained in the sample. During the assay of silver by the foregoing process, called the *dry method*, a small loss of silver occurs. For this reason the *humid* process has been adopted in the mints of France, of the U. S., and of other nations. This method consists in dissolving the compound or impure silver in nitric acid of density 1.25, and adding a solution of common salt ($NaCl$), which causes the precipitation of the chloride of silver ($AgCl$) in white flocculi. The solution of salt is made of a definite strength, and is poured out of a graduated vessel until all precipitation of pure silver ceases. The assay of gold ores or impure gold is performed in a manner similar to that of silver. If gold alloyed with copper is to be assayed, some silver must be added to the alloy. The alloy of the three metals, gold, silver, and copper, may be assayed by cupellation, by which the copper is oxidized and the gold and silver remain combined. These may be separated by a process called *parting*, which, however, is only practicable when the alloy contains three parts of silver to one of gold. The parting or quartation consists in acting on the alloy by hot nitric acid, which dissolves the silver, forming the soluble nitrate of silver, and leaves the gold in a solid and separate state. As no ore of gold or artificial alloy contains so much silver as three to one, it is necessary to incorporate an additional quantity of silver with it. This is done by wrapping the proper quantities of gold and silver in lead-foil, and heating them on a cupel. The metallic button which is the result of this cupellation is hammered on an anvil, and rolled into a thin plate or ribbon, which is coiled up and called a *cornet*. This is exposed in a glass vessel to the action of nitric acid, which, dissolving the silver, leaves a brown, spongy mass of gold. It is then heated in a crucible, annealed, and weighed. As jewelry and other articles cannot be assayed either by the dry or humid method without injuring their form, their purity is ascertained by the use of the *touchstone*, with which a streak is drawn on the surface of the gold. Black basalt is one of the minerals used as a touchstone. (For special methods of assay, see the respective metals.) William Jacobs.

Asselijn (Jan). See Appendix.

Asseman′ni (Giuseppe Simone), bishop of Tyre *in partibus*, a learned Maronite, born at Tripoli, in Syria, in

1687. He was sent in 1715 by the pope to Syria and Egypt to collect manuscripts, and was keeper of the Vatican Library (1738–68). He published a valuable work on Syrian literature, entitled "Bibliotheca Orientalis Clementino-Vaticana" (4 vols., 1719–28). Died Jan. 14, 1768.—His nephew, STEFANO EVODIO, an Orientalist, born at Tripoli in 1707, was educated at Rome. He was archbishop of Apamea *in partibus*. He succeeded his uncle, Giuseppe Simone, as keeper of the Vatican Library, in 1768. He published several catalogues of Oriental manuscripts. Died in 1782.

Assem′bly, in politics, a convention or body of men associated for civil or legislative business, and possessing more or less political power. In some of the U. S. the term is applied to the lower branch of the legislature, and the other house is called the senate. At the beginning of the French Revolution, the members of the *Tiers État* (Third Estate), who had been chosen to represent the common people in the States-General, assumed (Jan. 17, 1789) the title of *Assemblée Nationale*, and, having been joined by the more liberal members of the nobility and clergy, proceeded to frame a new constitution. The court denied their authority, and made a not very vigorous effort to dissolve the Assembly, but failed, and finally yielded to the popular current. This body, which was termed the Constituent Assembly, formed a constitution which was accepted by the king, and, having ordered the election of a legislative assembly, dissolved itself Sept. 30, 1791. The Legislative Assembly, from which all members of the Constituent Assembly were expressly excluded, met Oct., 1791, and continued to undermine or defy the royal authority, which was abolished Aug. 10, 1792. Having convoked a *National Convention*, the Assembly closed its labors and existence Sept. 21, 1792. The formation of the second French republic (Feb., 1848) was followed by the election of a National Assembly, which met in May of that year, and, having formed a constitution, transferred its power to the Legislative Assembly. This body was dissolved or abolished by the *coup-d'état* of Dec. 2, 1851. The third republic was proclaimed Sept. 4, 1870, but, on account of the presence of German armies in France, the election of deputies was postponed until the armistice, which began just after the capture of Paris, Jan. 30, 1871. The National Assembly met at Bordeaux in Feb., and elected Adolphe Thiers as *chef du pouvoir exécutif* ("chief of the executive power").

Assembly, General. See GENERAL ASSEMBLY.

As′sen, capital of the Dutch province of Drenthe, 16 miles S. of Groningen, is connected with the Zuyder-Zee by the Drenthe Canal. In the neighborhood are tumuli mentioned by Tacitus. Pop in 1879, 7932.

Asses′sor [Lat. *asses′sor*, from *assid′eo*, *asses′sum*, to "sit beside," to "assist"] is applied in England to a person, usually a lawyer or jurist, who is appointed to advise the judge and direct his decisions. In several inferior courts assessors are appointed by statute. The burgesses of every borough are required to elect annually two assessors, who assist the mayor in revising the burgess lists and in presiding at the municipal elections. In some of the U. S. an assessor is a person elected by the people to assess or appraise all taxable property, in order that the owner of the same may pay a tax proportioned to its value. This valuation or appraisement is called assessment. The assessed value is usually less than the real, or less than the price for which it could be purchased.

As′seteague Island, off the E. coast of Northampton co., Va., to which it belongs, has a brick lighthouse, 129 feet high, standing 2 miles from the S. W. extremity of the island and showing a fixed light of the first order, 150 feet above the sea, in lat. 37° 54′ 37″ N., lon. 75° 21′ 04″ W.

As′sets [from the Fr. *assez*, "enough"], in law, denotes the property in the possession of an heir or under control of an executor, administrator, or trustee, applicable to the payment of debts and charges against the estate which they represent. It is mainly applied to the case of heirs, executors, and administrators. Assets are either real or personal. Real estate is assets in the hands of an heir; personal property, in like manner, in those of an executor or administrator. If the real estate is devised to an executor, he takes it as trustee. Assets are also distinguished into legal and equitable, the first being under the control of a court of law, and the second administered by a court of equity; and the two courts are not governed by the same rules. In the U. S. this last distinction is by reason of statute law of little consequence, as all the estate of a deceased person becomes a fund for the liquidation of his debts, according to a prescribed statutory order. The distinction between real and personal assets is still of importance, as it is a general rule that real estate is not to be taken for the payment of debts until the personal property is exhausted. A testator may by a sufficiently clear direction in his will avoid the effect of this rule, and make his real estate the primary fund for the payment of his debts.

Assh′ur, or **Ash′ur,** an ancient and populous city, capital of Assyria, on the Tigris, 40 miles below Calah, and 60 miles S. of Nineveh. Its site is marked by extensive ruins at Kileh-Sherghat. Here is a large square mound or platform two and a half miles in circumference, about 100 feet above the level of the plain, and composed in part of sun-dried bricks. Cuneiform inscriptions of great interest have been found here.—A son of Shem was also called ASSHUR, from whom the name of the city was derived.

Assien′to (or, preferably, **Asiento**), a word applied to treaties which the government of Spain made with several foreign nations for the purpose of supplying her colonies with negro slaves. The first of the assientos was made with the Flemings, in the reign of the emperor Charles V. The Genoese obtained the contract in 1580. The privilege was transferred to the Portuguese in 1696, and to the French in 1701. The English acquired it by the treaty of Utrecht, 1713, but resigned or sold it to Spain about 1750, since which no such contract has been made.

Assignat, paper money issued by the French government in 1790, and at subsequent periods of the revolutionary régime. It was based on the security of the national domains, which consisted of the confiscated estates of the Church and wealthy *émigrés*. The total amount of assignats issued was 45,578,000,000 francs. The public credit having been ruined by the reign of terror and anarchy, the value of the assignats declined lower and lower. In June, 1793, one franc in silver was worth three francs in paper. The government, in order to check their depreciation, passed a law to fix the maximum prices of commodities, the effect of which law was very injurious to trade. In Mar., 1796, one franc in gold was equivalent to three hundred francs in paper. In July of that year the assignats were recalled, and replaced by the *mandats*.

Assign′ment [from the Lat. *assigno*, to "appoint"], in law, the act of making over to another one's estate or interest. The person making the assignment is an *assignor;* the recipient is an *assignee.* The word is mainly used in reference to transfers of leases, incorporeal rights, such as copyrights and patents, and rights of action. Such transfers are to some extent by statute law required to be in writing. It is a rule of *common law* that a thing in action is not assignable, though this doctrine is not followed in a court of *equity*, an assignment being regarded in that court as in the nature of a declaration of trust, so that the assignor becomes a trustee for the assignee. There are some exceptions to this rule, as in the case of mere personal causes of action and cases where public policy intervenes. Such an assignee simply takes the rights of his assignor, and holds subject to any defences which the debtor could urge against his creditor. There is a class of things in action not subject to this infirmity, such as bills of exchange, promissory notes, checks upon banks, and public securities payable to order or bearer. He who purchases these in good faith and before maturity, for a valuable consideration, may shut out for the most part the defences which might have been urged against the payee. Such paper is termed negotiable. In this way the distinction between that which is negotiable and that which is assignable becomes of great practical consequence. It is a frequent practice on taking an assignment of a claim to obtain a statement from the debtor that he has no defence to it. He would then be precluded from setting up any that he might have on the doctrine of estoppel.

The word "assignment" is also used to indicate the act of setting apart dower for a widow in the real estate of her husband. It is also employed in case of bankruptcy or insolvency, to indicate the act of transfer of a failing debtor's property to a person called an assignee, who is substantially a trustee for the benefit of the creditors. A failing debtor by the laws of some States is permitted to make a voluntary and even preferential transfer to an assignee acting in the same general manner, though such laws are substantially superseded for the time being when there is a U. S. bankrupt law in operation. T. W. DWIGHT.

Assing (LUDMILLA). See APPENDIX.

Assi′si [Lat. *Assis′ium*], a town of Italy, province of Perugia, is built on a steep hill, 13 miles S. E. of Perugia. It is surrounded by a wall flanked with towers, and has a cathedral built in the eleventh century and many monasteries. It is the native place of St. Francis, and has remarkable paintings by Cimabue and Giotto, and a large and beautiful Gothic structure, Convento Sacro, with fine paintings. Among the remains of the ancient Assisium is a beautiful portico of the temple of Minerva. Pop. 3333.

Assis′tance [from the Lat. *ad*, "near," and *sisto*, to "stand"], **Writ of,** a direction by the court of chancery to the sheriff to put a party in whose favor a decree has been rendered in possession of land to which the decree has declared him to be entitled.

Assize [from the Lat. *assideo*, to "sit near"], the name of an ancient English court; a writ to recover the possession of a freehold. The word is used in the plural to denote the stated sittings of the judges of the superior courts in England in the various counties, by virtue of several commissions, to try civil and criminal cases.

Asso′ciated Press, an association of newspapers in the U. S. for the collection of news. Its principal centre is at New York, but there are subordinate centres, as at Cincinnati, Chicago, and Washington, to which items of news are transmitted, to be there condensed and distributed to the various journals. Besides this, there are rival associations which perform a similar work. In Europe the Baron Reuter has almost a monopoly of this kind of business, but American journals have always opposed the establishment of his system on this continent.

Asso′ciate Pres′bytery, in Scotland, dating from 1733, founded in opposition to aristocratic dictation in the settlement of ministers. In 1747 a split occurred on the question of the "Burgess Oath," resulting in the formation of the ASSOCIATE SYNOD and the GENERAL ASSOCIATE SYNOD. In 1820 this schism was healed, only a few ministers, belonging to the GENERAL ASSOCIATE SYNOD, protesting against the union. (See UNITED ORIGINAL SECEDERS and UNITED SECESSION CHURCH.)

ASSOCIATE REFORMED SYNOD OF NEW YORK, composed of two presbyteries which refused to join the UNITED PRESBYTERIAN CHURCH, formed in 1858 by bringing together the Associate and Associate Reformed churches. In 1860 they reported 16 ministers, 14 churches, and 1631 members; in 1867 they reported only 11 ministers.

ASSOCIATE REFORMED SYNOD OF THE SOUTH, a small Presbyterian body which in 1860 reported 68 ministers, in 1867, 65, in 1872, 67, and in 1878, 70.

ASSOCIATE SYNOD OF NORTH AMERICA, like the Associate Reformed Synod of N. Y., persons who declined the union of the Associate and Associate Reformed churches in 1858. In 1867 they reported 14 ministers, 40 churches, and 1221 members, chiefly in Indiana, Illinois, and Iowa; in 1876, they reported 12 ministers, 34 churches, and 1115 members.

Associa′tion [from the Lat. *ad*, "to," "together," and *so′cius*, a "companion"], a union of persons; a company; a society formed for the transaction of some business for mutual advantage; a company formed for the advancement of science or literature.

Associa′tion, British, the title of an annual reunion of the most eminent scientific men of Great Britain, who meet at different places, and report the progress and new discoveries made in their respective departments of science. The American Association for the Advancement of Science was formed in 1847.

Association of Ideas (otherwise called **Mental Association,** or simply **Association, Suggestion, Connection of Ideas, Train of Thought, Succession of Thoughts**), etc., a principle or law in mental philosophy exercising an important influence upon the operations of the mind. "When a traveller visits the ruins of Athens or of Rome, the plain of Pharsalia or of Marathon, the sight of these places awakens the memory of the men and of the deeds which have made them glorious." The names of the great recall their achievements. A portrait revives similar memories, and calls up emotions which might have seemed dormant for ever.

> "It may be a sound,
> A tone of music, summer's eve, or spring,
> A flower, the wind, the ocean, which shall wound,
> Striking the electric chain."—*Byron.*

These facts rest upon the reciprocal power of thought to evoke thought. Under this power arises what is called the association of *ideas*, but its law is the law of intellectual gravitation—its sphere is the universe of mind. It is wider than "ideas," and extends to all our mental modifications. Our cognitions, emotions, and active powers, all come under the law of association. Our feelings, our willings, and our efforts are as completely held in groups by internal bonds as our ideas are.

Association may connect ideas by a simple link or by a multitude of links. The idea of the civil war of England prompts the question, "What is the value of a Roman denarius?" There are no two thoughts so remote as to have no link. Association has, therefore, infinite possibilities.

The laws of association have been variously enumerated. Some of the most obvious and important are—

1. Simultaneity and succession, synchronism and chronology. Thus, Cæsar and Pompey, Luther and Leo, Charles I. and Charles II.; Aristotle back to Plato, Descartes on to Spinoza.

2. Contiguity and remoteness between ourselves and the things, or between the things themselves: New York and Brooklyn, ourselves and our antipodes. We think of Mercury as nearest the sun, and that suggests Neptune as the farthest off.

3. Resemblance and contrast to the eye in works of art, which recall the original to the mind: metaphor; punning rests on the association of sounds that resemble with things that differ. Night recalls day, sickness recalls health, war recalls peace.

4. The logical relations involve association of ideas, though not all association of ideas is logical: cause and effect, workmen and work, father and child, the universe and God, object and means, analogy, premiss and conclusion, part and whole. The relations of physical, mechanical, and cosmical order are of the same kind, and hence association is the mother of invention and discovery.

5. The association of the verbal sign with the thing signified, which is the essence of language and the necessary preliminary to reasoning. Two or more of these causes may co-operate in particular cases, or the thing may in one aspect give rise to one association, in another aspect to another. Aristotle reduces the principle of association to three parts: Proximity in time and contiguity in place as one; resemblance, contrast. Hume says: "There appear to be only three principles of connection among ideas—namely, resemblance, contiguity in time or place, and cause or effect. A picture naturally leads our thoughts to the original (resemblance); the mention of one apartment introduces an inquiry concerning the others (contiguity); we think of a wound and the pain which follows it (cause and effect)." Augustine reduces the principle to one: What is once together is afterwards together. Hobbes says: "The cause of the coherence or consequence of one conception to another is their first coherence or consequence at that time when they are produced by sense." Cardaillac (1830) in substance repeats Hobbes when he says that simultaneity is the common condition of all the other connections: nothing can be linked now that has not been linked before. Hamilton in the same way reduces the laws to two, simultaneity and affinity; and these two laws, he asserts, are only modifications of one law, redintegration, or totality: "Those thoughts suggest each other which had previously constituted parts of the same entire or total act of cognition." This is ending where Augustine began. Hamilton maintains that a third thought may be associated with a first through a second which "does not rise into consciousness," "suggestions passing through one or more ideas which do not themselves rise into consciousness." This false theory in metaphysics he illustrates by an example drawn from a false theory in physics—to wit, that billiard-balls in a row, intermediate between the first one, which is struck, and the last one, which flies off, remain motionless. Hamilton's whole position and argument are marked by the crudity and self-contradiction which often mar his lectures. The true theory in such cases is, that the acts of consciousness are too rapid to mark themselves deeply and distinctly enough in memory to be carried on by it to the end of the process. Reflection usually with very little difficulty articulates all the parts. When Hamilton reflectively associated Ben Lomond with the Prussian system of education, he simply did slowly what he had done before rapidly. The human mind is subtler than light, far beyond the degree in which light is subtler than lead. Consciousness is the essential condition of an idea. Memory, as objectively separated in time from consciousness, is not essential to it. Both can be born together, and both die together. A precedence in the order of thought must not be confounded with a precedence objectively in time. Alexander Bain reduces the primary attributes of intellect to three, of which the third is retentiveness, the facts connected with which may, with few exceptions, "be comprehended under the principle called the law of contiguity or contiguous adhesion. The principle of contiguity has been described under various names—as Hamilton's law of 'redintegration,' the 'association of ideas.' The principle may be stated thus: Actions, sensations, and states of feeling, occurring together or in close succession, tend to grow together or cohere in such a way that when any one of them is afterwards presented to the mind, the others are apt to be brought up in idea." Bain further discusses agreement, law of similarity, compound association, constructive association.

Not all ideas once integrant are necessarily redintegrated. The strength of the impression which they originally made, their duration in fellowship, the time which has elapsed since we had them, the cogency of their connection, are all determining forces. But in advance of all this the tendencies of the law of association in the particular individual are determined by the native constitution of his mind and by the circumstances of his whole training, mental and moral. These tendencies carried out make the poet or the mathematician, the sensualist or the sage. An illegitimate association of ideas may mar a whole life, may work out crime and ruin. One and the same thing may be to two persons a deadly or a reviving savor. The same flag calls forth the fiercest assaults and the most vigorous defence. The same strain of music awakens joy, sadness, hope, or despair. The poem of Wordsworth on the "Power of Sound" is but an exquisite painting of one class of illustrations of the power of association. There are national tendencies under this law as well as individual. Governments and societies are built for ages on the ideas associated with a single central idea embodied in a word. It is the association of ideas which makes the mightiest and holiest bond of our life—the tie of the home, the native land, the Christian communion. It makes the heart of the Swiss sicken and die for the little rocky mountain-nook which is associated with the "Ranz-des-Vaches." The principle of the association of ideas is therefore not only of profound interest in psychology, but has great importance in morals. Like every power of man, it comes under the law of moral responsibility. Association is in certain respects involuntary, and habit can in any case carry it beyond the proper control of the will. But the will can largely determine what shall be the original links of association, and bear an important part in determining whether we shall follow up or repress a particular class of associated ideas. The association of a profane or ludicrous idea with a sacred name or fact may make that name or fact through a whole lifetime the means of recalling blasphemy or mockery.

The attempts to account for the association of ideas are of course affected by the general features of the different systems. The effort to give them in whole or in part an organic mechanical relation has been made by Descartes, Hartley, Bonnet, and a number of later writers, who relate them to brain-fibre and the nerve. Locke says: "They seem to be but traces of motion in the animal spirit." Kant ("Anthropologie") truly says: "It is in vain to look for a physiologic solution of them." This wonderful power of the human mind is part of the perfection which it owes to the Great Being who is its author. The thinker who makes ideas and their associations physical things, is as extravagant as the idealist who converts the solid earth into a mere relation between the mind that thinks of itself and the mind itself thus thought of. The materialist and the absolute idealist are the antipodes of the one world of extravagance in thought. The later psychologists, Herbart, Benecke, and others, have made clearer the twofold character in the association of ideas: First, where the associated elements are homogeneous, and produce what Herbart calls perfect fusion; second, where the elements are heterogeneous, and result in complication or imperfect fusion. This distinction is regarded as of great value for the entire soul-life, but especially with reference to the points at which the approaches of soul to the physiological processes are closest.

A well-regulated association of ideas on our own part, and a delicate perception of what is likely to be the association in the minds of others with particular words or things, are essential to the charm of conversation and of social intercourse. Without both of these a good and intelligent man may be a bore and a nuisance. One of the characteristic differences between logic and wit is, that logic keeps the association of ideas under the control of reason, while wit uses it for combinations which triumph over reason and carry it away a delighted captive. The active imagination is the result of this force of the association of ideas. The imagination no more creates its own primary elements than the painter creates the matter of his colors or his canvas. The imagination selects and combines what the law of association furnishes. Its most daring so-called "creations" are capable of an easy analysis, which shows that they are shaped under this law. The memory is largely dependent upon association. (See Memory and Mnemotechnics.) Various uses have been made of the principle of association in philosophy. Hume employs it to explain the idea of causality; Reid and others to account for the force of habit. But though the association of ideas can become the subject of culture, it is, as we have seen, primary and innate.

The association of ideas has been observed by thinkers from an early period. Aristotle speaks of it in his "Treatise of Reminiscence" very briefly, but in a manner worthy of his wonderful acuteness. It is to Locke, however, in the latest edition of his "Human Understanding," we owe the first discussion of the subject with a fulness at all commensurate with its importance; and no system worthy of the name, since Locke, has failed to devote a large space to it.

C. P. Krauth.

Assolant (Jean Baptiste Alfred), a French author, born in 1827, who commenced active life as a teacher of history in Poitiers. He travelled over the American continent. Returning to France, he published in the "Revue des Deux Mondes" several novels founded upon his American adventures, and published later various romances. His best known works are "Butterfly," "Acacia," and "Une Fantaisie Americaine." He was also a very popular journalistic writer. Died Mar. 5, 1886.

As′sos, or **Assus** (Ἄσσος), an ancient city and seaport of Asia Minor, in the territory of Mysia, was situated on the N. shore of the Gulf of Adramyttium, between Cape Lectum and Andros, about 7 miles from the opposite coast of Lesbos. It occupied a commanding position and was connected with the sea by a long, steep ascent, was well protected by walls, and was still visited by shipping in the time of the apostle Paul. The surrounding country was famous for its wheat. Assos was singularly a Greek city, and contains many interesting ruins, including those of a theatre, citadel, temples, etc. The Street of Tombs is one of its most remarkable features. It is now desolate.

Assoucy, d' (Charles Coypeau), a French burlesque poet, born in 1604, who styled himself "The emperor of burlesque," and who was called by others "Scarron's ape." He wrote many humorous poems, among them "Ovide en belle Humeur" and "Ravissement de Proserpine," in which the humor was dull, and their author provoked the satire of Boileau, who wrote of him

> "Le plus mauvais plaisant eut des approbateurs
> Et jusq'a d'Assoucy, tout trouva des lecteurs."

Died in 1679.

Assump′sit [Lat. "he has undertaken"], an agreement not under seal, either express or implied; a common-law action to obtain damages for the violation of such an agreement. It is usually divided into common or *indebitatus assumpsit,* brought in general upon an implied promise; and special assumpsit, which is founded on an express promise.

Assumption [Sp. *Asuncion*], a city of South America, the capital of Paraguay, is situated on the left (E.) bank of the river Paraguay, 645 miles N. of Buenos Ayres; lat. 25° 16′ 29″ S., lon. 57° 42′ 42″ W. It was founded by the Spaniards in 1536. It has a cathedral, five churches, a government palace, a college, a public library, etc. Hides, tobacco, timber, and *yerba maté* (or Paraguay tea) are shipped here by the river. The houses are mostly built of brick, one story high. Pop. 19,463.

Assumption, on R. R., Christian co., Ill. (see map of Illinois, ref. 7–E, for location of county), 23 miles S. of Decatur. It has flouring-mills. Pop. in 1870, 590; in 1880, 706.

Assump′tion of the Vir′gin, a festival of the Greek and Roman churches in commemoration of the resurrection and miraculous ascent of the Virgin Mary to heaven. It is held on the 15th of August. Protestant Christians unanimously reject the tradition of these events. The full tradition of the Assumption is given in Saint Alphonso Liguori's "Glory of Mary."

Assump′tion of Mo′ses, a pseudepigraphical or apocryphal book containing a pretended account of the death of Moses and of the assumption of his soul to heaven. Some suppose that Saint Jude alludes, in his reference to the contest between the archangel Michael and the devil, to the statements made in this book; but it is not certain that it existed in apostolic times.

Asswan, as-swân′, **Assouan,** or **Essuan** (anc. *Sye′ne*), a town of Upper Egypt, on the right bank of the Nile, near the border of Nubia, 115 miles S. of Thebes; lat. 24° 5′ N., lon. 33° E. It is two and a half miles below the First Cataract, and is remarkable for its picturesque situation and ancient monuments. Here are quarries of syenite, a variety of granite which derives its name from Syene. From these quarries came the red obelisks that adorned various temples of Egypt. Here are also ruins of a large Saracen or Arabian town, among which are found many Cufic inscriptions. Here, according to some authorities, the poet Juvenal died in exile about 125 A. D., but this is not now generally believed. Pop. 4000.

As′sye, or **As′saye,** a village of the Nizam's dominions, in Hindostan, 24 miles N. of Jaulna, was the scene of the duke of Wellington's first great victory. On the 23d of Sept., 1803, with a force of 2000 British and 2500 natives, he utterly defeated the Mahrattas, numbering from 30,000 to 50,000 men, partly officered by the French. Wellington, then Gen. Wellesley, captured 98 cannon, and lost 1560 killed and wounded.

Assyr′ia [Gr. Ἀσσυρία], the Latin name of an ancient and powerful kingdom (called also **Asshur** and **Assura**) of Western Asia, was bounded on the N. by Armenia, on the E. by Media, on the S. by Babylonia, and on the W. by Mesopotamia, or the river Euphrates. Assyria proper appears to have coincided very nearly with the modern Kurdistan, but the dominions of the most powerful

Assyrian monarchs had a much greater extent. According to George Rawlinson, "The site of the second or great Assyrian monarchy was the upper portion of the Mesopotamian valley. The cities which successively formed its capitals lay, all of them, upon the middle Tigris, and the heart of the country was a district on either side of that river enclosed between the 35th and 37th parallels of latitude. By degrees these limits were enlarged, and the term Assyria came to be used in a loose and vague way of a vast and ill-defined tract extending on all sides from this central region." The high mountain-chain of Zagros formed the natural eastern boundary of this region, which was also bounded on the N. by a snowy mountain-range called Mons Nipha'tes. The surface was mostly a plain diversified with several ridges or ranges of limestone hills. The soil of the plains and valleys was exceedingly productive, so that the fertility of Assyria was a favorite theme of ancient writers. It is probable that this fertility was promoted by artificial irrigation, for Herodotus states that but little rain fell in Assyria. The country on the eastern side of the Tigris was well watered by rivers—namely, the Greater Zab, the Adhem, the Lesser Zab, and the Dialus or Diyâleh. The word *Assyria* is probably derived from Asshur (or Ashur), which was the name of a son of Shem and of the chief god worshipped by the Assyrians.

History.—The early history of Assyria is involved in obscurity. According to the book of Genesis (chap. x.), Nineveh, the capital of this kingdom, was founded by Nimrod, the son of Cush, or by Asshur, a son of Shem. This ambiguity arises from the fact that in the Hebrew text Asshur means sometimes Assyria, and sometimes a son of Shem. The cuneiform inscriptions indicate that the most ancient capital was the city of Asshur, on the Tigris, about 60 miles S. of Nineveh. The Assyrians belonged to the Semitic family of nations. Their features, sculptured on monuments recently discovered along the Tigris, present a striking resemblance to those of the Jews and Arabs. They were remarkably warlike, and, according to the prophet Isaiah, were "a fierce people." Their pride, treachery, and violence are also denounced by several Hebrew prophets.

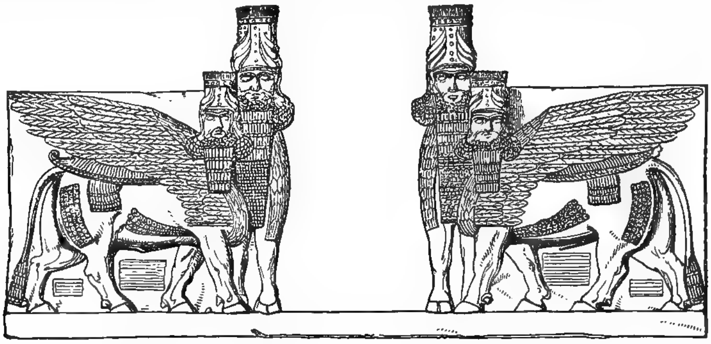
In relation to the history and chronology of Assyria we have only three original authorities—Herodotus, Ctesias, and Berosus. According to Herodotus, who is confirmed to some extent by Berosus, the empire commenced about 1270 B. C., and endured about 650 years, but Ctesias gives it a duration of more than 1300 years. "The cuneiform monuments," says George Rawlinson, "while they generally confirm Herodotus, contradict Ctesias perpetually." It is probable that several kings reigned over Assyria before the empire was founded, as an empire implies the previous and gradual growth of a nation. Among the early kings whose names are found on bricks at Kileh-Sherghat is Bel-lush, who is supposed to have reigned about 1350–1330 B. C. His great-grandson, Shalmaneser I. (1290–70), is chiefly known in history as the founder of Calah, the second capital of Assyria. He was succeeded about 1270 B. C. by his son, Tiglathi-nin, called the conqueror of Babylon, who is the first king of whom extensive conquests are recorded. Passing over several kings of whom nothing is known but their names, we come to Tiglath-pileser I., a powerful monarch who reigned about 1150. His conquests are recorded on a terra-cotta cylinder which is now in the British Museum, and is perhaps the earliest Assyrian historical document that has been discovered. In his reign Assyria was probably the most powerful kingdom in the world, except Egypt. Among the other Assyrian conquerors was Asshur-danni-pal (the Sardanapa'lus I. of the Greeks), who, according to Rawlinson, began to reign in 884 B. C., and extended the boundaries of Assyria by conquests. He compelled Tyre and Sidon to pay tribute to him, and reigned about twenty-five years, during which Assyria made rapid progress in wealth and art. He excelled all his predecessors in the grandeur of his public buildings, and erected a great palace at Calah (Nimrood), which is the most magnificent Assyrian edifice that has been discovered, except the palace of Sennacherib at Nineveh. This palace of Asshur-danni-pal, which was 360 feet long, was adorned with sculptures, many of which are now in the British Museum. He was succeeded by his son, Shalmaneser II., who defeated Ben-hadad, king of Damascus, and his successor, Hazael. The events of his long reign are recorded on an obelisk of black basalt (about seven feet high) which was discovered by Mr. Layard at Nimrood in excellent preservation. The statement of Ctesias, that Ninus founded the Assyrian empire, and that his wife Semiramis conquered Ethiopia and invaded India, is generally considered fabulous, but among the Assyrian monuments occurs the name of Sammuramit, the wife of Iva-lush (810–781 B. C.). Recent explorers of history have substituted this Sammuramit, "a very prosaic and commonplace princess," for the famous and heroic Semiramis of the Greek legends, which appear to have had a very slight basis of fact.

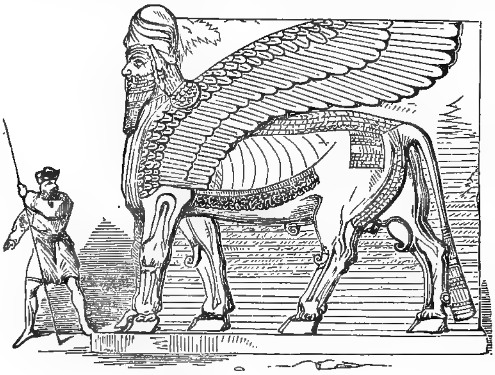
The second book of Kings states that Pul, king of Assyria, invaded Palestine, and received tribute from Menahem, king of Israel, about 750 B. C., but the name of Pul does not occur in the native inscription. The Hebrew sacred history also mentions Tiglath-pileser II., who began to reign about 745 B. C., and waged war with success against the kings of Syria, Israel, and Tyre (2 Kings xv. 29). By his victories over these and other nations he re-established the power of Assyria in the region between the desert and the Mediterranean. He was succeeded by Shalmaneser, who subdued Hoshea, king of Israel, and reigned about six years. The next king was Sargon, who usurped the throne about 721 B. C., and was victorious in expeditions against many nations or tribes. He defeated the army of Egypt, and dethroned Merodach-baladan, king of Babylon, which he annexed to his own empire. He was succeeded about 704 B. C. by his son, Sennacherib, who was the most celebrated of all the Assyrian kings, and was distinguished for his pride, ambition, and warlike enterprise. His long reign was signalized by many victorious expeditions. He defeated the Egyptians near Ekron, subdued the Philistines, and invaded the dominions of Hezekiah, king of Judah, from whom he took many fenced cities, and carried away about 200,000 Jews into captivity. Having forced Hezekiah to pay tribute to him, he returned to Nineveh, his capital, where he built a magnificent palace, which surpassed in size and splendor all earlier edifices, and was adorned with excellent sculptures. This palace was partly exhumed by Mr. Layard, who excavated on its ground floor sixty-eight chambers, and a hall 180 feet long. In a second expedition against the king of Judah and his ally, the king of Egypt, he failed disastrously (see 2 Kings xviii. and xix.), his army being destroyed by a miracle in the night at Pelusium. "The total destruction of the empire in consequence of this blow," says Rawlinson, "is an exaggeration of Josephus. Sennacherib did not die till 680 B. C., seventeen years after his misfortune. . . . He wisely turned his sword against other enemies, and was rewarded by important successes upon all his other frontiers." Sennacherib was assassinated by two of his sons, and was succeeded by another son, Esar-haddon, who reigned thirteen years, and held his court alternately at Nineveh and Babylon. Among his exploits was the conquest of Egypt. He died about 667 B. C., and left the throne to his son, Asshur-bani-pal (or Sardanapalus), who was eminent as a warrior, builder, and patron of art. He extended the limits of the empire in almost every direction, and built a grand palace at Nineveh (Koyunjik). This palace was remarkable for the beauty of the bas-reliefs and other ornaments. The sculptures of this reign are much superior to the earlier in spirit and freedom from conventionality. The empire declined rapidly after the death of Asshur-bani-pal, who was succeeded by his son, Saracus, a weak and effeminate prince. In his reign occurred a great inroad of Scythians, who ravaged Assyria and other civilized countries, about 630 B. C. Soon after this event, Cyaxares the Mede formed a league with Nabopolassar, governor of Babylon, against Saracus. These allies took and destroyed Nineveh in 625 (or, as some say, 606 B. C.), and Assyria then became a province of Media.

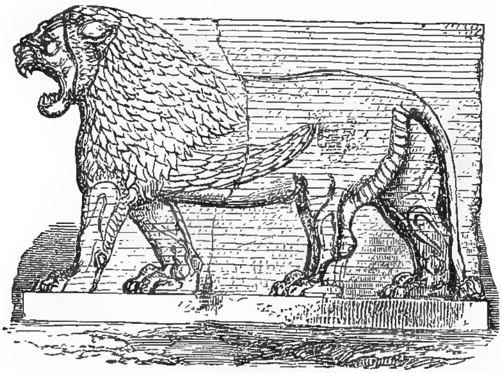
Language and Religion.—From the mounds of Mesopotamia have been exhumed a large mass and variety of documents in the Assyrian language, in cuneiform characters. These documents confirm the previous opinion of the learned that the language was Semitic. They were inscribed on slabs of stone, with which the walls of palaces were panelled, on obelisks of stone, on clay tablets, and on cylinders (or, more strictly, hexagonal prisms) of fine terra-cotta, two or three feet long, which the Assyrian kings deposited at the corners of temples. These so-called cylinders were covered closely with small inscriptions, which, says G. Rawlinson, "it often requires a good magnifying-glass to decipher." The materials which they used most extensively for records and literary documents were stone and plastic clay, the latter of which, being afterwards baked, has resisted the ravages of time as well as stone. The number of characters was very great—about 300, all wedge-shaped, but with a great variety in the form of the wedge. (See Cuneiform Inscriptions.) "The Assyrian characters," says George Rawlinson, "correspond not to letters, according to our notion of letters, but to syllables." A grammar of the Assyrian language has been published by Ménant, and a dictionary by Norris (London, 1869).

The religion of the Assyrians was a gross polytheism, and nearly identical with that of the Chaldeans or Babylonians. The principal objects of their worship were Asshur, Anu, Bel, Iva, Beltis, Nisroch, Nebo, Nin, Shamas, and Sin. At the head of the Assyrian Pantheon stood Asshur, a thoroughly national deity, whom they styled the "Great Lord," the "King of all the Gods." The tutelage of Asshur over Assyria is strongly marked by the identity of his name with that of the country, which in the original is complete.

Architecture, etc.—The artistic genius and multifarious ingenuity of the Assyrians, and their highly civilized condition, are abundantly proved by the remains of art which have been exhumed near the Tigris by M. Botta and Mr. Layard. As architects, as sculptors, as designers and engravers, it is evident that they equalled or surpassed all other Asiatic nations. Ancient Hebrew and Greek traditions concur in representing the Assyrians as renowned in early ages for skill in architecture. They lavished great labor and ornament on royal palaces, compared with which their temples were rather insignificant. The Assyrian palace, constructed mainly of sun-dried bricks, uniformly stood on an artificial platform, which was commonly composed of bricks. It contained a great number of rectangular chambers and several grand halls, richly ornamented with sculptures, which are designed with excellent taste and display an artistic genius of a high order. These halls are lined or panelled with slabs of marble or other stone, which are profusely adorned with bas-reliefs and covered with historical inscriptions. "Of all the Assyrian works of art," says Rawlinson, "which have come down to us, by far the most important are the bas-reliefs. They used the bas-relief for almost every purpose to which mimetic art is applicable." These represent battles, sieges, naval operations, hunting-scenes, processions, and scenes of ordinary life. The use of the column appears to have been rare in Assyrian palaces, where it sometimes occurs in interior doorways. The accompanying illustrations may serve to give the reader an idea of the general style of the Assyrian sculptures, discovered by Mr. Layard, M. Botta, and others.


Portal or Doorway of the Palace of Khorsâbâd. (Bas-relief.)


Winged Bull with a human head, from Nimrood; now in the British Museum. (Bas-relief.)

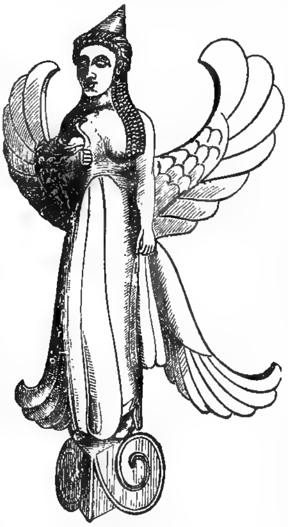

Colossal Lion from the Great Mound at Nimrood. Length, 12 feet; height, 7 feet 8 inches. (Bas-relief.)

"The imperial palace of Sennacherib," says Mr. Fergusson, "is, of all the buildings of antiquity, surpassed in magnitude only by the great palace-temple of Karnac; and when we consider the vastness of the mound on which it was raised, and the richness of the ornaments with which it was adorned, it is by no means clear that it was not as great, or at least as expensive, a work as the great palace-temple at Thebes." (*Handbook of Architecture*, vol. i.) Among the remarkable remains of Assyrian art now in the British Museum are the winged and human-headed lions, twelve feet high, and winged bulls of similar dimensions. (See NINEVEH.) (See also LAYARD'S "Nineveh and Babylon," 1853; LAYARD'S "Nineveh and its Remains," 2 vols., 1849; G. RAWLINSON, "The Five Great Monarchies of the Ancient Eastern World," 4 vols., 1862–67; BONOMI, "Nineveh and its Palaces," 1857; GUMPACH, "Abriss der Assyr. Babyl. Geschichte," 1859; NIEBUHR, "Geschichte Assurs und Babels seit Phul," 1857.) WILLIAM JACOBS.

Ast (GEORG ANTON FRIEDRICH), an eminent German philologist and critic, born at Gotha in 1776. He was appointed professor of classical literature at Landshut in 1805, and obtained the same chair in the University of Munich in 1826. He wrote, besides other works, a "Manual of Æsthetics" (1805), "Introduction to Philology" (1808), and "The Life and Writings of Plato" (1816). He also published a good edition of the works of Plato, with a Latin version and a commentary (11 vols., 1819–32). Died Dec. 30, 1841.

As'tacus [a Latin word signifying "lobster"], a genus of crustaceans, including the cray-fishes of Europe and the Pacific States of the U. S.

Astar'te [Gr. 'Αστάρτη], or **Ash'taroth,** the chief goddess worshipped by the Phœnicians, Syrians, and Carthaginians. She is considered by some as the original of the Greek Aphrodite (Venus). Others identify her with Cybele, and others again with Juno. As Baal was the god of the sun, so Astarte was the goddess of the moon. She is variously represented, but more usually with four wings (the two uppermost of which are intended to symbolize the horns of the moon), wearing a pointed cap, and holding a dove in her hand; as shown in the accompanying illustration, taken from an image of Astarte found in Etruria. The Syrians built to her a famous temple at Hierapolis. Her chief temples, besides that at Hierapolis, were at Tyre and Sidon. (See Appendix (Essay I.) to book iii. in vol. ii. of RAWLINSON'S "Herodotus.")


Astarte.

Astar'te, a genus of bivalve mollusks, the type of the family Cyprinidæ, nearly related to the Veneridæ. Fossils of some 200 extinct species are widely distributed over the world. Some of them are found in the lias formation. Fifteen or twenty species of *Astarte* now exist in the deep sea in various parts of the world.

Astat′ic [Lat. *astaticus;* from the Gr. *α*, priv., and *ἵστημι*, to "stand"], a term applied to the magnetic needle when it is withdrawn from the action of the earth's magnetism, and has no longer the *statical* position in which it is *in equilibrio* with the influence of this force. A needle is rendered astatic by placing the axis about which it is movable in the direction in which terrestrial magnetism acts, because it cannot then receive any motion from the force, and will rest in any position. This effect is more usually produced by neutralizing the action of the earth by means of an equal and opposite magnetic action; that is, by placing the needle vertically above or below a second magnetic needle, the N. pole of which is in juxtaposition with the S. pole of the first needle.

As′ter [from the Gr. *ἀστήρ*, a "star"], a genus of plants of the natural order Compositæ, which Lindley proposes to call Asteraceæ. This genus comprises a great number of species, generally herbaceous, mostly natives of the U. S. Many of them are cultivated in the gardens of Europe for the beauty of the flowers, which bloom from July to November. The ray-florets, which are never of the same color as the disk, are purple, blue, violet, white, etc. Among the remarkable American species are *Aster Novæ Angliæ, Aster puniceus, Aster cyaneus,* and *Aster spectabilis.* The China aster (*Aster Chinensis; Callistephus Chinensis*) is a favorite garden flower in England and the U. S. Many varieties are cultivated, and present a great diversity of colors. They prefer a rich soil, and bloom until end of autumn.

Aster, von (ERNST LUDWIG). See APPENDIX.

Asteracan′thus ["star spine"], a genus of fossil sharks, of which only the dorsal defensive spines are known. These are found in the mesozoic rocks of England, and were named by Agassiz from the stellate tubercles with which they are ornamented.

Aste′rius, or **As′ter,** a Father of the Church, supposed to have been born at Antioch about 340 A. D. Little is known of his life except that he was bishop of Amasea, in Pontus. Some of his homilies are extant.

As′teroids [Gr. *ἀστεροειδής*, "resembling a star," from *ἀστήρ*, a "star," and *εἶδος*, "form," "resemblance"], the name given to members of the zone of small planets travelling between the orbits of Mars and Jupiter. They are so called because they are not readily distinguishable from the fixed stars save by the experienced observer. The discovery of the first known members of this group of celestial bodies forms one of the most interesting chapters in the history of astronomy. It had long been noticed that a large gap separates the orbit of Mars from that of Jupiter. Not, indeed, that the actual distance between these orbits is even so great as that which separates the orbits of Jupiter and Saturn, but the orderly increase observable in the planetary distances as we proceed outward from the sun is obviously marred by the sudden increase which marks the interval between the orbits of Mars and Jupiter, as compared with that between the orbits of the earth and Mars. This circumstance led Kepler, and afterwards Titius, to express the opinion that an undetected planet revolves between Mars and Jupiter. The discovery of the planet Uranus, whose mean distance corresponds exactly with Bode's law (see BODE), led this eminent astronomer to recommend that search should be made for such a planet. Accordingly, for the first time in the history of astronomy, an empirical law—a law whose cause is even now not recognized—led astronomers to commence a systematic survey of the heavens. Through the exertions of Baron de Zach an association of twenty-four astronomers was formed. These observers divided the zodiac among them, and soon after the beginning of the present century the search for the new planet was fairly commenced. But the discovery did not fall to the lot of any of those who had undertaken the search. As in the case of the planet Uranus, an apparent accident brought the first discovered member of the family of asteroids under the notice of an astronomer who richly merited such a success, though actually engaged on work of another character. Piazzi, then at work on his great catalogue, was carefully surveying the constellation Taurus, when his attention was attracted by an apparent change of place in a small star which he had observed on the first day of the present century. By Jan. 3, 1801, he had convinced himself of the star's change of place. He communicated his discovery to Oriani and Bode, and continued his own observations until Feb. 11, when his labors were interrupted by dangerous illness. When his letters reached Oriani and Bode the planet had already approached too near to conjunction with the sun to be discernible. There seemed great risk that after all the planet would escape astronomers, since it would not be discernible before Sept., 1801, and the observations of Piazzi were deemed insufficient for the calculation of the planet's place after so long an interval. But Gauss, the eminent mathematician, came to the rescue, and after a careful study of all the observations made by Piazzi, he formed an ephemeris of the planet's path for several months in advance. At length, after an arduous search, De Zach redetected the planet on Dec. 31, 1801, Olbers (independently) discovering it on the following evening. After one year of doubt and difficulty, astronomers had succeeded in achieving a well-earned triumph for their science. It was found that the new planet travels at a mean distance of 2.767 from the sun, the earth's distance being unity, while Bode's law had indicated for it a distance of 2.8. It therefore fulfilled even more closely than was to have been expected this empirical law. It was called Ceres by Piazzi. But while astronomers were congratulating themselves on this new proof of the existence of law and harmony within the solar system, a fresh discovery threatened to throw all into disorder again. While searching for Ceres, Olbers had noticed with special care the arrangement of the small stars which lay near its assigned geocentric path. On Mar. 28, 1802, while examining a part of the constellation Virgo, he noticed a small star in a part of the heavens which had thus been rendered familiar to him, the star occupying a place where he felt sure no star had been visible while his search for Ceres had been in progress. In two hours he had recognized the planetary motion of this body. By April 28, Gauss had assigned to the newly-discovered planet, which received the name of Pallas, an orbit having a mean distance very little less than that of the planet Ceres. Thus there were now two planets where only one had been wanted to supply the gap in the planetary scheme. Olbers was led to expect that others would be found; and a search being instituted for the purpose of testing this view, Harding of the Lilienthal Observatory discovered, on Sept. 1, 1804, the planet Juno. Subsequently, on Mar. 29, 1807, exactly five years after his discovery of Pallas, and in the same region of the heavens, Olbers discovered Vesta.

No further addition was made to the family of asteroids until Dec. 8, 1845, when Astræa was discovered at Driessen by a German observer named Hencke. But from the discovery of Hebe, on July 1, 1847, not a year has passed without adding one or more asteroids to the list of known planets. In some years the progress of discovery has gone on more rapidly than in others. Thus, in 1861 *ten* asteroids were discovered; in 1868, *twelve;* while in each of the years 1863 and 1869 only *two* were discovered. But at present there seems to be no reason to expect that a year will ever pass without adding to the list. The following table presents all the asteroids discovered up to the date of writing, with the name of the discoverer and the date of discovery:

No.	Name.	Date of Discovery.	Discoverer.
1	Ceres	1801, January 1	Piazzi.
2	Pallas	1802, March 28	Olbers.
3	Juno	1804, September 1	Harding.
4	Vesta	1807, March 29	Olbers.
5	Astræa	1845, December 8	Hencke.
6	Hebe	1847, July 1	Hencke.
7	Iris	August 13	Hind.
8	Flora	October 18	Hind.
9	Metis	1848, April 25	Graham.
10	Hygeia	1849, April 12	De Gasparis.
11	Parthenope	1850, May 11	De Gasparis.
12	Victoria	September 13	Hind.
13	Egeria	November 2	De Gasparis.
14	Irene	1851, May 19	Hind.
15	Eunomia	July 29	De Gasparis.
16	Psyche	1852, March 17	De Gasparis.
17	Thetis	April 17	Luther.
18	Melpomene	June 24	Hind.
19	Fortuna	August 22	Hind.
20	Massilia	September 19	De Gasparis.
21	Lutetia	November 15	Goldschmidt.
22	Calliope	November 16	Hind.
23	Thalia	December 15	Hind.
24	Themis	1853, April 5	De Gasparis.
25	Phocea	April 6	Chacornac.
26	Proserpina	May 5	Luther.
27	Euterpe	November 8	Hind.
28	Bellona	1854, March 1	Luther.
29	Amphitrite	March 1	Marth.
30	Urania	July 22	Hind.
31	Euphrosyne	September 1	Ferguson, U. S.
32	Pomona	October 28	Goldschmidt.
33	Polyhymnia	October 28	Chacornac.
34	Circe	1855, April 6	Chacornac.
35	Leucothea	April 19	Luther.
36	Atalanta	October 5	Goldschmidt.
37	Fides	October 5	Luther.
38	Leda	1856, January 12	Chacornac.
39	Lætitia	February 8	Chacornac.
40	Harmonia	March 31	Goldschmidt.

No.	Name.	Date of Discovery.	Discoverer.
41	Daphne	May 22	Goldschmidt.
42	Isis	May 23	Pogson.
43	Ariadne	1857, April 15	Pogson.
44	Nysa	May 27	Goldschmidt.
45	Eugenia	June 27	Goldschmidt.
46	Hestia	August 16	Pogson.
47	Aglaia	September 15	Luther.
48	Doris	September 19	Goldschmidt.
49	Pales	September 19	Goldschmidt.
50	Virginia	October 4	Ferguson, U. S.
51	Nemausa	1858, January 22	Laurent.
52	Europa	February 6	Goldschmidt.
53	Calypso	April 4	Luther.
54	Alexandra	September 10	Goldschmidt.
55	Pandora	September 10	Searle, U. S.
56	Melete	1857, September 9	Goldschmidt.
57	Mnemosyne	1859, September 22	Luther.
58	Concordia	1860, March 24	Luther.
59	Elpis	September 12	Chacornac.
60	Erato	September 14	Forster & Lesser.
61	Echo	September 15	Ferguson, U. S.
62	Danaë	September 19	Goldschmidt.
63	Ausonia	1861, February 10	De Gasparis.
64	Angelina	March 4	Tempel.
65	Cybele	March 8	Tempel.
66	Maia	April 9	Tuttle, U. S.
67	Asia	April 17	Pogson.
68	Leto	April 29	Luther.
69	Hesperia	April 29	Schiaparelli.
70	Panopea	May 5	Goldschmidt.
71	Niobe	August 13	Luther.
72	Feronia	May 29	Peters, U. S.
73	Clytie	1862, April 7	Tuttle, U. S.
74	Galatea	August 29	Tempel.
75	Eurydice	September 22	Peters, U. S.
76	Freia	October 21	D'Arrest.
77	Frigga	November 12	Peters, U. S.
78	Diana	1863, March 15	Luther.
79	Eurynome	September 14	Watson, U. S.
80	Sappho	1864, May 2	Pogson.
81	Terpsichore	September 30	Tempel.
82	Alcmene	November 27	Luther.
83	Beatrix	1865, April 26	De Gasparis.
84	Clio	August 25	Luther.
85	Io	September 19	Peters, U. S.
86	Semele	1866, January 4	Tietjen.
87	Sylvia	May 16	Pogson.
88	Thisbe	June 15	Peters, U. S.
89	Julia	August 6	Stéphan.
90	Antiope	October 1	Luther.
91	Ægina	November 4	Borelly.
92	Undina	1867, July 7	Peters, U. S.
93	Minerva	August 24	Watson, U. S.
94	Aurora	September 6	Watson, U. S.
95	Arethusa	November 23	Luther.
96	Ægle	1868, February 17	Coggia.
97	Clotho	February 17	Tempel.
98	Ianthe	April 18	Peters, U. S.
99	Dike	May 29	Borelly.
100	Hecate	July 11	Watson, U. S.
101	Helene	August 15	Watson, U. S.
102	Miriam	August 23	Peters, U. S.
103	Hera	September 7	Watson, U. S.
104	Clymene	September 13	Watson, U. S.
105	Artemis	September 16	Watson, U. S.
106	Dione	October 10	Watson, U. S.
107	Camilla	November 19	Pogson.
108	Hecuba	1869, April 2	Luther.
109	Felicitas	October 9	Peters, U. S.
110	Lydia	1870, April 19	Borelly.
111	Ate	August 14	Peters, U. S.
112	Iphigenia	September 19	Peters, U. S.
113	Amalthæa	1871, March 12	Luther.
114	Cassandra	July 24	Peters, U. S.
115	Thyra	August 6	Watson, U. S.
116	Sirona	September 8	Peters, U. S.
117	Lomia	September 11	Borelly.
118	Peitho	1872, March 15	Luther.
119	Althæa	April 3	Watson, U. S.
120	Lachesis	April 10	Borelly.
121	Hermione	May 12	Watson, U. S.
122	Girda	July 31	Peters, U. S.
123	Brunhilda	July 31	Peters, U. S.
124	Alceste	August 23	Peters, U. S.
125	Liberatrix	September 11	Prosper-Henry.
126	Velleda	November 5	Paul Henry.
127	Johanna	November 5	Prosper-Henry.
128	Nemesis	November 25	Watson, U. S.
129	Antigone	1873, February 5	Peters, U. S.
130	Electra	February 17	Peters, U. S.
131	Vala	May 25	Peters, U. S.
132	Aethra	June 12	Watson, U. S.
133	Cyrene	August 16	Watson, U. S.
134	Sophrosyne	September 27	Luther.
135	Hertha	1874, February 18	Peters, U. S.

[For supplementary list of asteroids see APPENDIX.]

From the time of compilation of the above table to Oct. 27, 1884, 110 new asteroids have been discovered; the whole number now known is 245.

The most remarkable characteristic of the asteroids besides their smallness is the relatively wide range of eccentricity and inclination among their orbits; so that in this last respect they may be said to be intermediate between the planets and comets. Their distances vary between two hundred and more than three hundred millions of miles. The eccentricity of Polyhymnia is no less than .339119, so that its greatest distance is more than twice its least. The inclination of Pallas is 34° 43′, so that the excursions of this planet above and below the ecliptic exceed, when taken together, the mean distance of the planet from the sun. Leverrier has shown, by means of calculations founded on the secular motion of the perihelion of Mars, that the combined mass of all the asteroids (discovered and undiscovered) cannot greatly, if at all, exceed one-fourth of the mass of our earth, and in all probability is much less than this. REVISED BY J. C. WATSON.

Asterol′epis [from the Gr. *ἀστήρ*, a "star," and *λεπίς*, a "scale," alluding to the marks on the dermal plates of the head], a genus of fossil ganoid fishes, described by the famous geologist Hugh Miller, from the Scotch old red sandstone. Some are believed to have been twenty feet long.

Asthma, az′ma [Gr. *ἄσθμα*, a "gasping for breath"], a term somewhat vaguely used to designate diseases characterized by difficulty of breathing, occurring in paroxysms; thus, spasm of the glottis is sometimes called "thymic asthma;" autumnal catarrh is known as "hay asthma;" the dyspnœa (difficult breathing) of Bright's disease has been, with questionable propriety, called "uræmic asthma;" and similar symptoms arising from heart or lung disease have also been mistaken for true asthma, which, however, may be associated with those various diseases. True asthma, according to Niemeyer, includes only those cases where the point of the irritation producing the attack is either at the origin of the vagus nerve or in some remote part of its course. This does not exclude cases of reflex asthma, such, for example, as may occur in uterine disease. Others state that irritability and hyperæmia of the bronchial mucous membrane are essential elements of the disease; and the readiness with which powdered ipecac., the exhalations from feathers, etc., will excite paroxysms, would appear to confirm this view. It is rare to find structural changes of any organ in cases of simple asthma. The trained diagnostician alone can discriminate between asthma and dyspnœa from other chest diseases. True or nervous asthma consists in a paroxysmal spasm of longer or shorter duration, attacking the muscular elements of the bronchial tubes, diminishing temporarily their calibre, and thereby obstructing respiration. Notwithstanding the great distress which may accompany the attack, the immediate danger is not great. The smoking of saltpetre-paper or of stramonium-leaves, the administration of opiates, coffee, belladonna, conium, cannabis, chloral, vapor of chloroform, etc., may or may not relieve the paroxysm. Iodide of potassium benefits many cases, permanently or temporarily. Quinia, Fowler's solution, iron, and other tonics are often useful. A nutritious diet, with careful regulation of the bowels, is important. The compressed air-bath is recommended as affording great relief during the paroxysm.

As′ti (anc. *As′ta Pompe′ia*), a city of Italy, in the province of Alessandria, is on the river Tanaro, and on the Turin and Genoa Railway, 36 miles by rail E. S. E. of Turin. It is a bishop's see, has a fine Gothic cathedral, a royal college, a theological seminary, a printing-office established in 1479, and many elegant mansions. Here are several manufactories of silk stuffs. This is the native place of the poet Alfieri. Asta Pompeia was a town of great antiquity. In the Middle Ages it was the capital of a republic, which existed from 1098 to 1155. Its light white and sparkling wine is in very great demand. Pop. in 1881, 33,233.

Astié (JEAN FRÉDÉRIC). See APPENDIX.

Astig′matism [from the Gr. *α*, priv., and *στίγμα*, a "mark" or "spot"] is the term applied to a peculiar defect in the eye which consists in its refracting the rays of light differently in different planes. The defect may be detected by looking at a small pinhole in a card held up against any bright object, and moved to different distances from the eye. To an ordinary eye the image of the hole remains circular at all distances, but to an eye having the peculiar defect in question the image of the hole, as the card is moved away from the eye, becomes elongated, and at a certain distance passes into a straight line. This imperfection may be corrected by means of a cylindrical or spherico-cylindrical lens.

Astol′phus, or **Astul′phus** [Fr. *Astolphe;* Ger. *Ais′tulf*], king of the Lombards, obtained the throne in 749 or 750 A. D. Having seized Ravenna about 752, he threatened Rome. The pope then applied for help to Pepin, king of the Franks, who defeated Astolphus in 754, and forced him to cede Ravenna and the Pentapolis to the pope. This is said to have been the origin of the temporal power of the popes. Died in 756 A. D.

As′tor (John Jacob), born at Waldorf, near Heidelberg, in Germany, July 17, 1763, emigrated to the U. S. in 1783, and invested his capital in furs, which he took to London and sold with much profit. He next settled at New York, and engaged extensively in the fur-trade. He exported furs to Europe in his own vessels, which returned with cargoes of foreign commodities, and thus rapidly amassed a fortune. In 1811 he founded Astoria on the western coast of North America, near the mouth of the Columbia, as a dépôt for the fur-trade, for the promotion of which he sent two expeditions to the Pacific Ocean. He was remarkable for his sagacity and diligence in business. He purchased in New York a large amount of real estate, the value of which increased enormously. At his death (Mar. 29, 1848) his fortune was estimated at $20,000,000. He left $400,000 to found a public library in New York. (See Astor Library.)

Astor (William B.). See Appendix.

Astor′ga, d′ (Emanuele), Baron, an eminent musical composer, born in Sicily Dec. 11, 1681. He passed some years at the court of the emperor Leopold I., by whom he was patronized. His chief work is a "Stabat Mater," which is much admired. He also produced "Daphne," an opera, and cantatas, one of which is called "Quando Penso." D. Aug. 21, 1736.

Astoria, Ill. See Appendix.

Astoria, Queens co., N. Y., on the East River, opposite New York City, now a part of Long Island City.

Astoria, city, port of entry, and capital of Clatsop co., Or. (see map of Oregon, ref. 5–A, for location of county), on the S. bank of the Columbia River. 9 miles from its mouth. It was once an important dépôt of the fur trade, having been founded by John Jacob Astor in 1811. It has waterworks and gasworks, is very extensively engaged in canning salmon, and is becoming a summer resort. Pop. in 1870, 639; in 1880, 2803.

Astor Library, of New York City, one of the largest in the U. S., was founded by John Jacob Astor, who bequeathed $400,000 for that purpose. His will directed that the government of the library should be vested in eleven trustees—namely, Washington Irving, William B. Astor, Daniel Lord, Jr., James G. King, Joseph G. Cogswell, Fitz-Greene Halleck, Henry Brevoort, Jr., Samuel B. Ruggles, Samuel Ward, Jr., the mayor of New York, and the chancellor of the State. The library, erected on La Fayette place, was opened in 1854, before which J. G. Cogswell had been appointed superintendent. William B. Astor, a son of the founder, added to his father's bequest a sum nearly equal. The library had 221,490 volumes in 1886.

Astrâbâd′, or **Asterâbâd,** a town in the northern part of Persia, capital of a province of its own name, is on a small river which enters the south-eastern part of the Caspian Sea, from which it is about 20 miles distant. It is near the N. foot of the Elbrooz Mountains. The situation is unhealthy in summer, but the appearance of it is rendered attractive by extensive gardens. The greater part of the town is in ruins. Here are some manufactures of silk and cotton stuffs. Pop. estimated at 10,000.

Astrachan. See Astrakhan.

Astræ′a [Gr. Ἀστραία], goddess of justice, a personage of classic mythology, was said to be a daughter of Jupiter and Themis. At the termination of the Golden Age, when violence began to prevail in the world, she ascended to heaven, being the last of the goddesses to leave the earth.—Astræa is also the name of an asteroid discovered by Hencke in 1845. Its mean distance from the sun is 2.577 times that of the earth. It completes a revolution in 1511 days.

Astræa, a genus of radiated animals of the class Polypes, order Madreporaria. They live in the sea, and form calcareous skeletons (star-corals), which are characterized by sessile, star-shaped, lamellate cells, crowded on the upper surface. The polyps are often an inch in diameter. They form large, hemispherical masses of coral.

Astræa Viridis.

As′tragal [Lat. *astrag′alus;* Gr. ἀστράγαλος], a convex moulding, which was first introduced at the base of the capital of the Ionic order, and has since been applied in other positions. It is also called a collarino.

As′tragalus, in anatomy, the first or uppermost bone of the tarsus, which forms with the leg-bones the hinge of the ankle-joint. Its lower surface is concave, and rests on the os calcis, or heel-bone, with which it is connected by a strong ligament.

Astrag′alus, a genus of herbaceous and shrubby plants of the natural order Leguminosæ, sub-order Papilionaceæ. The leaves are pinnate, with an odd leaflet, and the pod is two-celled. It comprises numerous species, mostly natives of the temperate and cold parts of the eastern hemisphere. Several species of *Astragalus* growing in Persia and Asia Minor yield gum-tragacanth. The *Astragalus Bœticus* is cultivated in Hungary and Germany for its seeds, which are used as a substitute for coffee. Numerous species of *Astragalus* are found in the U. S., especially westward.

Astrakhan′, a government in the south-eastern part of European Russia, is bounded on the N. by Samara, on the E. by Orenburg and the Caspian Sea, on the S. by Caucasia, and on the W. by the country of the Don Cossacks and Saratov. It is intersected by the Volga, which divides it into two nearly equal parts. Area, 85,012 square miles. The surface is nearly level, and the soil mostly sterile and saline. A large part of it is occupied by salt marshes and saline lakes. The fisheries of the Volga in this government are very valuable, many sturgeon being caught in it. Pop. in 1879, 688,719.

Astrakhan, or **Astrachan,** a city of Russia, capital of the above government, is situated on an island of the river Volga, 40 miles from its entrance into the Caspian Sea. It has crooked and dirty streets, and houses mostly built of wood. It contains a cathedral, about thirty-five churches, fifteen mosques, an archiepiscopal palace, a botanic garden, an Indian temple, and a gymnasium. Immense quantities of fish are exported hence. The other articles of export are leather, furs, linen, and woollen goods. This place is the seat of Greek and Armenian archbishoprics. It has an extensive trade, and manufactures of silk and cotton. Steamboats ply between this place and the ports of the Caspian Sea. Pop. in 1882, 57,704.

As′tralite, a variety of glass resembling aventurine, containing crystals of a cuprous compound, which exhibits a dichroitic iridescence of dark-red and greenish-blue. It is made by fusing and cooling slowly a mixture of 80 parts of silica, 120 of litharge, 72 of carbonate of soda, 18 of borax glass, 24 of scale oxide of copper, and 1 of scale oxide of iron.

As′tral Spir′its, spirits which the ancient Persians and other Orientals supposed to animate the stars. This opinion or superstition was adopted by some of the Greeks and Jews. The demonologists of the Middle Ages conceived them as fallen angels or souls of departed men.

Astrin′gent [Lat. *astrin′gens,* active part of *astrin′go,* to "bind," to "contract"], an agent which produces a persistent contraction in organic tissues, and thus checks discharges from the body, such as excessive purging or diarrhœa and hæmorrhages. Astringents are of two classes, vegetable and mineral. Of the former, tannic and gallic acids are the prevailing active principles; and these may be obtained and used in the pure state. The most common vegetable astringents are galls, oak-bark, logwood, blackberry root, rhatany, catechu, and kino. Of mineral astringents, the most important are acetate of lead, sulphate and chloride of iron, nitrate of silver, alum, carbonate of lime, and the mineral acids, sulphuric, nitric, and hydrochloric.

Astroca′ryum, a genus of palms, comprises about sixteen known species, natives of tropical America, and remarkable for the sharp spines with which the stem and almost every part is armed. They have pinnated leaves. The murumuru palm (*Astrocaryum Murumuru*), a small tree about ten feet high, grows on the Amazon, and bears a fruit about one inch long, which is esculent and highly esteemed. Another edible fruit is produced by the tucuma palm (*Astrocaryum Tucuma*), which grows near the Amazon to the height of thirty to forty feet. The *Astroca′ryum vulga′re,* called tucum palm, is more lofty than the tree last noticed. It is cultivated by the natives, who obtain from the epidermis of its unopened leaves a fine and strong fibre of which they make cordage, nets, etc.

As′trolabe [Gr. ἀστρόλαβος, from ἄστρον, a "star," and λαμβάνω, to "take"], a name given by the Greeks to a circular instrument used to make astronomical observations, which is now superseded by better instruments. The ancient astrolabe consisted of two or more circles having a common centre, and so inclined to each other as to enable the astronomer to observe in the planes of different circles of the sphere at the same time.

Astrol′ogy [from the Gr. ἄστρον, a "star," and λόγος, a "discourse," also "science"], literally, the "science of the stars." This term was originally synonymous with astronomy, but was subsequently applied to a spurious science which professed to explain the events of human life by the influence of the stars or planets. Astrology, which is a very ancient form of superstition, may be defined as the study of horoscopes, and an attempt to predict the fortunes of men by the positions and aspects of the stars. Judicial[*] astrology is supposed to have originated in Chaldæa. The Jews, after their captivity in Babylon, were much addicted to it, and the same delusion has prevailed among all the nations of Europe. In ancient Rome, during the empire, astrologers were a numerous and influential class. In the Middle Ages, astronomy proper was chiefly studied as subsidiary to astrology, which was considered as the more important of the two sciences. The relation between astrology and astronomy was like that between alchemy and chemistry. The Copernican system contributed greatly to bring astrology into discredit. The fundamental conception of astrology seems to have been drawn from the actual influence of the sun upon the earth in affecting health, fertility, and temperature. Connected with these facts was the worship of the heavenly bodies as divinities. The notion of Aristotle, set forth in the twelfth book of the "Metaphysics," that the heavenly bodies were "ensouled," and that each moved in its orbit by a conscious volition, gave currency to similar ideas among the students of the Peripatetic system. The power of these heavenly beings was supposed to *flow out* from their dwelling-places, and affect beings on the earth for good or evil. Astrological predictions are founded on the relative positions and aspects of the sun, moon, and planets at the moment of birth, and on certain arbitrary influences supposed to belong to each of these bodies. To facilitate the determination of the aspects, the whole heaven, visible and invisible, is divided into twelve equal parts by the horizon, the meridian, and four other circles passing through the N. and S. points of the horizon and the points of the equator (or prime vertical) which are at the distance of thirty and sixty degrees from the meridian. These equal spaces are called the twelve houses of the heavens, and the circles by which they are circumscribed are called circles of position. The circles of position are supposed to remain fixed, so that a celestial body is carried through each of the twelve houses in the course of a day by the diurnal rotation. The first house is contained between the eastern horizon and the next circle of position going to the eastward. The beginning of the first house, or the point of the ecliptic just rising, is called the horoscope. The first house is the house of life; the second, of riches; the third, of brothers; the fourth, of parents; the fifth, of children; the sixth, of health; the seventh, of marriage; the eighth, of death; the ninth, of religion; the tenth, of dignities; the eleventh, of friends; and the twelfth, of enemies. Each of the houses has one of the heavenly bodies as its peculiar lord. They have different powers, the first being the most powerful. The next object is to consider the aspects or configurations of the influential bodies. The ancients reckoned five aspects. (See Aspects.) The quartile and opposition were considered malignant or adverse, the trine and sextile as benignant or propitious, and the conjunction was an indifferent aspect. The influences ascribed to the planets were as arbitrary as those ascribed to the aspects. Saturn, being at the greatest distance from the sun, was supposed to be of a cold nature; Jupiter, Venus, and the Moon, temperate and benignant; Saturn and Mars were the most dangerous. The influence of the sun and Mercury varied according to circumstances.

Revised by M. B. Anderson.

Astron'omy [from the Gr. ἄστρον, a "star," and νόμος, a "rule" or "regulation"], the science which treats of the constitution, motions, and appearances of the heavenly bodies. Its scope includes the whole visible universe outside our atmosphere. Its principal divisions are—1, Descriptive or Physical Astronomy, which, as its name implies, includes the simple description of celestial phenomena and laws, and is to the heavenly bodies what physical geography is to the earth; 2, Theoretical Astronomy, which comprises the investigation of the celestial motions; 3, Practical Astronomy, which teaches the art of using astronomical instruments, and, by their means, of determining positions on the earth and in the heavens.

The material universe, as revealed by the telescope, is formed of a vast collection of stars and nebulæ, to the number of which no definite limit can be set, scattered through an immeasurable and inconceivable extent of space. Of the stars, about 5000 are usually visible to the naked eye, but very keen observers can detect as many as 8000. The number visible is greatly increased when a small telescope is pointed at the heavens, and continues to increase with every increase in the power of the instrument, rising, in the case of the most powerful telescopes, to forty or fifty millions, or six to eight thousand for every one visible to the naked eye. Even then there is no evidence that the smallest stars are seen, but every reason to believe that larger instruments would show millions more in every direction. The telescopic stars are for the most part scattered at random, except that they are many times thicker in some regions than in others. But great numbers of clusters are known in which great telescopes show a whole firmament of stars in a spot hardly visible to the naked eye.

The first inquiry which suggests itself in considering the stellar universe is, Can we form any estimate of its magnitude or of the scale on which it is constructed? The most difficult and refined investigations of recent times have been devoted to this question, but with only partial success. Until near the middle of the present century the distances even of the nearest stars eluded measurement, and even now there are not a dozen of which the parallax is known with anything like certainty. But these are sufficient to enable us to form a sort of judgment, at least, of the scale on which the universe is constructed. It is roughly estimated that the stars of the first magnitude have, on the average, an annual parallax of two-tenths of a second, and are therefore at an average distance of about a million times that of the earth from the sun. This distance may be most conveniently expressed by saying that light, moving around the earth eight times in a second, would require fifteen years to traverse it. Now, supposing that, on a general average, the more distant stars are of the same real magnitude with the nearer ones, but look smaller owing to their distance, we may conclude that the smallest stars visible to the naked eye are ten times as far as the nearest ones: and, allowing for their range of real magnitude, we may conclude with considerable probability that they lie at distances which light traverses in from fifty to two hundred years. In other words, if we conceive two spheres described around our sun as a centre, the smaller with a radius over which light would pass in fifty years (in round numbers, three hundred million of millions of miles), and another with a radius four times as great, it is probable that a large portion of the stars of the sixth magnitude will be included between these two spheres. Applying the same reasoning to the telescopic stars, we may conclude that the smallest stars visible in the most powerful telescopes are at distances which light would traverse in from five to fifty thousand years. Of what is beyond we know nothing as yet.

Of the form and boundaries of this agglomeration of stars which forms the visible universe nothing certain is known, but it is certain that there is a great tendency to aggregation near the plane of the Milky Way. The latter is well known to consist of vast aggregations of telescopic stars, too small to be separately visible to the naked eye. This fact was first clearly shown by Herschel, and led him to his celebrated theory that all the visible stars form a comparatively thin stratum, near the centre of which our sun is placed. That the densest portions of the universe are spread out into such a stratum or plate there can be no doubt, but of the limits of the thinner portions, composed of stars scattered outside of this stratum, nothing positive can be asserted.

Nothing indicating either growth or decay has been actually observed in the stellar universe. There is no established instance either of a known star disappearing from the heavens, or of a really new one coming into view. The supposed cases of the latter kind are now found to be due to extraordinary variability; a small star, perhaps invisible to the naked eye, suddenly bursting forth into brilliancy, and after a time subsiding to its former magnitude. Several instances of this kind are on record, the last as late as 1866, when a star of the second or third magnitude suddenly appeared in the Northern Crown. An examination of Argelander's great star-catalogue showed that it was formerly a telescopic star of the ninth magnitude. After a few days it gradually returned to this magnitude, and has not since shown any kind of disturbance.

A large number of stars—probably one out of every forty or fifty—are of variable brilliancy. Usually, the variations are so slight as to be discovered only by the careful watching of the trained observer, but in a few cases they are so striking as to be plain to any one who will observe. The star η Argus, in the southern hemisphere, varies in an extraordinary and irregular manner. Mira Ceti, usually hardly visible to the naked eye, rises nearly to the second magnitude once in every ten or eleven months, and after a week or two fades away again. Generally, the variations take place in a regular period, so that the times of greatest and least brilliancy admit of tolerably exact prediction.

The stars are found to be moving among themselves in a way that must ultimately lead to an entire change of their distribution, and perhaps to their entire separation. The velocity of motion is usually from twenty to fifty miles per second, but in one instance it probably exceeds 200 miles per second. So far as observation can show, the rule is that each star moves forward independently in a straight line with a uniform velocity. From the few estimates of the masses of the stars which have been made, there is no reason to believe that their motions can be appreciably affected by their mutual gravitation. The combined attraction of all the stars visible with the most powerful telescope, supposing their masses to be correctly judged by those of the stars which have been weighed, would never stop, and would hardly turn aside, the star Arcturus in its course of sixty or eighty miles per second, nor Groombialze 1830 in its course of 200 miles per second. There is, in fact, no certain evidence that the stellar universe is held together by any bond of attraction whatever, as our solar system is. Mädler's view, that Alcyone is the central sun of the universe, is a piece of groundless speculation which has never received the assent of astronomers qualified to judge it. The stellar motions take place in every possible direction, and without regard to any known law, except that, as a general rule, stars in the same region of space move nearly in the same direction.

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[*] *Judicial* is often applied to astrology in the sense of pronouncing judgment (or sentence) upon a man's character or destiny, in contradistinction to simple astrology, signifying merely the knowledge of the stars or heavenly bodies.

Besides stars, we have nebulæ as component parts of the telescopic universe. They are cloud-like patches of light scattered all over the heavens, but less numerous in the Milky Way than at a distance from it. Two of them, situated in the northern hemisphere, the great nebulæ of Orion and of Andromeda, are clearly visible to the naked eye. Before the discovery of spectral analysis it was not possible to draw the line between nebulæ and clusters of stars, because large numbers of objects which look like nebulæ through small telescopes are found, with large ones, to be clusters of stars, and every increase in the power of the instrument was found to change objects from the former to the latter class. It was therefore doubtful whether all nebulæ were not really clusters of stars too small or too distant to be resolved with the telescope. But, as soon as the spectroscope was turned upon such of these objects as could give a visible spectrum, it was found that many of them were not solid bodies at all, but masses of incandescent gas, generally hydrogen or nitrogen. To this class belongs the nebula of Orion, which is therefore a true nebula. On the other hand, the nebula of Andromeda gives a continuous spectrum, showing that the luminous matter is in the solid or liquid state, and probably consists of an agglomeration of stars, though no telescope has yet resolved it.

We have no data whatever for forming a judgment of the distance of the nebulæ, as we have in the case of the fixed stars. A favorite theory is, that the forty or fifty millions of stars separately visible through the largest telescopes, the greater number of which, as we have said, are spread out in a thin, widely extended stratum, form a system to which our sun belongs, and that many of the resolvable nebulæ are similar systems situated far outside of our own. In favor of this view is to be said that our Milky Way, viewed from a point 500 times the distance of the most remote star in it, would have the appearance of a nebula, and would give a continuous spectrum, although no telescope we possess would resolve it. It is therefore possible that many of the more distant resolvable nebulæ may be such systems. But the greater number of visible clusters cannot compare with our Milky Way in the number of their stars, as they only comprise a few hundreds or thousands. We can really draw no line of demarcation between the agglomerations of stars within our own system and the most distant cluster, the whole range from one extreme to the other being filled with known objects. We must therefore regard the views in question as forming a very grand but yet unproven hypothesis.

Our description of the stellar universe may be summed up by saying that it is composed of an unknown host of stars, certainly more than 50,000,000, mostly scattered in irregular aggregations forming the Milky Way, while many are aggregated in yet closer clusters, some of which are situated within the Milky Way and some without it, and of a number of enormous masses of incandescent gases situated at unknown distances. Our sun is simply one of these 50,000,000 of stars, without, so far as we know, any mark to distinguish him among his fellows. He is probably rather smaller than the average: removed to 1,000,000 times his present distance, which is probably the average distance of the stars of the first magnitude, he would shine only as a star of the third or fourth magnitude. He is, indeed, accompanied by a number of non-luminous planets, while, with one possible exception, no such companions are seen to the stars; but this does not disprove their existence, because every planet of our system would disappear from view in our most powerful telescopes at a distance far less than that of the nearest star.

The physical constitution of the sun and stars is a subject which has greatly occupied investigators in recent times, without leading them to an entirely certain and complete conclusion. The theory of Wilson and Herschel, that the sun is a dark, cool body, surrounded by a stratum of luminous clouds floating in an atmosphere, has been one of the best known, but it is completely disproved by the modern discoveries of the conservation of force and the equivalence of heat and force. The enormous volumes of heat sent off by the sun can be supplied only by a continuous expenditure of force, and any theory which accounts for the solar light and heat must show whence that force comes. We know that our sun has been radiating light and heat in quantities as great as at present for thousands, or even millions, of years, while the sun of Herschel would cool off very quickly, and then cease to give either light or heat. In one respect, however, the theory in question is now universally agreed to: the "photosphere"—that is, the shining surface of the solar sphere—is composed of cloud-like matter, apparently floating in some kind of fluid, the whole being at an extremely high temperature. The spots are known to be dark depressions in the photosphere, as to the cause of which investigators are not yet agreed. Of the interior of this enormous globe we can see nothing, but there is good reason for holding that it is mostly formed of materials similar to those which compose the crust of the earth, heated to so high a temperature as to be completely vaporized and reduced to a state of *dissociation*, or one in which chemical union of different elements is no longer possible. At the same time, the pressure to which this vaporous interior is subjected by the weight of its outer layers is so great that it is compressed into the smallest possible space, so that the mean density of the sun is not much less than that of water.

On the outside, this mass is continually cooling off by radiation, and hence condensing to the solid or liquid state. The matter thus condensed forms the photosphere, which seems to be in a state of continual change.

Immediately above the photosphere lies a comparatively shallow, but extremely complex, incandescent atmosphere, the absorption of which causes the dark lines in the solar spectrum. This atmosphere consists of hydrogen gas, mixed with the vapors of many of the metals, especially magnesium, calcium, sodium, and iron; the metallic vapors, except that of magnesium, mostly lying so near the base that they are not visible, even with a spectroscope, except just at the beginning and end of a total eclipse. This atmosphere shines with a red light, and was frequently seen during total eclipses of the sun, but its existence and nature were first clearly brought to light by Mr. J. N. Lockyer's spectroscope. This gentleman termed it the chromosphere. It is agitated by storms of fire, the fury of which exceeds anything ever pictured by the wildest imagination of the poet, the velocity of the wind sometimes rising to 100 miles per second, and masses of fiery vapor many times the size of our earth shooting up to the height of 20,000, 50,000, or even 80,000, miles. These masses constitute the red "protuberances" always visible during total eclipses of the sun, the nature of which was a complete mystery until the spectroscope was turned upon them by Janssen in India during the great eclipse of 1868. They are now the subjects of daily observation by spectroscopists.

Outside the chromosphere lies an appendage the nature of which is still involved in mystery, as it can be studied only during the rare moments afforded by total eclipses of the sun. It is seen in the glow of light which then surrounds the whole sun, extending to a height greater than the semi-diameter of that body, and is known as the solar corona. Its spectrum consists principally of a single green line, not identified with that of any terrestrial substance, but Janssen also recognized some of the lines of hydrogen during the eclipse of Dec., 1871. (See Spectrum Analysis.)

One of the most difficult questions respecting the sun is, Whence come the floods of heat which he is continually radiating into space? Why did he not cool off hundreds of thousands of years ago? Why does he not now grow cooler from year to year? Only in recent years have serious attempts been made to answer these questions, because only then was it recognized that heat was a form of force which could not be expended without being continually renewed. The theory now most generally received is that of *contraction*. It is supposed that as the sun cools off he contracts in volume; and it is found, by calculation, that a very small contraction will develop an enormous amount of heat in a mass so immense as that of the sun, so long as it does not condense to the solid or liquid state. Thus, the supply of heat may be kept up for a million of years to come, but it must give out some time, unless renewed from some unseen source, and our system will then be involved in darkness and death.

By the motion of the spots it is found that the sun rotates on his axis in about twenty-five days, this being the period at the equator. But as we approach the poles the rate becomes slower and the period longer, approaching twenty-six days at a distance of 45°. Beyond this point very few spots are to be seen, and the law of rotation is not completely known. The liquid or gaseous character of the sun's surface is conclusively proved by the variation in the rate of rotation.

The sun is accompanied by a retinue of eight major planets, of which our earth is one, and by a large group of minor planets. The major planets may themselves be divided into two groups of four each, the four inner and smaller ones being Mercury, Venus, the Earth, and Mars, and the four outer and larger ones being Jupiter, Saturn, Uranus, and Neptune. The smallest of the outer group (Uranus) has more than ten times the mass of the largest of the inner group (the Earth), and is more than fifty times its size. Between the two groups is a wide gap in which the minor planets are found. The principal numerical elements of each planet are given in a table appended to the present article; the principal of the remaining peculiarities are given in the following condensed description:

Mercury, the nearest to the sun, and the smallest of the major planets, shines with a light exceeding that of any of the fixed stars, with the possible exception of Sirius. Owing to its proximity to the sun, it can be seen by the naked eye only when near its greatest elongation, which occurs about once in four months on each side of the sun. The same circumstance, together with its intense brilliancy, has prevented the certain discovery of any peculiarities of physical constitution. This planet is quite often seen to pass between us and the sun, the transits usually occurring at intervals of three, seven, ten, or thirteen years. From a careful discussion of all the transits hitherto observed, Leverrier concluded that the motion of its perihelion is 36″ per century greater than the motion calculated from the attraction of all the known planets, and was hence led to the hypothesis that a group of small planets circulated between Mercury and the sun. But the most careful search by the best observers has uniformly failed to show any trace of such bodies, and there are strong reasons for disbelieving in their existence. No satisfactory explanation of Leverrier's result has ever been given.

Venus, the second planet from the sun, is at times, next to the sun and moon, the most brilliant object in the heavens. When east of the sun it is seen in the west, after sunset, as the evening star, and when west of him it rises before him as the morning star. It gives strong evidence of being surrounded by an atmosphere more dense than that of the earth. Several astronomers have announced the existence of mountains twenty miles high on this planet, but the evidence is too weak to be relied on. Twice in every 120 years Venus passes between us and the sun. (For an account of this very rare phenomenon, see PARALLAX, SOLAR.)

The Earth is the first planet accompanied by a moon. Its equator is inclined to the ecliptic, or the plane in which it moves round the sun, at an angle which in 1850 amounted to 23° 27′ 31″, and which is now diminishing at the rate of about 47″ per century, to increase again in the course of ages, as it fluctuates between comparatively narrow limits. The earth's axis at the same time changes its direction very slowly in the heavens, describing a complete circle around the pole of the ecliptic in about 26,000 years, the time varying somewhat in consequence of the motion of the ecliptic itself. The change of seasons is due to the inclination of these two planes, the earth's northern hemisphere being turned towards the sun from Mar. 21 till Sept. 21, and its southern hemisphere being so turned during the remainder of the year. About these two dates the plane of the earth's equator passes through the sun, and day and night are consequently equal all over the globe, whence the term *equinox*. The civil year has always been measured by the interval between the returns of the earth to the same equinox, because this return brings round the change of the seasons. (See CALENDAR.)

The Moon, being the nearest of the heavenly bodies, is that one with the physical peculiarities of which we are best acquainted. She has the appearance of a perfectly arid desert, on which the most careful scrutiny has failed to reveal a trace of air, water, or life. Her surface is broken up by great inequalities, but they are entirely different in character from those on the surface of the earth. Instead of undulating hill and valley, with chains of mountains, we find saucer-shaped depressions, generally of considerable regularity, with flat bottoms, and mounds or hillocks, great and small, scattered over nearly the entire surface. Large regions are comparatively smooth, and, from their dark color, were supposed by the first users of the telescope to be seas. Several maps of her visible hemisphere have been prepared, on which many of the features are named after the great astronomers or philosophers of ancient and modern times. The moon's revolution on her axis coincides exactly with her mean motion around the earth, and consequently she always presents the same face to us. Her farther hemisphere is for ever hid from view, but there is not the slightest reason to believe that it differs in any respect from the one we see. The size of the moon is such that her dark shadow, cast by the sun, is about 240,000 miles in length, narrowing down to a point at this distance. Whenever the earth is in the line of this shadow we have an eclipse of the sun. (See ECLIPSE and ACCELERATION.)

Mars, the fourth planet from the sun, and the last of the inner group, has always been scrutinized by astronomers with the greatest interest, owing to the variegated character of its surface, and its seeming resemblance to the earth. The whole disk is clearly divided into light and dark portions, which have been supposed to be seas and continents. The supposed seas present a dull greenish hue, while the continents are reddish and give rise to the characteristic color of the planet. Near each pole a brilliant white patch is seen, which is attributed to arctic snows and ice. The conclusion that the markings are due to land, water, snow, and ice are to be received with caution.

Outside of Mars we have the group of minor planets, or asteroids, of which 133 are now known, and of which from five to ten have been discovered annually for some years past. The total number probably amounts to several hundred. As a general rule, their orbits are much more eccentric and much more inclined to the ecliptic than those of the major planets. Nothing is known of their physical constitution, their small size preventing any peculiarities of form or structure from being seen. Their diameters are supposed to range from thirty or forty miles to 300 or 400. These estimates are founded not on measurement, but on the apparent brilliancy of the bodies, and are therefore very uncertain. Most readers are acquainted with the celebrated hypothesis of Olbers, that these bodies are the fragments of a planet which was shattered by some unknown force. Recent researches have rendered this hypothesis very improbable, and it has almost ceased to be a subject of discussion among astronomers.

Jupiter, the next planet in order, is the largest of the system, so that, notwithstanding its great distance, it is brighter than any other star or planet except Venus. Its appearance through the telescope is quite peculiar, a dark band or belt being always visible on each side of its equator, and sometimes another near each pole. When closely scrutinized these belts are found to be of irregular shape and ragged, cloud-like formation. They are subject to occasional changes in color and appearance, and within a year or two have been of a rosy hue, which never seems to have been seen before. It is doubtful whether the solid body of Jupiter is visible at all; in fact, it is not certain that it has any solid body. It has been supposed that the belts are clouds floating in the Jovian atmosphere, but all such analogies between the surfaces of the planets and that of our own globe are little better than pure speculation. Jupiter is accompanied by four satellites, which were discovered by Galileo when he first pointed his telescope at the planet. They are about as bright as the smallest stars visible to the naked eye, and could therefore be seen without a telescope if they were not overpowered by the brilliancy of the planet. Indeed, it is claimed that they actually have been seen by unusually good eyes; and some of these claims are too strongly supported to be lightly set aside. Most of the satellites pass through the shadow of the planet, and suffer a consequent eclipse in every revolution. These eclipses, being visible at the same time all over the globe, furnish one of the easiest methods of roughly determining the longitude, but very little accuracy can be thus attained. By these eclipses the progressive motion of light was first determined by Roemer. (See ABERRATION.)

Saturn, the sixth planet from the sun, with his rings and satellites, is perhaps the most striking telescopic object in the heavens. He has belts like Jupiter, but much fainter. His rings are very broad and thin, their edges being turned towards the planet. Nothing like these rings has been seen anywhere else in our system, nor even in the heavens, and the question, What keeps them from falling upon the planet? is one which has occupied several generations of mathematicians and astronomers, without being definitely solved. The corpuscular or cloud theory is that now most generally admitted. This theory is that the rings are not solid or liquid masses at all, but only a vast swarm—or rather two or three vast swarms—of very minute satellites, too small to be seen separately, but so numerous that they present the appearance of a continuous body. Just within the inner bright ring is a faint dusky ring, first discovered by Bond at Cambridge, which this theory explains very easily by supposing the swarm of satellites to be here so thin that they are scarcely visible, and permit light to pass freely between them. Saturn is accompanied by eight satellites, twice as many as are known to surround any other planet, but none of them present any characters of especial interest.

Uranus was discovered by Sir William Herschel in 1781. It had frequently been observed before that time, but was not known to be a planet. It is accompanied by four satellites, two of which were discovered by Herschel.

Neptune was discovered in 1846 by one of the most remarkable achievements in the history of astronomy, its position in the heavens having been calculated by Leverrier and Adams before its existence was known. (See Neptune, Discovery of.) It is attended by one satellite. Both Uranus and Neptune are too far off both from the earth and the sun to admit of any peculiarities being seen upon their disks, but the spectroscope shows them both to be surrounded by atmospheres of great density and remarkable constitution, in which carbonic acid is perhaps the principal ingredient.

Besides the planets which we have described, quite a number of comets are known to be members of the solar system, and a great number of others are suspected to be such, even though their time of revolution is so great that they have never been recorded as seen but once. The general rule is that a comet comes into view suddenly and unexpectedly, falling nearly towards the sun as if dropped from an infinite distance. It whirls around the sun in a parabolic orbit, and flies off into space nearly in the direction from which it came. If astronomers have an opportunity of observing it carefully for several months, they can tell whether it is or is not flying so fast that the attraction of the sun will never bring it back again. It is thus definitely ascertained that the great comet of 1858 will return, in consequence of the sun's attraction, in about 1950 years, probably between the years 3800 and 3820, after flying off into space to the distance of fifteen thousand million miles.

The physical constitution of comets is still one of the enigmas of astronomy. Large comets are generally found to consist of three distinct formations: (1) a small bright, but ill-defined nucleus; (2) a round mass of hazy, nebulous, or foggy matter surrounding this nucleus, and indeed seeming to rise from it; and (3) a tail of extremely rare matter, but of enormous length, extending off from the comet in a direction opposed to the sun, growing wider and fainter as it extends, until it gradually becomes invisible. But the smaller telescopic comets often exhibit neither nucleus nor tail, but consist only of an irregular, ill-defined, nebulous mass, perhaps brighter at one point. As the comet approaches the sun the tail develops enormously, and frequently shows itself when none was visible at a distance. It is now generally considered that the tail of a comet is not a permanent appendage, but a stream of finely divided matter continually driven off from the comet into space by some repulsive force residing in the sun, the nature of which is not yet understood. It may be compared to the steam rising from a boiling pot, or to smoke from a chimney. If this view be correct—and it can hardly be disputed—all the comets are continually evaporating into space, and must in time be entirely dissipated.

This theory of the constant dissipation of comets has recently received a striking confirmation in the ascertained coincidence of meteor-streams with the orbits of comets, and in the disappearance of Biela's comet from the heavens. It has long been known that we have either a meteoric shower or an unusual number of meteors every year on the nights of Aug. 9 and Nov. 14, and they are now found to be produced by the earth's atmosphere meeting a swarm of very minute particles which move in the respective orbits of two comets. The particles are supposed to be the fragments or dust of the comets which have become separated in the course of ages. (See Meteors.)

The foregoing is the briefest possible description of the material universe as revealed by the telescope, and may be considered as an epitome of descriptive astronomy. Of *practical astronomy* we can say no more than that it teaches the construction and use of such instruments as the telescope, the transit instrument, the meridian circle, and the zenith telescope, and the calculation of the observations made with them. The usefulness of practical astronomy, and the perfection it has attained, may be judged from this consideration: take an astronomer blindfolded to any part of the globe, give him the instruments we have mentioned, a chronometer regulated to Greenwich or Washington time, and the necessary tables, and if the weather be clear, so that he can see the stars, he can in the course of twenty-four hours tell where he is in latitude and longitude within a hundred yards.

For *theoretical astronomy*, though scientifically the most important branch of the subject, we can do no more than give the reader a general idea of what it has been and is. This science has existed in a rude state from the earliest ages of which we have any written record; indeed, astronomy has very properly been called the most ancient of the sciences. Its progress may be conveniently divided into three eras.

The first era is that of the ancient system, in which the earth was considered as the centre of the universe, and all the heavenly bodies were believed to revolve about it in the course of twenty-four hours. Far from the truth as this system was, the ancients discovered the rotundity of the earth, and the difference of local time or of the hour of the day between places of different longitudes, knew the causes and laws of eclipses, and constructed tables which gave the motions of the sun, moon, and planets with considerable accuracy. The annual motion of the earth round the sun produces an *apparent* annual revolution of the sun among the stars, and this apparent revolution was perfectly understood in the earliest historical times. The annual course of the sun was mapped out on the heavens, and divided into twelve signs, known as "signs of the zodiac." The year was known to consist of 365¼ days, and the connection of the seasons with the position of the sun in the zodiac was fully understood and described. The great body of ancient knowledge on these subjects has been preserved in the "Almagest" of Ptolemy, a work which remained an authority in astronomy for nearly 1600 years.

The second era was that of Copernicus and Kepler, in which the sun was assigned to its true place as the centre of the solar system; the earth was classified as one of the planets moving around it; and all the orbits of these bodies were found to be ellipses having the sun in one focus. A comparatively simple geometrical system was thus introduced, which did away with the complicated epicycles of Ptolemy, and at the same time represented the apparent motions with much more accuracy. Indeed, if the orbits had really been perfect ellipses, hardly any further advance in accuracy would have been made possible, even by the discovery of gravitation.

The third era is that of gravitation, in which all the heavenly bodies are considered as flying through space with perfect freedom, but each gravitating towards all the others. The sun, being 700 times as heavy as all the planets, keeps them moving in orbits around him by his own gravitation, while the motion of each planet is affected with small irregularities caused by the attraction of all the others. By this theory the courses of all the planets, and of the moon and many of the satellites, are predicted with an astonishing degree of accuracy. The first thing which gravitation settles is the motion of the earth itself on its axis. The daily revolution around its axis seems to take place with perfect regularity, but the axis itself is subject to several very slow motions, which make its direction decidedly different in the course of ages. These motions cannot well be described without a globe, but as the whole earth and the instruments with which observations are made partake of them, they change all observed positions of the heavenly bodies, and these changes must be carefully allowed for in all calculations.

The Copernican system and the theory of gravitation have reduced theoretical astronomy almost to branches of pure mathematics—mechanics, geometry, and trigonometry. The system is quite simple in its original conceptions, but very complex when we descend to minute details. A number of imaginary planes are conceived of as passing through the earth or sun, and extending out into infinity in every direction. The positions of the heavenly bodies are defined by their distances from these planes, and the angles which the line drawn from the sun or the earth to the body makes with different lines drawn in the planes. The most common mode of defining position is by giving three data: (1) the distance of the heavenly body from some point, either the centre of the earth or the centre of the sun, in a straight line; (2) the angle which this straight line makes with one of the planes in question; (3) a perpendicular being dropped from the body on the plane, the angle which the line to the point of intersection makes with some fixed line in the plane. When the distances are reckoned from the earth, it is usual to take the plane of the equator as that of reference; when from the sun, the ecliptic is usually selected. Both these planes are constantly changing their position in consequence of the attraction of the moon and planets on the earth, and this change has always to be calculated and allowed for. This operation makes the subject a very intricate one, which can be fully developed only in works devoted especially to the subject.

The following table gives the numerical details of the different elements pertaining to each major planet of the solar system. We shall explain such of the columns and numbers as need explanation. The "apparent semi-diameter" is half the angle which the diameter of the planet subtends when seen from some usual or mean distance from the earth. In the case of the four inner planets this distance is that of the earth from the sun, while in the case of the four outer ones it is the mean distance of the planet itself from the sun. The actual distance of many of the planets from us varying very much at different times, their apparent magnitudes vary in a corresponding manner.

The "mass" of the planet signifies not its size, but its weight compared with the weight of the sun. The masses of Mercury and Mars are still uncertain; the former by perhaps a fourth, or even a third, of its entire amount, and the latter by a tenth.

Dividing the mass of the planet by its solid contents, we have its specific gravity or "density," which we give as compared with the density of the earth. The column of densities shows a remarkable difference between the materials of the inner and those of the outer planets, the lightest of the former (Mars) being nearly three times as heavy, in proportion to its size, as the heaviest of the latter. In fact, a piece of the planet Saturn would float in water, which is hardly true of a single solid constituent of our globe.

Among the "diurnal revolutions" of the planets on their axis we give those of Venus and Mercury, as some astronomers have thought they observed them, but that of Mercury is entitled to no reliance at all, and that of Venus to very little.

The "mean distance" of the earth from the sun is the astronomical unit or measuring-rod, with which all distances in the universe farther than the moon are ordinarily measured. We give the mean distances of the several planets, first in terms of this unit, which are very exact, and then in miles, which are still somewhat uncertain, because the distance of the sun from the earth in miles is not yet known with entire certainty. The most complete determination of this element yet made gives a distance of 92,380,000 miles, and this is probably within 300,000 miles of the truth; but all we can say with reasonable certainty is, that the distance is between 92,000,000 and 93,000,000. Calling the uncertainty half a million for the earth, it will be proportional to their distance in the case of the other planets, and therefore nearly 5,000,000 in the case of Saturn, and 15,000,000 in the case of Neptune.

The "periodic time," or time of making one revolution around the sun, is given in days for the inner group, and in Julian years—that is, years of 365¼ days each—for the outer group.

TABLE OF THE PLANETARY ELEMENTS FOR 1850.

Planet.	Apparent Semi-Dia.	Diameter in miles.	Mass (⊙ = 1).	Density (earth = 1).	Diurnal Revolution.	Mean distance from ⊙		Periodictime (days).	Eccentricity	Long. of Perihe'n.	Inclination of Orbit.	Long. of Node.
					h. m. s.	In astron. units.	In mills. of miles.			° ′ ″	° ′ ″	° ′ ″
Mercury...	3″.30	2,955	$\frac{1}{5000000}$	1.25	24 5 0	0.387099	35¾	87.96926	0.2056048	75 7 14	7 0 7.7	46 33 9
Venus......	8″.50	7,610	$\frac{1}{420000}$	0.875	23 21 24	0.723332	67	224.700787	0.0068433	129 27 14	3 23 34.8	75 19 52
The Earth	8″.83	7,912	$\frac{1}{326800}$	1.000	23 56 41	1.000000	92½	365.256358	0.0167711	280 21 22	0 0 0.0	
Mars........	4″.70	4,210	$\frac{1}{3000000}$	0.723	24 37.22.6	1.523691	141	686.979714	0.0932611	333 17 54	1 51 2.3	48 23 53
								(Years.)				
Jupiter....	18″.30	85,300	$\frac{1}{1048}$	0.249	9 55 21	5.20280	480	11.86197	0.0482273	11 54 51	1 18 41.1	98 56 10
Saturn......	8″.20	70,080	$\frac{1}{3502}$	0.134	10 16	9.53890	881	29.45694	0.0560660	90 6 26	2 29 39.2	112 20 0
Uranus....	1″.80	30,900	$\frac{1}{22000}$	0.249	Unknown	19.18338	1772	84.0205	0.0463592	170 38 49	0 46 20.9	73 14 38
Neptune...	1″.30	34,000	$\frac{1}{19700}$	0.209	Unknown	30.05682	2770	164.782	0.0084962	43 17 30	1 47 2.0	130 7 33

S. NEWCOMB, *U. S. Nautical Almanac Office.*

Astruc (JEAN), an eminent French medical writer, born at Sauve, in Languedoc, Mar. 19, 1684. He was appointed professor of anatomy at Toulouse in 1710, and of medicine at Montpellier in 1716. Having removed to Paris in 1728, he became consulting physician to the king, and in 1731 professor of medicine at the Royal College. He had a high reputation as a professor. He published, besides other works, "De Morbis Venereis" ("On Venereal Diseases," 1736). Died May 5, 1766. (See LORRY, "Vie d'Astruc.")

Astu'ria, a former kingdom in the N. of Spain, bounded on the N. by the Bay of Biscay, and on the S. by the Cantabrian Mountains. The Asturians made a long and brave resistance to the Goths and Vandals who invaded Spain about 500 A. D., but were finally subdued. Asturia was the only part of Spain that was not conquered by the Moors. (See ASTURIAS.)

Astu'rias, an ancient division of Spain, now the province of Oviedo, has an area of 4094 square miles. It is bounded on the N. by the Bay of Biscay, on the E. by Santander, on the S. by Leon, and on the W. by Galicia. The surface is mountainous, and abounds in wild and picturesque scenery. Along the southern border extends a chain of mountains, the summit of which, called Peña de Peñaranda, is about 11,000 feet high. It has extensive forests of oak, chestnut, beech, and fir. Among the mineral resources are copper, iron, lead, cobalt, antimony, marble, coal, and zinc. The eldest sons of the kings of Spain formerly took the title of prince of Asturias. The chief town is Oviedo. Pop. in 1877, 576,352. (See ASTURIA.)

Asty'ages [Gr. Ἀστυάγης], king of Media, was a son of Cyaxares I., and reigned from 593 to 569 B. C. He had a daughter, Mandane, who was married to Cambyses, a noble Persian, and bore a son who was Cyrus the Great. He was succeeded by Cyaxares II., the last king of Media (569–536 B. C.).

Asy'lum [Gr. ἄσυλον, from α, neg., and συλάω, to "rob," to "carry off," because, originally, it was a place of refuge against violent and lawless men], a sanctuary and place of refuge and security for criminals and others; any place of retreat and security. In ancient Greece the temples, altars, and sacred places were appointed as asylums for criminals and persecuted persons, and it was considered a sacrilege to kill or remove by force those who had taken refuge in them. They were, however, sometimes surrounded and watched until they died of starvation. Among the ancient Jews cities of refuge were appointed for the benefit of persons who had accidentally committed manslaughter. Romulus is said to have attracted men from other states to Rome by offering an asylum to criminals, debtors, or outlaws. Asylums became so numerous under the Roman empire that they were considered nuisances by honest people, and were nearly all abolished by Tiberius. In the reign of Constantine the Great all Christian churches were asylums. The privilege was afterwards extended to convents, and was much abused by criminals in the Middle Ages. Several popes, in order to prevent this abuse, excluded murderers and some other classes of offenders from the privilege of sanctuary, which was abolished in England by acts passed in 1534 and 1697. In modern usage, the term asylum is applied to charitable institutions for the relief of the blind, insane, orphans, etc.

Atacama, a province of Chili, is bounded on the N. by the province of Tarapaca, on the E. by the Argentine Republic and Bolivia, on the S. by the province of Coquimbo, and on the W. by the Pacific Ocean. Area, 111,301 square miles, including former province of Atacama, Bolivia. The country is for the most part mountainous and sterile, and produces only along the banks of a few rivers some vegetables and a few fruits. It contains, however, rich copper-mines. The climate is dry and warm; most of the springs contain salt water. Capital, Copiapo. Pop. in 1880, 85,161, including former province of Atacama, Bolivia.

Atac'amite, an ore of copper, abundant in the desert of Atacama (whence its name), and occurring also as a crust on the lavas of Vesuvius and Etna. It may be defined as a hydrated oxychloride of copper, or a combination of protoxide of copper with chloride of copper. It is a rich ore, containing 55 or 60 per cent. of copper. The natural varieties of atacamite are crystallized, massive, and pulverulent or granular. The primary form of its crystals is a rhombic prism. The greenish incrustation which is formed on antique bronze weapons, utensils, etc., and which is called *ærugo nobilis*, is composed of this salt.

Atahuall'pa, or **Ataba'lipa,** the last inca of Peru, was a son of Huayna Capac, who died in 1529. By his will he divided his dominions between his two sons, Huascar and Atahuallpa, who obtained the kingdom of Quito. These brothers reigned in peace about five years, after which Huascar sent an envoy to Atahuallpa, and required him to render homage for the kingdom of Quito. That inca, who was ambitious and warlike, refused to pay homage, and, having invaded Peru with an army, defeated Huascar and took him prisoner in 1532. He spared the life of Huascar, but deprived him of his throne and liberty. In the same year Peru was invaded by Pizarro and a small army of Spaniards. The inca, with an unarmed retinue, approached the camp of Pizarro, in Nov., 1532, for a friendly interview, during which a Spanish priest informed the inca that the pope had given Peru to the king of Spain. As he rejected with indignation the authority of the pope, the treacherous Spaniards seized him and massacred his attendants. The captive inca offered to ransom himself by a quantity of gold which would fill the room in which he was confined as high as he could reach. The Spaniards accepted the gold, but refused him liberty. Pizarro accused Atahuallpa of plotting against him, and ordered him to be tried by a court-martial, which condemned him to be burned alive. After he had consented to be baptized his sentence was commuted to strangulation, and he was executed Aug. 29, 1533. (See Prescott, "Conquest of Peru," vol. i.)

Atalan'ta [Gr. Ἀταλάντη], a mythical personage, was, according to ancient Greek legends, the most swift-footed of mortals, and was renowned for martial courage. She took part in the Argonautic expedition and the Calydonian hunt. Having many suitors, she offered to marry any man who should defeat her in a foot-race, with the condition that if he lost he must be put to death. Milanion, who had received from Venus three golden apples, became the successful competitor by dropping them one by one before Atalanta, who could not resist the temptation to stop and pick them up.

At'aulf, Adaulf, or **Adolf** [Lat. *Ataul'phus*], king of the Visigoths, and a brother-in-law of Alaric I., whom he succeeded in 411 A. D. He had aided Alaric in the capture of Rome in 410, and had captured Placidia, a sister of the emperor Honorius, whom he married. In 412 he retired from Italy into Gaul, where he defeated Jovinus, took Bordeaux (*Burdigala*), and conquered Aquitania. He was assassinated by one of his own officers in 415 A. D.

At'avism [from the Lat. *at'avus*, a "great-grandfather" or "ancestor"] is a word of recent introduction, with two modifications of meaning: 1. In natural history atavism is the reappearance in animals or plants of traits belonging to their remote progenitors which their immediate parents did not present. *Reversion* is a term nearly synonymous, used (by Darwin and others) to indicate not only the occasional or individual appearance of such remotely-descended traits, but the actual returning to them of a variety or species. Domesticated breeds of animals allowed to run wild become, after a time, nearly (seldom exactly) like their wild ancestors. This is a familiar fact with horses, cattle, hogs, and pigeons. The wild horses on the great North American prairies and on the pampas of South America, though all derived from those imported to the Western continent by Europeans, are nearly of one size, shape, and color; and the same is true of the wild herds of cattle of the South American pampas and llanos. Domestic hogs running wild assume, in a few generations, a moderate size, slender figure, and (in some places at least) a nearly black color, with head and tusks approaching those of the wild boar of Europe. Darwin mentions the fact that in all the breeds of domestic pigeons there appear occasionally birds of a slaty-blue color, with bars and other marks characteristic of the ancestral rock-pigeon (*Columba livia*). He also considers the occasional appearance of stripes upon a horse or mule as indicating ancestral identity between the now distinct species of the equine genus. This opinion may be accepted as probable by some of those who are not ready to adopt the whole Darwinian theory. 2. In human pathology atavism is a reversion (similar to the above) to morbid traits existing in ancestors, but not in immediate parents. This may be briefly illustrated by an example (from "Lectures on Practice of Medicine," by Sir T. Watson): A deaf-mute man married a woman whose hearing was perfect, and had two children by her—one a deaf-mute son, who died childless; the other, a *hearing* daughter, who married a *hearing* man, and gave birth to two *deaf-mute* daughters and a *hearing* son. This son married a woman also with good hearing, and had by her a deaf-mute son. One of the daughters married a deaf-mute, and bore a hearing son. Gout, consumption, insanity, and other diseases sometimes thus disappear for one, two, or more generations in a family, and yet return in a manner evidently due to hereditary (though interrupted or latent) transmission.

Atba'ra (*Astab'oras*), a river of North-eastern Africa, rises in Abyssinia, near Lake Dembea (or Tsana), and flows north-westward. After receiving several tributaries from the mountains, it traverses the desert of Southern Nubia, and enters the Nile in lat. 17° 37′ N., and about 25 miles S. of Berber. It is the last tributary that the Nile receives, and is one of the principal causes of the inundation of Egypt. Its length is estimated at 550 miles. In the dry season, October to June, it contains no water except standing pools. Crocodiles and hippopotami abound in this river, on the borders of which are great numbers of elephants, rhinoceroses, giraffes, lions, etc.

Atchafalay'a Bay'ou, in Louisiana, is an outlet of Red River, from whence it issues near the mouth of the latter at the N. extremity of Point Coupée parish. It flows nearly southward through Chetimaches Lake, and enters Atchafalaya Bay, a part of the Gulf of Mexico. The whole length is estimated at 225 miles. It is navigable for steamers. At the entrance to the bay is South-west Reef, with an iron lighthouse 50 feet high.

Atchison, city and important R. R. centre, capital of Atchison co., Kan. (see map of Kansas, ref. 4–J, for location of county), is beautifully situated on the W. bank of the Missouri River, at the extreme western point of the "Great Bend." It is one of the principal commercial cities in the State and has fine public-school buildings, one of which cost $50,000, academies, and St. Benedict's College. Pop. in 1870, 7054; in 1880, 15,105; in 1885, 15,599.

Atchison (David R.), an American politician, born in Fayette co., Ky., Aug. 11, 1807, emigrated to Missouri in 1830. He was elected a Senator of the U. S. in 1843 by the Democrats, and was re-elected for a term of six years ending Mar., 1855. He advocated the repeal of the Missouri Compromise, and was a leader of the Democratic party of Missouri in its conflicts with the Free-State party of Kansas.

A'te [Gr. Ἄτη], a goddess in classic mythology, supposed to avenge crimes, and also to stir up mischief. According to Homer, she was a daughter of Jupiter, who, for her mischief-making character, banished her from Olympus.

At'eles [from the Gr. ἀτελής, "imperfect"], a genus of South American monkeys, characterized by the absence of a rudimentary condition of the thumb of the anterior hands. They have long, prehensile tails. The genus comprises the marimonda (*Ateles Beelzebub*), which is very numerous on the Orinoco, besides a dozen other species.

Ates'sa, an Italian town in the province of Abruzzo Citeriore, 14 miles W. of Vasto d'Ammone. It has a fine church and numerous convents, a hospital, and three *monti de pietà*. Pop. 10,729.

Ath, or **Aath,** a fortified town of Belgium, province of Hainaut, on the river Dender, and on the railway from Brussels to Lille, 20 miles by rail E. by S. of Tournay. It has an arsenal, a college, a town-hall, an orphan asylum, and a remarkable church; also manufactories of calico, lace, gloves, cutlery, etc. Pop. 8260.

Athabasc'a, or **Athapes'co,** a river and lake of the N. W. provinces of British North America. The lake is about lat. 59° N., and between lon. 106° and 112° W. It extends E. and W. about 230 miles, and has an average width of 20 miles. The river rises in the Rocky Mountains, flows north-eastward, and enters the lake near its western extremity. The water of this lake is discharged through Slave River, eventually into the Mackenzie River.

Athali'ah, a queen of Judah, was a daughter of Ahab, king of Israel, and Jezebel. She was married to Jehoram, king of Judah, whom she survived, and became a notorious idolater. After the death of her son Ahaziah, about 884 B. C., she usurped the royal power and murdered all the males of the royal family except Joash. In 878 B. C. she was killed by the partisans of Joash. Her story is the subject of one of Racine's most celebrated tragedies. (See 2 Kings viii. and xi.)

Athana'sian Creed [Lat. *Sym'bolum Athanasia'num*], so called because it was supposed to have been written by Athanasius (died 373). But this is a mistake. It did not appear in Greek till the eleventh or twelfth century, and was then evidently a translation. In the West it was commented upon by Venantius Fortunatus in 570. And it contains extracts from Augustine's "Trinity" (415 A. D.), and from the "Commonitorium" of Vincentius Lirinensis (434 A. D.); so that it was probably written not far from 450 A. D., and apparently in Gaul.

The Athanasian Creed is the sharpest and most rigid of the three catholic symbols. It sometimes takes as its title the words *Quicunque vult*, with which in its Latin version it commences. The entire passage of which those words are a part is in English as follows: "Whosoever will be saved, before all things it is necessary that he hold the catholic faith; which faith except every one do keep whole and undefiled, without doubt he shall perish everlastingly." Then follows a minute and precise exposition of the Trinity, and an equally exact statement of the doctrine of the incarnation; after which this clause occurs: "This is the catholic faith; which except a man believe faithfully he cannot be saved." The common inference would be that unless a man held the doctrine precisely as it is taught in the creed he cannot be saved. On account of these "damnatory clauses," as they are sometimes called, many Christians, while substantially accepting the doctrines of the creed, disapprove of its being used in the churches. Though still retained in the church-service in England, it is omitted from the Book of Common Prayer used by the Episcopal churches in the U. S. Revised by R. D. Hitchcock.

Athana'sius [Gr. Ἀθανάσιος], Saint, a celebrated Greek Father of the Church, was born at Alexandria about 296 A. D. His education was directed by Alexander, archbishop of Alexandria. After he had been ordained as a deacon he was appointed a member of the general Council of Nice (325), in which he distinguished himself by his eloquence, learning, and zeal against Arianism. In 328 A. D. he was elected archbishop of Alexandria by the clergy and the people. He refused to comply with the will of the emperor Constantine the Great, by restoring to communion Arius, who had recanted or renounced some doctrines which the Council of Nice condemned. He was summoned to appear at the Council of Tyre, in 335 A. D., to answer several charges, and was there deposed. The emperor Constantine banished him to Treves, but the emperor Constantius, on the death of Constantine, restored him (338) to his see. In 339 about ninety Arian bishops assembled at the Council of Antioch, condemned Athanasius, and, their decision being approved by the emperor, he was suspended, and retired to Rome. He recovered his office in 346. The Arians prevailed in the Council of Arles (353) and the Council of Milan, which, under the influence of the emperor Constantius, condemned Athanasius in 355 A. D. He was again driven out of Alexandria, and took refuge in the solitudes of Upper Egypt, where he passed six years, and wrote several doctrinal works. On the accession of Julian the Apostate (361 A. D.) he returned to Alexandria, but he was exiled in 362. In 367 he was restored by Jovian; in 367 he was once more exiled by the Arian emperor Valens, but after a few months (368) he was allowed to return, and now continued in peaceable possession of his office until his death, in 373 A. D. Athanasius was the most eminent and influential leader of the orthodox party (who were sometimes called Athanasians), and was distinguished for his fortitude under persecution, and other virtues which qualified him to be a pillar of the militant Church in stormy and perilous times. He left numerous polemical and religious works, written in Greek in a simple, nervous, and perspicuous style. Among them are a "Discourse on the Incarnation," "Five Books against Arius," "Epistles to Serapio," an "Oration against the Gentiles," and an "Apology for his own Flight." An edition of his works was published at Paris in 3 vols. folio, 1628. (See SOCRATES, "Historia Ecclesiastica;" SOZOMEN, "Historia Ecclesiastica;" MÖHLER, "Athanasius der Grosse," 1827; VOIGT, "Lehre des Athanasius," 1861.) REVISED BY A. J. SCHEM.

A'theism [Lat. *atheis'mus;* from the Gr. *a*, neg., and *θεός*, a "god"], the denial of the existence of God, or the doctrine that there is no God. Atheism may be either speculative or practical; the former consists in denying the existence of God; the latter in living as if there were no God. Speculative atheism is, strictly speaking, impossible, for the denial of the Divine existence necessarily affirms it. For if one deny God's being, his denial is worthless unless it rests upon some reason; but this reason must be absolute, or it can be no sufficient warrant for his denial, and this will only be to adduce absolute reason to declare that the Absolute Reason cannot be, which is the very absurdity of all absurdities. To suppose the existence of some nature of things whose chain of invincible necessity stretches above and around the Deity, is to suppose what, if it have any meaning, must itself be invested with the being and the attributes of the Godhead. Strictly speaking, the belief in a God would seem to imply a belief in his personality—that is, in his existence as a *conscious* being. But, according to its modern acceptation, atheism is understood to deny not merely the existence of a personal Deity, but also the presence in the universe (apart from *individual* intelligences) of any Principle of intelligence, beauty, or goodness. (See PANTHEISM.) Perhaps the most remarkable phase of systematic atheism is that which is set forth in the writings of Epicurus and his followers; for although that philosopher nominally acknowledged the existence of gods, he doubtless did so (as Cicero suggests) merely to avoid the popular odium which by a denial of their existence he was certain to incur. In his system of philosophy there is no all-pervading Intelligence, as in that of Anaxagoras—no principle of order, no law except the law of chance. All possible forms of existence had been tried in the fortuitous concourse of the primitive atoms, and those beings only which had at last attained, by repeated accidental trials, a certain regularity and completeness of parts, possessed any permanent existence. Among many of the ancient nations in very early times to deny the gods was much the same as to deny all religious and moral obligations; hence the name *atheos* (ἄθεος), or "atheist"—that is, "without God" or "denying the gods"—became a term of the greatest reproach; at length those who had political ends to serve came to use it, not very unfrequently, as a convenient method of exciting popular odium against an opponent; and it has been repeatedly applied to worthy and virtuous men, both in ancient and modern times.

REVISED BY J. H. SEELYE.

Ath'elard of Bath, an English natural philosopher of the twelfth century who travelled in the East and published numerous works, some original and some translated from the Arabic. A few of these works have been printed, and others exist in MS.

Ath'elstan, or **Æthelstan,** an able Anglo-Saxon king of England, born about 895 A. D., was the natural son of Edward the Elder, and a grandson of Alfred the Great. He began to reign in 925, and was the first actual sovereign of all England. On the death of Sigtric, king of Northumbria, Athelstan annexed that country. A league was formed against him by the Welsh, Scots, and Picts, whom he defeated in a great battle at Brunenburg, 937 A. D. He reigned over nearly all the island, except Scotland and Wales. He promoted learning and civilization, and was reputed one of the wisest of the Anglo-Saxon kings. He died without issue Oct. 27, 940, and was succeeded by his brother Edmund. (See FREEMAN, "Norman Conquest," vol. i.; HUME, "History of England.")

Athe'na [Gr. 'Αθήνη or 'Αθηνᾶ], sometimes called **Pallas Athena,** the goddess of wisdom, and one of the principal divinities of the Greek mythology. According to an ancient legend, she was the daughter of Jupiter, from whose head she issued in full armor. She was the favorite national divinity of the Athenians, whose capital was named in her honor. She presided over the sciences, inventions, arts of peace, laws, etc., and was supposed to have invented every kind of art or work proper to women. *Athena* corresponds to the Roman MINERVA (which see).

Athenæ'um [Gr. 'Αθήναιον], a general name for the temples of Athena; a temple at Athens, dedicated to Athena, in which poets and orators assembled to recite their works and to instruct the young. Also, a school which was founded at Rome on the Capitoline Hill by the emperor Hadrian, and long continued to be an important institution. In the reign of Theodosius II. it had ten professors of grammar, three of oratory, five of dialectics, one of philosophy, and two of jurisprudence. The name was given to it in honor of Athens, the great seat of ancient learning. In modern times the term is applied to literary institutions, public reading-rooms, etc.

Athenæ'us, an eminent Greek *littérateur* and antiquary, born at Naucratis, in Egypt, lived about 200 A. D. The events of his life are mostly unknown. He resided for some years at Rome, and appears to have been a great reader, and an epicure in his habits. He wrote, in the form of a dialogue, a very interesting work called Δειπνοσοφισταί ("The Banquet of the Learned"), which is extant. It is an account of an imaginary banquet given by a noble Roman to a number of eminent men, and contains a rich fund of anecdotes, criticisms, and extracts from the works of about seven hundred poets and historians, some of whose works are lost. Although it does not indicate much literary ability, it is considered extremely valuable as a *mélange* of literary, social, and domestic gossip. A good edition of this work was published by W. Dindorf, Leipsic, 3 vols., 1827. An English translation of it may be found in Bohn's "Classical Library," London, 1854. (See FABRICIUS, "Bibliotheca Græca;" "Edinburgh Review," vol. iii., 1803.)

Athenag'oras [Gr. 'Αθηναγόρας], a Greek philosopher and Christian writer, born at Athens, flourished about 170. Philip Sidetes (about 400 A. D.) makes him the first principal of the catechetical school at Alexandria (161–180 A. D.). He wrote an elaborate treatise on the "Resurrection," also an "Apology," addressed, some say, to Marcus Antoninus and Lucius Verus, about 166 A. D.; others, to Marcus Aurelius and his son Commodus, about 177 A. D. The best recent edition of his works is that by Otto, 1857.

Athe'nion [Gr. 'Αθηνίων], an eminent Greek encaustic painter, born at Maronea, in Thrace, was a pupil of Glaucion. He lived about 320 B. C., and died prematurely. Among his works was "Ulysses detecting Achilles disguised as a Female."

Ath'ens [Gr. 'Αθῆναι; Lat. *Athe'næ;* Turk. *Seti'nes*], an ancient and celebrated Hellenic city and republic, unrivalled in art and literature, immortal in the records of genius and glory. No state, ancient or modern, has produced in proportion to its extent and population so many authors, orators, artists, and statesmen of the first order, or has contributed so largely to the education and improvement of humanity. Athens is situated about 5 miles N. E. of the Saronic Gulf, in the plain of Attica, which is enclosed by mountains on every side except the south, and forms a grand natural amphitheatre; lat. 37° 56′ N., lon. 23° 38′ E. The plain is bounded on the N. W. by Mount Parnes, on the N. E. by Mount Pentelicus (now often called Mendeli), on the S. E. by Mount Hymettus, on the S. W. by the sea, and on the W. by Mount Ægaleos. About 1 mile N. E. of the city rose Mount Lycabettus, an isolated conical peak, which forms a prominent and beautiful feature in the landscape, and is now called the "Hill of Saint George." Within the city walls were four hills—namely, the Acropolis; the Areopagus, or Mars' Hill; the Pnyx, on which political assemblies were held; and the Museum. The Acropolis, or citadel, an isolated, rocky hill, rises abruptly nearly 300 feet above the plain, near the centre of the space enclosed by the walls of Themistocles. It has a flat top about 1100 feet long and 450 feet wide, inaccessible on all sides except the W., where the ascent is also steep. The city stands on a bed of hard limestone, partly covered by a thin, light, and rather sterile soil. It has a delightful climate, and an atmosphere of almost matchless purity and transparency. Mr. Stanley speaks of "the transparent clearness, the brilliant coloring of an Athenian sky; of the flood of fire with which the marble columns, the mountains, and the seas are all bathed and penetrated by the illumination of an Athenian sunset." The same traveller notices "the *violet* hue which Hymettus assumes in the evening sky, in contrast to the glowing furnace of the rock of Lycabettus and the rosy pyramid of Pentelicus." Hence, Athens has been called the "City of the Violet Crown." Among the physical features of the environs of Athens are two rivulets, the Cephissus and the Ilissus, both of which are nearly exhausted and waterless in summer. The walls of Athens in its most prosperous state enclosed not only the city proper (τὸ Ἄστυ), but also a long, narrow suburb extending to the harbor of Piræus, which was four and a half miles S. W. of the Acropolis, and was connected with it by two long walls, 550 feet apart. The Piræus was a rocky peninsula enclosing several good harbors, and defended by a citadel and fortress, called Munychia, built on a high rock. This was sometimes termed the Acropolis of the Piræus.

History.—According to an ancient legend, Athens was founded by Cecrops, and was originally called Cecropia. In the reign of Erechtheus the name was changed to *Athenæ*, in consequence of the prominence which was given to the worship of Athena (Minerva). Theseus, the national hero of Attica, is said to have united into one political body the twelve independent *demi* or communities into which Cecrops had divided Attica, and to have made Athens the capital of the new state. Homer in the "Iliad" mentions Athens and its temple of Athena. The last king of Athens was Codrus, who sacrificed himself for his country, in compliance with the advice of an oracle, about 1068 B. C. The state then became a republic or oligarchy, ruled by an archon or archons, the first of whom was Medon, a son of Codrus. An important event in the history of the Athenians was the institution of the Olympic Games (which see), celebrated once in four years at Olympia, in Elis. The first Olympiad began in 776 B. C., the era to which all subsequent events were referred by the ancient Greek historians. The term of office of the archons was reduced to one year about 684 B. C., before which date the archon ruled the state for ten years. (See Archon.) Among the powerful and conservative elements in the Athenian constitution was the council or court of the Areopagus (which see), the origin of which was very ancient. The great legislator and statesman who laid the stable foundations of the glory and prosperity of Athens was Solon, who became archon in 594 B. C., at a time when many of the poor were reduced to slavery and violent party dissensions tended to civil war. He reformed the constitution, abolished slavery for debt, improved the condition of the poor and the common people, and divided the population into four classes, according to their property. The fourth or lowest class were not eligible to office, but they were exempt from taxation, and could vote for archons and other officers. He also enlarged the jurisdiction and authority of the court of the Areopagus, which tended to counteract the excesses of the democratic element which he infused into the constitution. Pisistratus usurped the chief power in 560 B. C., ruled as a mild and liberal tyrant for many years, and left his power to his sons Hippias and Hipparchus. The first effort to embellish the city during the historical period appears to have been made by Pisistratus and his sons. They erected many temples and other public buildings, and commenced the temple of Jupiter Olympius, which was the largest temple in Greece, but it remained unfinished about seven hundred years. The state was liberated from the mild tyranny of the Pisistratidæ by Harmodius and Aristogi′ton, who killed Hipparchus in 514. Hippias was expelled in 510 B. C. Soon after Clisthenes made some liberal reforms in the constitution, which he rendered essentially democratic. He divided the people of Attica into ten tribes (which were subdivided into δῆμοι, townships or parishes), instead of the four ancient Ionic tribes (φυλαί). It is important to observe that the *demi* assigned to each tribe were in no case all adjacent to each other; and "the tribe as a whole," says Mr. Grote, "did not correspond with any continuous portion of the territory, nor could it have any peculiar local interest separate from the entire community." This arrangement was adopted as a precaution against factious movements arising out of local feuds. About 500 B. C. the Greek colonies of Ionia revolted against the king of Persia, and were aided by the Athenians. Provoked by this affront, Darius resolved to subjugate Greece, and to punish the Athenians in an especial manner, for which purpose he sent a large army in 490 B. C. Among the ten generals who commanded the Athenian army were three illustrious men—Aristides, Miltiades, and Themistocles. The armies met on the plain of Marathon, where Miltiades gained a decisive victory which was one of the most momentous events of universal history. The Spartans did not arrive in time to take part in this battle. The sagacious Themistocles, foreseeing that this was only the beginning and not the end of the war, persuaded the Athenians to build a large fleet. Having spent several years in diligent preparation for another invasion of Greece, Xerxes (called the Great) crossed the Hellespont with an immense army in 480 B. C. The Persians forced the pass of Thermopylæ, defended by a small band of Spartans, for whose epitaph Simonides wrote two famous lines which may be thus translated:

> "Go tell the Spartans, friendly passer-by,
> That we obeyed their orders, and here lie."

The Athenians in this crisis consulted the oracle of Delphi, and received at first an alarming or sinister response, to which was finally added this emphatic prediction: "But this assurance I will give you firm as adamant: when everything else in the land of Cecrops shall be taken, Jupiter grants to Athens that the wooden wall alone shall remain unconquered to defend you." Concluding that the wooden wall signified the fleet, the Athenians removed their women and children to Ægina and Salamis, and evacuated Athens, which was taken and burned by the Persians. The Greeks were reduced to a desperate extremity, but in one day the great naval battle of Salamis (480 B. C.) made an immense change in their situation, and restored them to security and triumph. This event was followed by the rapid development of the maritime power of Athens. Themistocles fortified the Piræus, and surrounded Athens with massive walls sixty stadia in circumference. The courage and public spirit of the Athenians in the conflict with the Persians raised their reputation and influence so high that when many of the Greek states formed a league for mutual defence, they gave to Athens the hegemony or chief control of the confederacy. Soon after the battle of Salamis the Athenians began to rebuild their capital and to erect those masterpieces of architecture which have excited the admiration of all succeeding ages. The most brilliant period in Athenian art was the age of Pericles, who became the most powerful statesman of Athens about 469 B. C. During his long and able administration Æschylus, Sophocles, Euripides, Socrates, and Phidias flourished. He made Athens the most splendid city of Greece, and erected, on the Acropolis, the Parthenon, Erechtheum, and Propylæa. It was here that Art achieved her greatest triumphs. "In order to form a proper idea of the Acropolis, we must imagine the summit of the rock stripped of everything except temples and statues, the whole forming one vast composition of architecture, sculpture, and painting, the dazzling whiteness of the marble relieved by brilliant colors, and glittering in the transparent clearness of the Athenian atmosphere." (*Smith's Dictionary of Greek and Roman Geography.*) In 431 B. C. a long war broke out between the Athenians and the Spartans, who were the aggressors. This was called the Peloponnesian war, which continued about twenty-seven years, and was disastrous to the Athenians. During this period, Thucydides, Nicias, and Alcibiades were prominent public men of Athens. Nicias conducted a large fleet and army against Syracuse (an ally of Sparta) in 413 B. C. But the expedition proved a disastrous failure. Nearly all of his men were killed or captured. In 404 B. C. the war ended with the capture of Athens by the Spartan general Lysander, who abolished the democracy, and established the rule of the Thirty Tyrants. Thrasybulus, aided by a body of exiles, expelled these tyrants within one year after their accession to power. Athens had lost her political and military supremacy, but she still surpassed all other states in art and literature, and was illustrated by the genius of Plato and Demosthenes. The latter began his public career about 354 B. C., when the liberty of Athens was menaced by Philip of Macedon. He became the leader of the party that opposed Philip, whom he assailed in his celebrated "Philippics," the eternal monuments of his political foresight, wisdom, and magnanimity. The army of Philip gained a decisive victory over the Athenians and Thebans at Chæronea, in 338 B. C. Athens and the other Greek states then became subject to Macedon. In 146 B. C., Greece was reduced to a Roman province. Athens under the Roman power continued to enjoy much prosperity, and was the centre of Grecian philosophy, literature, and art. The great monuments of the age of Pericles still remained in their original beauty and perfection. The Athenian schools of eloquence and philosophy attracted great numbers of students from Rome and all parts of the civilized world. Here Cicero, Virgil, and Horace received part of their education. It is difficult to determine the population of ancient Athens, which, according to Xenophon, was the most populous city of Greece. He states that it contained more than 10,000 houses. Leake estimates the population at 192,000, including the Piræus. The private houses were small and poor compared with the public edifices. The climate was so genial that the Athenians passed nearly all their time in the open air.

Monuments and Antiquities.—At the W. end of the Acropolis stood the Propylæa, one of the masterpieces of Athenian art, constructed of Pentelic marble, and finished in 432 B. C. The central part of this building (called Propylæa because it formed a vestibule to the gates by which the Acropolis was entered) consisted of two Doric hexastyle porticoes, covered with a roof of white marble. Of these porticoes the western faced the city and the eastern the interior of the Acropolis; the latter, owing to the rise of the ground, being higher than the former. They were divided into two parts by a wall pierced by five gates or doors, which were the only public entrance into the Acropolis. Considerable remains of the Propylæa are still visible. Passing through the Propylæa, we come to the Parthenon, or temple of Athena Parthenos, regarded as the most perfect specimen of architecture ever executed. It was designed by Callicrates and Ictinus, was built in the Doric order of white Pentelic marble, and was completed in 438 B. C. The dimensions were 228 feet long, 101 feet wide, and 66 feet high to the top of the pediment. It consisted of a cella, surrounded by a peristyle of forty-six columns, which were six feet two inches in diameter and thirty-four feet high. Within the peristyle at either end there was an interior range of six columns five and a half feet in diameter. In technical language this temple was a peripteral octastyle, so called because it had eight columns at each front. "Such," says Leake, "was the simple structure of this magnificent building, which, by its united excellencies of materials, design, and decorations, was the most perfect ever executed. Its dimensions were sufficiently great to give an appearance of grandeur and sublimity; and this impression was not disturbed by any obtrusive subdivision of parts. . . . There was nothing to divert the spectator's contemplation from the simplicity and majesty of mass and outline which form the first and most remarkable object of admiration in a Greek temple." The whole building was adorned within and without with exquisite pieces of sculpture, the grandest of which was a colossal statue of Athena, executed by Phidias and formed of ivory and gold. This statue stood in the largest apartment of the cella. The Parthenon remained almost entire, except the roof, until 1687, when Athens was besieged by the Venetians. A quantity of powder which the Turks had placed in the cella exploded, and reduced the centre of the Parthenon to a heap of ruins. The columns of the two fronts escaped, and are still standing, with part of the walls. The Erechtheum ('Ερέχθειον), standing on the Acropolis, was a beautiful temple of the Ionic order, and the most revered of all the sanctuaries of Athens, being connected with the origin of the Athenian religion. It was completed about 393 B. C., and adorned with three porticoes and columns, many of which are now standing. Among the finest edifices of Athens was the Theseium (Θησεῖον), or temple of Theseus, which was built of Pentelic marble about 465 B. C. Its architecture was of the Doric order, and it was surrounded by a peristyle of thirty-four columns. The Theseium is the best preserved of all the monuments of ancient Athens. The temple itself is nearly perfect, but the sculptures have received much injury. The site of the Olympeum, or temple of Jupiter Olympius, is indicated by sixteen gigantic Corinthian columns of marble standing S. E. of the Acropolis. This exceeded all other temples of Greece in magnitude, being 354 feet long and 171 wide. It consisted of a cella surrounded by a peristyle, which had ten columns in front and twenty on each side. The peristyle, being double in the sides and having a triple range at either end, consisted of 120 columns six and a half feet in diameter and above sixty feet high. Among the interesting places in the suburbs of Athens were the Academy—in which Plato taught, and which long continued to be a sanctuary of philosophy—and the Lyceum, over which Aristotle presided. Towards the end of the sixth century of the Christian era Athens began to decline. In 1204 it became the capital of a duchy which during the fourteenth century belonged to Naples. In 1394 the Florentine Nerio Acciajuoli became duke of Athens, and his family held this position until 1456, in which year it was taken by the Turks. During the time of the Turkish rule Athens declined more and more, and had a population of only 6000 or 8000. The ancient monuments were falling to ruin, and the city itself presented a true picture of the demoralization of the whole nation. The Greek war of independence was the cause of great destruction to the city, so that when in 1830 Attica was incorporated with Greece, the city was nothing more or less than a heap of ruins. But when in 1834 it became the capital of the new kingdom of Greece, it rapidly changed, and was greatly improved. A royal palace, 300 feet in length and 280 feet wide, was completed in 1843 near Mount Lycabettus. Among the finest modern buildings are the university, the cathedral, the mint, the theatre, and the chamber of representatives. The university, founded in 1836, has about forty professors, and a library of 150,000 volumes. It is said to be well organized and flourishing. Athens has also several gymnasia, and a system of graded free schools. Since the liberation of Greece from the Turkish yoke the Hellenic people have been animated by an ardent desire to regenerate their country by the promotion of education. Athens has a good harbor, the ancient Piræus, now called Drâko. Pop. in 1884, 84,903. Pop. of the Piræus same year, 21,055. (See Leake, "Topography of Athens," 1841; Stuart and Revett, "Antiquities of Athens," 4 vols., 1762–1816; Grote, "History of Greece;" Wordsworth, "Athens and Attica," 1836; Mure, "Journal of a Tour in Greece," 1842; K. O. Müller, article *Attica* in Ersch and Gruber's "Encyklopädie;" Breton, "Athen," 1868; Welcker, "Tagebuch einer griechischen Reise," 1865.)

Revised by R. D. Hitchcock.

Athens, on R. R., capital of Limestone co., Ala., 27 miles W. N. W. from Huntsville. On Sept. 23, 1864, the Confederate general Forrest, with a large body of cavalry, invested the town, held by Colonel Campbell of the One Hundred and Tenth U. S. Colored Troops and 600 men, and demanded its surrender, which was finally made just as reinforcements were on their way. The place was again occupied by U. S. forces, and again attacked by the Confederate general Buford Oct. 2–3, 1864, but this time the place was firmly held by Colonel Slade, of the Seventy-third Indiana, and Buford repulsed. Pop. in 1870, 887; in 1880, 1011.

Athens, city, R. R. junction, and capital of Clarke co., Ga. (see map of Georgia, ref. 2–H, for location of county), on Oconee River. It is the seat of the University of Georgia, the State College of Agriculture, the Lucy Cobb Institute, several other schools of a high grade, and a number of common schools. It has cotton-mills and other manufactories. Pop. in 1870, 4251; in 1880, 6099.

Athens, R. R. junction, capital of Athens co., O. (see map of Ohio, ref. 7–G, for location of county), is on the Hockhocking River, 41 miles W. S. W. of Marietta. Here are the Ohio University, founded in 1804, and a State lunatic asylum. Pop. in 1870, 1696; in 1880, 2457.

Athens, on R. R., Bradford co., Pa. (see map of Pennsylvania, ref. 2–G, for location of county), embraces the junction of the North Branch of the Susquehanna with the Chemung (once called Tioga) River. Athens was early known as "Tioga," or "Tioga Point," and was the most important trading-post in the region. The borough is fifteen miles N. of Towanda, the county-seat, and 4 miles S. from Waverly. Athens has the oldest academy in the section. Pop. in 1870, 965; in 1880, 1592.

Athens, on R. R., capital of McMinn co., Tenn. (see map of Tennessee, ref. 7–I, for location of county), 55 miles S. W. of Knoxville, is the seat of Grant Memorial University (formerly East Tennessee Wesleyan University). Pop. in 1870, 974; in 1880, 1100.

Athens, on R. R., capital of Henderson co., Tex. (see map of Texas, ref. 3–J, for location of county). Pop. in 1870, 545; in 1880, 368.

Ath'erine (*Atheri'na*), a genus of fishes of the family Atherinidæ, related to the mullet. They have more than twice as many vertebræ as the mullet, are about six inches long, and have a broad silvery band along each flank. The genus comprises many species which abound in the Mediterranean. The *Atherina presbyter* is sold in England under the name of *smelt*. Those of the U. S. coast are called "silversides" and "sand-smelts."

Ath'erton (Charles Gordon), an American politician, born at Amherst, N. H., July 4, 1804. He graduated at Harvard in 1822. He was a member of Congress 1837–43. He procured in 1838 the passage of a resolution that all petitions or papers relating to slavery should be laid on the table without being debated, printed, or referred. In 1843 and '53 he was elected to the Senate of the U. S. Died Nov. 15, 1853.

Atherton (Charles Humphrey), born at Amherst,

N. H., Aug. 14, 1773, graduated at Harvard in 1794, became a lawyer, and was an enthusiastic Federalist. He was a member of Congress from New Hampshire (1815–17). Died at Amherst, N. H., Jan. 8, 1853.

Atherton (HUMPHREY), a native of England who emigrated to Massachusetts about 1636. He became a major-general, and was employed in negotiations with the Indians. Died Sept. 17, 1661.

Ath'lete, plu. **Ath'letes,** or **Athletæ** [Gr. ἀθλητής, plu. ἀθληταί], a term applied by the ancient Greeks to a person who contended for a prize in public games as a wrestler, pugilist, or runner; a man who competed for honor or awards in contests of physical strength or agility.

Athlone (*Athluhan, i. e.* "ford of the moon"), a market-town of Ireland, on both sides of the river Shannon, about 67 miles W. of Dublin, is chiefly in the county of Westmeath and partly in Roscommon. It is on the railway from Dublin to Galway, and about two miles S. of Lough Ree. The Shannon is navigable for steamers above this town. Athlone Castle, built in the reign of King John, has been converted into an important military position. Pop. 6617.

Ath'ol, R. R. junction, Worcester co., Mass. (see map of Massachusetts, ref. 3–F, for location of county). Cottons, woollens, lumber, wooden ware, castings, and many other goods are manufactured. Pop. of township in 1870, 3517; in 1880, 4307; in 1885, 4758.

Athor, Aythor, or **Het-her,** an Egyptian goddess, the daughter of Ra, supposed to correspond to the Aphrodite of the Greeks. The cow was regarded as her symbol.

A'thos, Mount [called *Hagion Oros* (Ἅγιον Ὄρος) by the modern Greeks, and *Monte Santo* by the Italians, both names signifying "holy mountain"], a celebrated mountain of Greece, at the extremity of the peninsula of Chalcidice, 80 miles S. E. of Salonica. It rises abruptly to the height of 6350 feet above the sea, and is cut in various directions by deep ravines, which, covered with old luxuriant forests, present the most striking natural scenery. With the mainland it is connected only by the narrow isthmus through which in olden times Xerxes dug a canal to avoid the dangerous navigation around the promontory. In the Middle Ages, Mount Athos was occupied by numerous monasteries and was a celebrated seat of learning. The origin of some of those monasteries is by legend dated back to the time of Constantine. In the eleventh century they numbered 180, and exercised a decisive influence not only on the ecclesiastical and literary, but also on the political, affairs of the Byzantine empire. In the fourteenth century the decadence began. Nevertheless, here were preserved the remains of famous libraries which furnished to scholars many valuable Greek manuscripts. A number of monks, estimated at 3000, still reside on this mountain. They pay a capitation tax of 10*s.* each to the sultan, but enjoy otherwise a considerable measure of independence under the protection of Russia. The Russians formerly submitted to all the regulations of the Greek monks. Of late, however, they have increased so much that the Russian monks now have a majority in two monasteries. (See GASS, "Zur Geschichte der Athosklöster," 1865; A. A. NEYRAT, "L'Athos," Paris, 1880.)

Atitlan', a lake and volcano of Central America, 80 miles N. W. of Guatemala. The lake is 24 miles long, 10 miles wide, and nearly 2000 feet deep. The volcano is 12,500 feet high, in lat. 14° 30′ 38″ N., lon. 91° 12′ 47″ W. The town of Santiago de Atitlan is on S. side of lake.

Atkarsk', a town of Russia, in the government of Saratov, 50 miles N. W. of Saratov. Pop. in 1882, 15,199.

At'kins (JOHN D. C.). See APPENDIX.

Atkinson (ARCHIBALD), born in Isle of Wight co., Va., Sept. 13, 1792, studied law at William and Mary College, served as an officer in the war of 1812, held prominent State offices, and was a member of Congress from Virginia (1843–48). Died Jan. 10, 1872.

Atkinson (THEODORE), born at Newcastle in 1697, became chief-justice of New Hampshire in 1754. Died in 1779.

Atlan'ta, capital of Georgia and of Fulton county, is the largest city in the State, and the great railroad centre of the South (see map of Georgia, ref. 3–G, for location of county). It owes its existence as a city to these great channels of overland transportation, which converge at the site on which it has sprung up and grown with astonishing rapidity. In 1843, where Atlanta now stands was an unbroken forest, but it in a few years afterwards became the terminal point of several important and extensive railroads.

It has sometimes been called the "Gate City." The first corporate name given to it was "Marthasville," in honor of the daughter of Hon. Wilson Lumpkin, ex-governor of the State. It was not until 1845 that the Georgia and Western and Atlantic R. Rs. were completed to this place. It was about this time that the first settlements were made. In 1847 a charter was granted for its municipal government under the name of "the city of Atlanta." The population was then about 2500. It is on the dividing ridge separating the waters of the Gulf from those of the South Atlantic slope. The elevation of Atlanta is 1100 feet above the ocean. It is on a high ridge, hence its climate is comparatively mild and delightful.

During the late war Atlanta was the theatre of many important events. This was the objective point of Gen. Sherman in his famous campaign of 1864. After many sanguinary conflicts in his progress from Dalton (from the 7th of May to the last of August), he finally succeeded in reaching his goal and taking possession of the city on Sept. 2. This he held until Nov. 15, when he set out upon his grand "March to the Sea." Before starting on this movement he compelled all the inhabitants to leave, and by general conflagration left the city in ruins. But after the war was over new life and energy animated the place. As early as the fall of 1865, Atlanta, Phœnix-like, was "rising from her ashes." In 1867 her population was thought to be quite as large as it was in 1859. In 1868, by the new constitution, made in pursuance of the requirements of the reconstruction acts of Congress, it was established as the future capital of the State. Since then it has continued to grow and prosper with its former wonderful rapidity. The corner-stone of the new capitol was laid Sept. 2, 1885; the building is to cost $1,000,000. A statue of Senator Benjamin H. Hill of Georgia was unveiled in Atlanta May 1, 1886, in presence of Jefferson Davis and a great multitude. Pop. in 1870, 21,789; in 1880, 37,409.

Manufactures.—The census of 1880 showed 196 manufactories. Capital, $2,468,456; average number of hands employed, 3680; wages paid during the year, $889,282; value of products, $4,861,727.

Atlanta is no less distinguished for its educational than for its industrial enterprises. The Oglethorpe University has been removed from near Milledgville to this place; besides this, it has the North Georgia Female College, the Atlanta Medical College, the Atlanta University (colored), Moore's Southern Business University, Eastman's Business College, English and German select school, Orphans' Free School, Storr's School (colored), and one of the best general systems of public schools to be found in any of the States. Atlanta is also now a port of delivery. Her trade is immense, and her manufactories of every kind are extensive and rapidly increasing. Her great International Cotton Exposition in 1881 exhibited the marvellous energies of her people. ALEX. H. STEPHENS.

Atlanta, city and R. R. junction, Logan co., Ill. (see map of Illinois, ref. 6–E, for location of county), 39 miles N. N. E. from Springfield. There are steam flouring mills, and one of the largest and best school buildings in Central Illinois. Pop. in 1880, 1368.

Atlan'tes [for etymology see below], in architecture, are statues of figures of the male human form used instead of columns by the ancient Greeks and Romans. The latter called them Telamones. *Atlantes* is merely the Latin plural form of *Atlas*, whose shoulders are said to have supported the heavens. Similar female figures are called *Caryatides*.

Atlantic, city, R. R. junction, and capital of Cass co., Ia. (see map of Iowa, ref. 6–E, for location of county), on the East Nishnabatona River, 79 miles W. by S. from Des Moines. Pop. in 1880, 3662; in 1885, 3842.

Atlan'tic City, R. R. centre, a fashionable watering-place of Atlantic co., N. J. (see map of New Jersey, ref. 7–C, for location of county), on the Atlantic Ocean, 60 miles S. E. of Philadelphia. Pop. in 1870, 1043; in 1880, 5477; in 1885, 7942.

Atlan'tic O'cean [Lat. *Atlan'ticus Oce'anus*; Gr. Ἀτλαντικὴ θάλασσα or Ἀτλαντικὸν πέλαγος; Ger. *Atlan'tisches Meer*] is that part of the ocean which separates America from Europe and Africa, and extends from the Arctic Circle to the Antarctic Circle. Its extreme breadth is about 5000 miles, and its area about half that of the Pacific. The part N. of the equator is called the North Atlantic, and that on the S. side of that line the South Atlantic. The following bodies of water are parts of the Atlantic: the Bay of Biscay, the German Ocean, the Irish Sea, the Baltic, Hudson's Bay, the Gulf of Mexico, the Caribbean Sea, and the Gulf of Guinea. Its chief affluents are the Amazon, La Plata, Orinoco, Mississippi, and St. Lawrence in America; the Niger, Senegal, and Congo in Africa; and the Rhine, Loire, and Tagus in Europe. The portion of America which is drained into the Atlantic is vastly greater than that which belongs to the basin of the Pacific. The greatest depth of the Atlantic yet discovered is about five miles. The main feature of the Atlantic basin seems to be a deep valley, which, with an average depth of 20,000 feet or more, extends along and parallel to the coasts of America. The so-called telegraphic plateau between Newfoundland and Ireland has an average depth of 12,000 feet. This is a remarkable ridge about 400 miles wide and 1640 miles long. (See Deep-sea Soundings.) The chief currents of the Atlantic are the Equatorial Current and the Gulf Stream. The former moves from the Bay of Benin westward along both sides of the equator with a mean velocity of about thirty nautical miles a day, but in some places the velocity is much greater. Its breadth varies from 200 to 400 miles. Near Cape St. Roque it divides into two branches, one of which, called the Brazil Current, runs southward, and the other, called the Guiana Current, flows north-westward to the Caribbean Sea. The Gulf Stream originates in the Gulf of Mexico, passes between Florida and Cuba, and flows along the coast of the U. S. with a velocity of about eighty miles a day, gradually expanding in volume. As it proceeds northward its velocity and temperature both decrease. Its mean breadth is about 350 miles. Reaching the latitude of New York, it gradually turns to the E., and crosses the Atlantic to the Azores, where it divides. The northern branch flows to the British Isles, and the other, turning southward, is swept back by the force of the North Equatorial Current to the Gulf of Mexico. Thus is formed near the middle of the North Atlantic a great whirlpool or eddy, which accumulates a mass of matted seaweed (*Fucus natans*). It is maintained by some that this weed has its origin at or near the place where it is found in such abundance, while others think that it is brought here by the action of the wind and water. This part of the sea, which is called *Mar de Sargasso*, is said to be 260,000 square miles in extent. The water of the Gulf Stream is sometimes twenty degrees warmer than that of the adjacent ocean. On issuing from the Gulf of Mexico it is of a dark-blue color. This stream contributes greatly to temper the climate of England and Ireland. Sailing-vessels from the U. S. to Europe take advantage of the Gulf Stream, and often make the voyage in twenty-three days; the voyage in the other direction is not often performed in less than thirty days, and the average duration is about forty days. The voyage from New York to Europe is favored by the prevalence of S. W. winds, as well as by the Gulf Stream. In the intertropical regions of the Atlantic the trade-winds prevail with great regularity, blowing nearly westward. (See Ocean.)

Revised by A. J. Schem.

Atlantic Telegraph. See Telegraph.

Atlan'tides [Gr. Ἀτλαντίδες], in classic mythology, the daughters of Atlas. They were also called Hesperides, Pleiades, and Hyades. (See Hesperides.)

Atlan'tis, the name of a large island which, according to an ancient tradition that was credited by the Greek geographers, was situated in the Atlantic Ocean W. of Africa, just over against the Pillars of Hercules. In reality, this was a great continent larger in extent than Libya and Asia put together, and yet it was only the passage to another continent, for which the Mediterranean was nothing but a simple harbor. One of the earliest writers who mentions Atlantis is Plato, who, in his dialogue "Timæus," states that an Egyptian priest gave Solon a description of it. Plato gives a beautiful picture of this island, to which he adds a fabulous history. Nine thousand years before the time of Plato, Atlantis was (so the legend ran) populous and powerful, and conquered the western part of Europe and Africa. At one time its whole power was arrayed against the nations bordering on the Mediterranean, and every nation gave way for the tremendous force of the invaders, except alone the Athenians. Though abandoned by all, the Athenians fought bravely, and were victorious. The gods finally came to the rescue of the earth. An earthquake afterward caused the whole island to sink in the ocean. This is the explanation of the shallows which are found in that part of the Atlantic Ocean, or, at least, said to be found there. (See Rudbeck, "Atlantica," 4 vols., 1675–98; Bailly, "Lettres sur l'Atlan de Platon;" and Carli, "Lettres Américaines.")

At'las [Gr. Ἄτλας], a mythical personage, said to be a son of Japetus and Clymene, and a brother of Prometheus. He was represented by the ancient Greek legends as a leader of the Titans in the war against Jupiter, for which offence he was condemned to support the vault of heaven on his head or shoulders. According to some writers who have rationalized the myth, he was a king who acquired great skill in astronomy.

Atlas, in anatomy, the first cervical vertebra, the piece of the vertebral column nearest to the skull. It forms, with the occipital bone, the joint on which the head moves in bowing. It turns on the pivot of the second cervical vertebra, the "axis," when we look from side to side.

Atlas [so called because some early collections of maps had prefixed a picture of Atlas upholding the sphere], a volume containing a collection of maps, usually including more or less descriptive letter-press. The name was probably first applied as the proper title of such a book by Gerard Mercator (1512–94) to his "Atlas," published in the year of his death. Among the best atlases are the works of Stieler (in German, French, Swedish, Finnish, Italian, etc.), of Menke, Spruner, Berghaus, Sydow, and others, illustrating not only geography proper, but history, ethnography, geology, astronomy, botany, and other sciences; and the works of A. K. Johnston, Black, and numerous others in Great Britain. Among the oldest American atlases are those of Matthew Carey and Burr's "Atlas of New York," both valuable and well executed for the times. The number of American atlases in later years is very great, the most complete and widely-known being "Johnson's Family Atlas of the World," containing a very thorough treatise upon physical geography by Prof. Arnold Guyot, Ph. D., LL.D.

Atlas Mountains, a mountain-system of Africa, mostly in Morocco and Algeria, extends from Cape Gher on the Atlantic to Cape Bon on the Mediterranean. It is a congeries of mountains, sometimes isolated and sometimes connected, with many irregular branches. The system is divided into the Greater and the Lesser Atlas, the latter of which is nearer to the Mediterranean. The highest point of the system is in Morocco, and is estimated at 13,000 feet above the sea. Mount Miltsin rises to 11,400 feet. Numerous metals are found in these mountains.

At'lee (Washington L.), M. D., an eminent physician and surgeon, was born at Lancaster, Pa., Feb. 22, 1808, graduated as M. D. at Jefferson Medical College in 1829, practised at Mount Joy and Lancaster, and was professor of medical chemistry at Jefferson College, Philadelphia, 1844–52. He published more than eighty medical and scientific monographs, etc., but was especially distinguished for his great number of successful operations in ovariotomy. D. Sept. 7, 1878.

Atmosphere [from the Gr. ἀτμός, "vapor," and σφαῖρα, a "sphere"], the aëriform fluid envelope which surrounds the earth or any celestial body. That of the earth is the only one with which we are familiar. It is composed of air (a mixture of 77 parts by weight of nitrogen and 21 of oxygen), with variable proportions of carbonic acid, aqueous vapor, and ammonia, the latter in exceedingly small amounts. (For its physical properties see Acoustics, by Prof. O. N. Rood, LL.D., Barometer, and Pneumatics; see also Climate, Storms, and Winds, by Prof. Arnold Guyot, Ph. D., LL.D., Oxygen, Nitrogen, Fermentation, Vegetable Physiology, Agricultural Chemistry, Warming and Ventilation, Sewers, Plumbing, etc.)

Atoll', or **Atoln,** a name which the natives of the Maldive Islands give to a peculiar kind of island that occurs in the Indian Ocean and parts of the Pacific. It is a low, circular reef of coral, enclosing a lagoon, which in many instances communicates with the ocean by a narrow inlet, or by more than one. (See Coral Islands.)

At'om [Lat. *at'omus;* Gr. ἄτομος, "that which cannot be cut," "indivisible," from α, priv., and τέμνω, to "cut," to "divide"], a minute, indivisible particle of matter. According to one theory of speculative philosophy, matter is infinitely divisible. On the other hand, many modern chemists maintain that all matter consists of ultimate, indivisible, and indestructible particles. They believe that all the atoms of each element have the same weight and form, but the atoms of different elements have unequal weights. Many scientific men suppose that all atoms are spherical. The tendency of recent scientific research has been to prove that the chemical atom and physical atom are not identical. (See Atomic Weights and Chemistry.)

Atomicity. See Chemistry.

Atomic Theory. See Chemistry.

Atom'ic Vol'ume of a gas is the space occupied by a quantity of it proportional to its atomic weight. It is ascertained that 1 equivalent or 16 grains of oxygen at 60° F., and at a barometric pressure of 30 inches, occupy 46.6 cubic inches; 1 equivalent or 1 grain of hydrogen occupies 46.7 cubic inches; and 1 equivalent or 35.5 grains of chlorine occupy 46.2 cubic inches; consequently the atomic volume of hydrogen, chlorine, and oxygen is the same. Other gases exhibit a similar relation, and an attempt has lately been made to carry out an analogous relation in regard to liquids and solids.

Atom'ic Weights, or **Chem'ical Equi'valents,** the proportions by weight in which chemical elements unite. One element must be selected as the starting-point of the series, and an arbitrary value affixed to it, and thereafter all the other elements can have their values awarded to them according to the proportional amounts in which they combine. It can be demonstrated that a given amount of one element is equivalent to, and serves the same purpose in combining with, a second element as a greater or less amount of a third substance. Hydrogen is by some writers taken as 1, and all the other elements are represented by a quantity which is the minimum amount in which they unite with 1 of hydrogen. By others oxygen is regarded as the starting-point of the series, and is called 100, whilst the other elements have a proportional number attached. (For a table of the atomic weights, see CHEMISTRY.)

Atomiza'tion. In practical medicine this is the very minute subdivision of liquids for inhalation or application to the throat. It was first introduced in France by Sales-Girons. It is effected by forcing a fine jet of liquid against either a solid body or a strong current of air, so as to convert it into diffused spray. Bergson, for instance, applied to this use the tubes used as *odorators* to spread perfumed liquids through the air. Two glass tubes with minute orifices are fixed at right angles to each other, so that the end of the upright tube is near and opposite to the centre of the orifice of the horizontal tube. The upright tube being placed in the liquid to be atomized, air is forcibly blown through the horizontal one. The current of air passing over the outlet of the upright tube rarefies the air in the latter, causing a rise of the liquid through it, and its very minute subdivision (atomization, nebulization, pulverization) as it escapes. Siegle has applied steam-power, generated by the heat of a spirit-lamp, to the propulsion of vapor for atomization. Richardson's *hand-ball* spray-producer is a simpler apparatus, constructed essentially upon the same principle. One of its uses is, by the rapid evaporation of ether or rhigolene, to produce a great degree of cold for local *anæsthesia* (*i. e.* to annul sensibility in a part for a surgical operation).

Atonement. I. THE WORD.—1. The etymology and usage of the *English* word. (1) Supposed to be derived from "at-one-ment," and its earlier signification, "reconciliation;" (2) at present universally used in the sense of "satisfaction for an offence," "expiation." (*Webster* and *Worcester*.) 2. In the authorized English version the word occurs only once in the New Testament (Rom. v. 11), and there represents καταλλαγή, "reconciliation." In the Old Testament it occurs frequently, translating כָּפַר, to "cover with sacrificial blood," and hence to "expiate," to "appease," to "purge away." 3. The biblical equivalents of the word in the Old Testament, כִּפֻּרִים, "expiation." In the New Testament: (1) As it respects God, ἱλάσκεσθαι, to "propitiate" (1 John ii. 2 and iv. 10); (2) as it respects sin, to "expiate" (Heb. ii. 11); (3) as it respects the sinner, ἀγοράξειν, to "redeem" (by blood, Rev. v. 9), and λυτροοῦν, to "ransom by substitution" (1 Pet. i. 18; 1 Tim. ii. 6).

II. THE DOCTRINE. 1. *Patristic.*—The biblical view above presented has always prevailed in the Church as the basis of religious experience. It was, however, but imperfectly discriminated as a logical conception by the early teachers. From an exaggerated conception of the independence and power of the kingdom of Satan, many of the Fathers, as Irenæus, Origen, and even Augustine and Jerome, etc., founded on such texts as Col. ii. 15 and Heb. ii. 14 the notion that Christ by his sufferings rendered satisfaction to Satan, who had acquired rights of conquest over the human race.

2. *The Anselmic.*—The doctrine which was from the beginning the living principle of the devotional writings of all Church teachers and of all liturgies and hymns, and which since his time has been taught in the authorized creeds of all sections of the Church, was first systematically unfolded by Anselm, archbishop of Canterbury (1093–1109), in his tract, "Cur Deus Homo." He teaches that the essential moral perfection of the divine nature, which is immutable, necessarily demands the punishment of sin—that sin is an intrinsic and infinite evil. The law is consequently unrelaxable, and the penalty must be executed upon the sinner unless a substitute (1) personally free of all legal demands and (2) of sufficient dignity is willing to be punished in his stead. This condition is answered only by a Person at once divine and human—*i. e.* a divine Person who has assumed a human nature. Christ made atonement for the sins of men by vicariously suffering the legal penalty of death to which they were condemned, and thus expiated the guilt of sin and propitiated the justice of God.

(1) This was in substance taught from the beginning. Athanasius (d. 373), "Contra Arianos," i. 60, etc.: "Laden with guilt, the world was condemned of law, but the Logos assumed the condemnation, and suffering in the flesh gave salvation to all." Augustine (d. 430), "De. Pec. Mer.," i. 56; Gregory the Great (d. 604), "Mor. in Job." 17 : 46.

(2) The same doctrine is taught in the standards of the Roman and the orthodox Greek churches, "Conc. Trent.," sess. 6, ch. 7: "Jesus Christ, who when we were enemies merited justification for us by his most sacred passion on the tree, and satisfied God the Father for us." "Cat. Rom.," ii. 5, 63; "Orthodox Conf. of Apos. East. Church," by Petrus Mogilas (A. D. 1642); Winer, p. 85.

(3) The same doctrine is taught in the confessions, liturgies, and hymns of every branch of the Lutheran and Reformed churches: "Formula Concordiæ" (Lutheran); Hase, "Libri Symbolici," p. 684; "Heidelberg Cat.," Ques. 60; "Second Helvetic Conf.," ch. 15; "Gallic Conf.," art. 18; "Belgic Conf.," art. 22; "Westminster Conf.," ch. 8, § 5; "Liturgy and Articles of the Church of England," art. 28, art. 31: "The offering of Christ, once made, is that perfect redemption, propitiation, and satisfaction for all the sins of the whole world, both original and actual."

3. Abelard (d. 1142) first systematically developed what has since been known as the "*moral influence* theory of the atonement." He regards the love of God as the sole principle determining him in his provision of redemption for sinners. All that God's nature or will requires of a sinner as prerequisite to forgiveness and happiness is repentance and reformation. As rebellious men are obstinately indisposed to this repentance, and are afraid to trust his favor, God by his alliance with human nature in Christ, and by his surrender of him to death, makes such an exhibition of his love for man as awakens man's love for and trust in him, and so disposes man to repentance. This view is essentially the doctrine of the Socinians of the fifteenth century (Racovian Cat.) and of modern Unitarians, and of such Trinitarians as Maurice, Jowett, and Bushnell.

4. The "governmental theory of the atonement" was first propounded by Hugo Grotius (d. 1645) in his work against the Socinians, "Defensio Fidei Catholicæ de Satisfactione Christi." He taught that the moral law under which men are held, including precept and penalty, is a positive product of the divine will. The right of waiving or relaxing its demands is therefore an element of God's prerogative as moral sovereign. But since this gratuitous remission of the penalty in case of some sinners would weaken the motives restraining the subjects of the divine government in general from disobedience, by affording an example of impunity, the BENEVOLENCE of God requires that he should make such an *example* of suffering in Christ as will indubitively exhibit his determination not to allow sin to pass in any case without signal marks of his displeasure. This doctrine has never been accepted by any historical Church as an adequate rationale of the atonement, nor has it been embodied in any creed, but it has been frequently adopted by several schools of theologians —*e. g.* the supernaturalists of the last age in Germany, as Stäudlin, Flatt, and Storr, and in America Jonathan Edwards, Jr., Smalley, Maxey, Dwight, Emmons, and Park.

5. The "mystical theory," which, existing in various forms, may be generally stated thus: That the reconciliation effected by Christ is brought about by the mysterious union of God and man accomplished by the incarnation, and not by his sacrificial death. This was held by the Platonizing Fathers, by followers of Scotus Erigena during the Middle Ages, by Osiander and Schwenkfeld at the Reformation, and by the school of Schleiermacher among modern German theologians. (See PROF. ED. PARKS'S "Atonement;" DR. SHEDD'S "Hist. of Christ. Doctrine;" RITSCHL'S "Hist. of Doc. of Reconcil.;" SCHAFF'S "Hist. Chr. Ch.;" WATSON'S "Institutes;" WINER'S "Comp. of Docs. of Christendom;" OUTRAM, "De Sac.;" HASE, "Libri Symbol.;" NIEMEYER, "Collec. Conf;" "The Scripture Doctrine of Atonement," by THOMAS J. CRAWFORD (1871; 2d ed., 1874).) A. A. HODGE.

Atra'to, a river of South America, in U. S. of Colombia, rises near the Cordillera, flows northward through Choco, and after a course of about 300 miles enters the Gulf of Darien by several mouths. It is navigable for small vessels about 140 miles, and traverses a region rich in gold. In 1857 the government of the U. S. sent an expedition to explore a route for a ship-canal from the Atrato to the Pacific. In 1870–72 the explorations under Capt. Selfridge, U. S. navy, were resumed, and all the routes between Panama and the Atrato examined, with results far from realizing the hopes entertained of a favorable route.

A'treus [Gr. Ἀτρεύς], an ancient and celebrated king of Mycenæ, was called a son of Pelops. He was the father of the famous *Atridæ*—*i. e.* Agamemnon and Menelaus. The story of Atreus and his family was embellished by the ancient fabulists and tragic poets with many wild legends, involving horrible crimes and calamities.

Atri'des [Gr. Ἀτρείδης], plural **Atri'dæ** [Ἀτρεῖδαι], a patronymic from *Atreus*, signifies a son or descendant of Atreus. The name in the singular is more usually applied to Agamemnon, but the plural is used to designate the two brothers, Agamemnon and Menelaus.

A′trium, a Latin word signifying a court, a hall. In Roman architecture the atrium was an entrance-hall or central apartment, which was the principal part of a private house. In this room the family lived and took their meals. Here stood the Lares and Penates, and here the female servants were employed in weaving and other labors. The atrium was also used as a waiting-room for clients and other visitors. In ecclesiastical architecture the term denotes an open space before a church, forming part of the narthex or ante-temple.

At′ropine, or **Atro′pia,** a peculiar alkaline principle obtained from the *Atropa Belladonna*, is very poisonous. It exists in all parts of the plant. A very minute portion of it has the power to dilate the pupil of the eye. Atropine is composed of carbon, 70.98; oxygen, 16.36; hydrogen, 7.83; and nitrogen, 4.83.

A′trypa [from the Gr. α. priv., and τρύπη, a "foramen," *i. e.* "without a foramen;" an objectionable name, since it is not true of these shells], a genus of fossil brachiopod shells which closely resemble the *Terebratula*. It had a perforation for the passage of the peduncle, by which the animal attached itself to foreign bodies. Many species of it have been described, the most of which are Silurian, many Devonian, but all palæozoic.

Attach′ment [Fr. *attachement*], the apprehension of a person or seizure of a thing by virtue of a writ or order issued by a court or judge under authority of law. The word is sometimes used to denote the process itself. In respect to property, the term is usually applied to seizure on *mesne* process. Attachment was originally one of the common-law means of obtaining an appearance in an action by the defendant. In some of the States a plaintiff can at the commencement of any action to recover money attach the property of the defendant as a security for the payment of the judgment expected to be recovered; and in case of recovery the property is to be applied in satisfaction of the judgment. But the more usual rule is that there can be no seizure of property, except in specified cases, till the rights of the parties have been settled by judgment of the court. The exceptions are chiefly in cases where the defendant is a non-resident or a fraudulent debtor, or is attempting to conceal or remove his property for the purpose of defrauding or delaying his creditors. An attachment is said to be foreign where a creditor attaches property in the hands of a third person belonging to his debtor, or a debt due from a third person to such debtor. The name is said to arise from the fact that the proceeding is often resorted to for the purpose of collecting a debt against a non-resident. In some of the Eastern States this proceeding is called "trustee process;" in other States it is generally known as "garnishment," meaning a warning. Foreign attachment was derived from local customs in London and other cities, and formed no part of the general law of England.

2. *Against the Person.*—This is issued against officers of the court for any misconduct or neglect of duty, and against any one who has been guilty of contempt of court. The object of the attachment is to bring the guilty party actually before the court. He has then an opportunity to show cause why he should not be found guilty, or, in legal language, to "purge himself of the contempt." If he cannot do this, he is subject to such punishment as the law permits and the court may award. T. W. Dwight.

Attain′der [Old Fr. *attaindre*, to "stain"], in law, is the extinction of civil rights as the consequence of a judicial sentence of death for a capital crime. From this moment the criminal was deemed to be legally dead, incapable of bringing an action except to reverse the attainder, or of appearing in court as a witness. Its two most important consequences are forfeiture and corruption of blood. The effect of forfeiture upon the offender's land was such that it related back to the time of the commission of the offence, and avoided intermediate sales, even to purchasers in good faith. The consequence of corruption of blood was that the person attainted was incapable of inheriting himself or of transmitting an estate by inheritance to another. Thus, if a grandfather owned land, and a son were attainted, his descendant could not inherit from the grandfather, even though the son were dead when the land passed from the grandfather. This harsh rule is now modified in England by statute. Forfeiture, except in cases of treason and murder, does not extend in the case of estates of land beyond the natural life of the offender. By the U. S. Constitution no attainder of treason shall work corruption of blood or forfeiture, except during the life of the person attainted. In case of rebellion the U. S. might regard the rebels either as belligerents or traitors. In the former aspect of the case they would not be bound by the restriction just referred to, but might, under the rules of public law applicable to a state of war, confiscate their property. If, however, they were treated as subjects and as guilty of treason, the restriction of the Constitution would become operative.

Attakapas, at-tuk′a-paw, a large and fertile district in the southern part of Louisiana, comprising, according to old maps, several parishes. It produces large quantities of sugar and molasses. Though often used in conversation, the name has no legal existence, and is not employed in the census.

Attakapas, a tribe of Indians who once lived in the above region and in Eastern Texas, near the Gulf of Mexico. The first Europeans who discovered them were the French, whom they aided in a conflict with the Natchez and Chickasaw Indians. About 100 Attakapas remained on their ancient location near Vermilion Bayou in 1803, when La., which included that region, was ceded to the U. S.

Atta′lea, a genus of palms of numerous species, natives of tropical South America. They generally have lofty, cylindrical, and smooth stems, but some are stemless. Their large pinnate leaves are used for thatching, mats, etc. The fruit is a nut enclosed in a dry fibrous husk. The *Attalea compta* bears an eatable fruit about as large as a goose egg. The leaf-stalks of *Attalea funifera*, which grows in the maritime parts of Brazil, and is there called piassaba, yield a fibre much used to make cordage which is very strong and durable in salt water.

At′talus I., king of Pergamus, was born 269 B. C. He succeeded his cousin, Eumenes I., in 241 B. C., defeated the Gauls who had occupied Galatia, and became an ally of the Romans in a war against Philip of Macedon. He was reputed a wise ruler and able general. Died in 197.

Attalus II., surnamed Philadelphus, born about 220 B. C., was the second son of Attalus I. He succeeded his brother, Eumenes II., in 159 B. C., was a constant ally of the Romans, and patronized arts and sciences. Died in 138.

Attalus (Flavius Priscus), a Roman emperor, born probably in Ionia, was converted from paganism to Arianism. He was prefect of Rome when that city was captured by Alaric in 409 A. D., and was proclaimed emperor by that conqueror in the same year. He was deposed by Alaric in 410, and banished by Honorius in 416 A. D.

At′taman, or **Het′man,** the title of the chiefs of the Cossacks, formerly elected by the people. (See Cossacks.) After the revolt of Mazeppa the office was suppressed by the czar of Russia until 1750. Catharine II. abolished the office among the Cossacks of the Ukraine; among those of the Don it still exists, but its prerogatives have been greatly reduced. The heir-apparent of the Russian crown is principal attaman of the Cossacks.

At′tar of Ro′ses [from the Arab. *itr*, "perfume"], the oil or essence of *Rosa centifolia* and its varieties, *Rosa damascena* and *Rosa moschata*. It is prepared by distillation of the petals in Persia, India, and other Eastern countries, whence it is exported in small vials. It is very costly, and is often adulterated: 100,000 roses, from 10,000 bushes, are said to yield but 180 grains of attar. It is often called *otto* of roses. That of Adrianople is called the best.

Atterbom (Peter D. A.). See Appendix.

At′terbury (Francis), an eminent English prelate, writer, and politician, born at Middleton-Keynes, in Buckinghamshire, Mar. 6, 1662. He entered Christ Church, Oxford, in 1680, graduated in 1687, and became lecturer in St. Bride's Church, London, in 1691. Having gained distinction as a pulpit orator, he was appointed a chaplain to the king. He was the author of a witty but superficial "Examination of Dr. Bentley's Dissertations on the Epistles of Phalaris," which appeared under the name of "Charles Boyle" in 1698. He was a Jacobite in politics, and a zealous defender of High Church doctrines. He was appointed chaplain to Queen Anne in 1702, dean of Carlisle in 1704, and bishop of Rochester in 1713. His turbulent and imperious temper several times involved him in difficulties, and his hopes of promotion were blasted by the death of Queen Anne in 1714. He was a friend of Pope, Swift, and Bolingbroke. In Aug., 1722, he was committed to the Tower on a charge of treason as an accomplice in plots for the restoration of the Stuarts. He was convicted by the House of Lords in May, 1723, and was condemned to perpetual banishment. He became a resident of Paris, where he died Feb. 15, 1732. Four volumes of his sermons were published in 1740. His reputation as a writer is founded on his sermons and letters, which have great literary merits. (See his "Epistolary Correspondence," 4 vols., 1783, edited by J. Nichols; Thomas Stackhouse, "Memoirs of the Life of Francis Atterbury," 1727.)

At′tic [Lat. *At′ticus;* Gr. Ἀττικός], pertaining to Attica or to its capital, Athens; marked by such qualities as were characteristic of the Athenians. An Attic style designates that which is pure, classical, and elegant. Attic base is the base of a column used in the Ionic and Corinthian, and sometimes in the Doric, orders. Attic wit and Attic salt signify a poignant and delicate wit especially characteristic of the Athenians.

Attic, a term in architecture applied to a low story rising above the cornice that terminates the main elevation of a building; a sky-lighted room next to the roof of a private dwelling-house.

At'tica [Gr. 'Αττική], a state of ancient Greece, bounded on the N. by Bœotia, on the E. by the Ægean Sea, on the S. W. by the Saronicus Sinus, and on the W. by Megaris. It occupied a triangular peninsula, at the S. E. extremity of which is the promontory of Sunium. A range of hills called Mount Cithæron extends along the northern border. The surface is diversified by limestone hills and plains, the soil of which is light and unproductive. About 10 miles N. E. of Athens rises Mount Pentelicus, which has an altitude of 3884 feet, and contains inexhaustible quarries of white marble of a superior quality. Among the prominent physical features of the country are Mount Hymettus, about 3500 feet high, and Mount Laurium, whose silver-mines have recently attracted again great attention. The principal streams are the Cephissus and Ilissus, which flow southwestward into the Saronic Gulf. The climate is dry and extremely pleasant. The chief productions are wheat, olives, figs, and grapes. Rich silver-mines were worked at Laurium. Attica was very advantageously situated for commerce, and was at one time the greatest maritime power of the world. The people of Attica, who belonged to the Ionic division of the Hellenic race, planted colonies in various distant lands. The region which they colonized on the western coast of Asia Minor was called Ionia. The capital of Attica was Athens (Athenæ), and the inhabitants of Attica were citizens of Athens, possessing the right to assemble in the capital, and take part in the legislative and judicial proceedings. The ancient population is estimated at 500,000, the majority of whom were slaves. Modern Attica is deficient in forest trees, and presents an arid and rather desolate aspect, except in spring. (For the history of Attica, see ATHENS.) ATTICA and BŒOTIA form a department of the modern kingdom of Greece, comprising Megaris and the islands of Egina and Salamis. It has an area of 2472 square miles. The soil is less fertile than it was in ancient times, and is not well cultivated, but it still produces olives, grapes, and some wheat. Pop. in 1879, 185,364.

Attica, city and R. R. junction, Fountain co., Ind. (see map of Indiana, ref. 6–B, for location of county), on the Wabash River and Canal, 21 miles W. S. W. of Lafayette. Pop. in 1870, 2273; in 1880, 2150.

Attica, on R. R., Wyoming co., N. Y. (see map of New York, ref. 5–D, for location of county), 31 miles E. of Buffalo. Pop. in 1870, 1333; in 1880, 1935.

At'ticus, born at Sebaste, Armenia, went to Constantinople; became a presbyter; was a leader in the conspirracy against Chrysostom, patriarch of Constantinople, and testified against him in the synod. Atticus was, after some months of intrigue, elected patriarch of Constantinople Mar., 406, and held that office till his death, Oct. 10, 426. Pope Innocent I. refused at first to recognize him as patriarch. Atticus declined for a long time to put the name of Chrysostom on the diptychs of the Church.

At'ticus (TITUS POMPONIUS), an accomplished Roman of the equestrian order, born in 109 B. C. During the war between Sulla and Marius he remained neutral, and passed many years (86–65) in Athens, to which city he rendered important services. He was an intimate friend of Cicero. Having returned to Rome in 65 B. C., he declined to take part in political affairs, and distinguished himself by his moderation, generosity, and mediatorial spirit. He was on friendly terms with the leaders of both parties that divided the Romans. He wrote, besides other books, an epitome of Roman history called "Annales," but all his works are lost. His daughter was the wife of M. Vipsanius Agrippa, the eminent statesman. Died in 32 B. C. (See CORN. NEPOS, "Life of Atticus;" HÜLLEMANN, "Diatribe in T. Pomponium Atticum," 1838.)

At'tila [Gr. 'Αττίλας; in Ger. *Et'zel* or *At'zel;* in Hung. *Ethele*], a famous barbaric conqueror and king of the Huns, was a son of Mundzuc (or Mundzuccus). He succeeded his uncle Roas as king of the Huns in 434 A. D., his subjects being nomadic hordes who occupied Pannonia and Sarmatia. He extended his dominion by conquest over Germany and Scythia, and obtained the surname of THE SCOURGE OF GOD. The Vandals, Ostrogoths, and Gepidæ fought under his banner. In 447 A. D. he invaded the Roman empire of the East, and defeated the armies of Theodosius II., who obtained peace by the payment of an annual tribute after the Huns had devastated Thrace and Macedonia. Marcian, who succeeded Theodosius II. in 450 A. D., refused to pay tribute to Attila, saying, "I have gold for my friends and iron for my enemies." In 451 A. D. Attila invaded Gaul with an army estimated at 700,000 men, and besieged Orleans (*Aurelianum*), which was relieved by the approach of a Roman army commanded by Aëtius. Attila retired to Champagne, and awaited the enemy on the Catalaunian plain, near the site now occupied by Châlons-sur-Marne. Here he was defeated in a great battle by the combined armies of Aëtius and Theodoric, king of the Visigoths, in June, 451 A. D. It is stated that 250,000 men or more were killed in this battle. Attila then retreated into Germany. In 452 he led an army into Northern Italy, which he ravaged, and threatened Rome. The emperor Valentinian III., unable to defend his capital, invoked the mediation of Pope Leo I., who had an interview with Attila, and persuaded him to grant the Romans a truce. Attila retired from Italy, and died in Pannonia in 453 A. D., on the night after his marriage with Ildico. He was buried by night, and the prisoners who dug his grave were killed, in order that the place of his burial might be kept secret. He had two sons, named Ellac and Dengezic. His actions form the principal subject of the "Niebelungen-Lied." (See JORNANDES, "De Rebus Geticis;" GIBBON, "Decline and Fall of the Roman Empire," chaps. xxxiv. and xxxv.; WM. HERBERT'S epic poem entitled "Attila," 1828; CALLIMACHUS EXPERIENS, "De Gestis Attilæ," 1541; FESSLER, "Attila, König der Hunnen," 1794; AMÉDÉE THIERRY, "Attila dans les Gaules," 1852.)

Attiwandaronk, Indians called "the Neutral Nation," once lived on Niagara River, mostly in Canada, but they were conquered and scattered by the Iroquois in 1651–53.

At'tleborough, R. R. junction, Bristol co., Mass. (see map of Massachusetts, ref. 5–I, for location of county), 30 miles S. S. W. of Boston. Here are extensive manufactures of jewelry, calicoes, clocks, buttons, braids, etc. Pop. of township in 1880, 11,111; in 1885, 13,175.

Attor'ney [Old Fr. *attorner*, to "prepare," to "direct"], one who acts for or on behalf of another. Attorneys are of two kinds—in fact and at law. An attorney in fact is an agent, though the term is commonly applied to one who is authorized to act for another by a writing called a power of attorney. An attorney at law is one who is authorized by law to act in the place of another in the management or conduct of law proceedings. In England the term is employed to denote a class of legal practitioners whose duties are preliminary to those of the barrister, who conducts the cause in court. An attorney is admitted there after a prescribed term of study, on passing an examination directed by the court. Barristers come to the bar through the action of voluntary societies of lawyers which have existed for several centuries. In the U. S. the same person is in general admitted both as counsellor (answering to barrister) and attorney, and examined in the same manner and under the same authority as to his qualifications to perform both classes of duties. An attorney is an officer of the court, and liable to be punished for a breach of duty, and in aggravated cases to have his name stricken from the roll, and thus lose his right to practice. His duties to his client require the exercise of reasonable care. He is responsible for negligence or wilful default whereby his client sustains loss; for example, for the disclosure by him of confidential communications. He is entitled to compensation, and has a lien upon his client's papers or securities in his possession, and upon any judgment obtained through his exertions.

Attorney-General is an officer under the English government whose duty it is to prosecute for the king in criminal matters, and to manage civil actions or proceedings where his revenue or other property is concerned, as well as to enforce public rights. An illustration is a proceeding for the establishment of charitable foundations by a court of justice, and the correction of abuses in their management. The U. S. and the respective States have a public officer of the same name, with similar duties. Statute law affords a more complete definition of them.

Attorney, Power of. See POWER OF ATTORNEY, by PROF. J. N. POMEROY, LL.D.

Attrac'tion [Lat. *attractio*, from *ad*, "to," and *traho*, to "draw"], the tendency of bodies to approach each other and unite; the force which brings bodies together and resists their separation. The principal kinds of attraction are—the attraction of gravitation (see GRAVITATION); capillary attraction; chemical attraction (see AFFINITY); the attraction of cohesion, which unites the particles of a body, and operates only between two portions of matter that are in contact; and magnetic attraction (see MAGNETISM). These attractions are divisible into two classes—1, those which act at sensible and measurable distances, as gravitation and magnetic attraction; and 2, those which extend only to extremely small or insensible distances, as chemical attraction and the attraction of cohesion.

Attraction of Mountains. In 1774, Maskelyne made an experiment on the mountain Schehallion, in Perthshire, to ascertain the attraction of mountains. This and subsequent experiments have established the fact that mountains are capable of producing sensible deflections of the plumb-lines of astronomical instruments.

At′tribute [from the Lat. *attribuo* (composed of *at* for *ad*, "to," and *trib′uo, tribu′tum*, to "give"), to "give to," to "assign"] denotes, primarily, any quality or power which is by universal consent attributed to a being. Hence, we speak of the "attributes of God," and in a similar manner of those of some particular man or of the human race. In logic, it signifies the opposite of *substance*, and the same as *predicate*.

Attribute, in the fine arts, is a symbol used to distinguish and characterize certain figures. Thus, the trident is the attribute of Neptune; the caduceus, that of Mercury; the owl, that of Minerva. Attributes are either essential or conventional. Essential attributes have some real relation or resemblance to the object or idea to be represented.

At′tucks (Crispus), the leader of the mob in Boston which attacked the British troops Mar. 5, 1770, was a mulatto or half-breed Indian. He was killed in this affray, which was called "the Boston Massacre."

Atwater (Caleb), born at North Adams, Mass., Dec. 25, 1778, graduated at Williams College in 1804, became a lawyer, went to Ohio in 1811, resided at Circleville, and was an Indian commissioner under Jackson. He published "History of Ohio" (1838), etc. Died Mar. 13, 1867.

Atwater (Jeremiah), D. D., born at New Haven, Conn., in 1774, graduated at Yale in 1793, was a college tutor (1795–99), first president of Middlebury College, Vt. (1800–09), and president of Dickinson College, Pa. (1809–15). Died July 29, 1858.

Atwater (Lyman Hotchkiss), D. D., LL.D., born at Hamden, Conn., Feb. 23, 1813, graduated at Yale in 1831, tutor and theological student at Yale (1832–35), pastor of First Congregational church in Fairfield, Conn. (1835–54), became in 1854 prof. of mental and moral philosophy at Princeton, N. J. In 1869 the dept. of economics and politics was given to him, and from that time he was prof. of logic, metaphysics, ethics, economics, and political science. He was principal editor of the "Princeton Review," 1869–78. Died Feb. 17, 1883.

Atwood, capital of Rawlins co., Kan. (see map of Kansas, ref. 4–B, for location of county). Pop. of township in 1885, 731.

At′wood, or **Attwood** (George), F. R. S., an English mathematician, born in London in 1745. He was a fellow of Trinity College, Cambridge, where he lectured on natural philosophy. He published a "Treatise on the Rectilinear Motion and Rotation of Bodies" (1784), a "Dissertation on the Construction of Arches" (1801), and other works. He invented a machine noticed below. (See Atwood's Machine.) Died July, 1807.

Atwood's Machine was invented by George Atwood (noticed above) to demonstrate the laws of uniformly accelerated motion, and illustrate the relations of time, space, and motion in the case of a body falling under the action of gravitation. This machine is so constructed by means of pulleys and wheels that turn with the least possible friction, that a weight (or falling body) suspended from one of the pulleys descends much more slowly than a body falling in free space, yet increases in velocity in the same ratio as when falling in the air. (See Falling Bodies.)

Aubagne, a town of France, in the department of Bouches-du-Rhône, 22 miles by rail E. of Marseilles. It has manufactures of paper, pottery, and leather, and exports excellent wine. Pop. in 1881, 7885.

Aubaine, Droit d', a French term, denotes the right of a sovereign to inherit the property of a foreigner dying intestate without native-born heirs. This practice was abolished in 1790, but was restored by Napoleon I. (See International Law No. I., by Pres. T. D. Woolsey, S. T. D., LL.D.)

Aube, ōb, a river of France, rises in Haute-Marne, flows north-westward through the department of Aube, passing Clairvaux, Bar-sur-Aube, and Arcis, and after a course of 124 miles enters the Seine about 24 miles below Troyes.

Aube, a department in the N. E. part of France, was formed of the southern portion of the province of Champagne and a small part of Burgundy. It is bounded on the N. by the department of Marne, on the E. by Haute-Marne, on the S. by Côte-d'Or and Yonne, and on the W. by Seine-et-Marne. Area, 2317 square miles. It is intersected by the rivers Seine and Aube. The surface is nearly level; the soil is fertile, especially in the S. E. part, which produces grain, wine, etc. It has manufactures of cotton and woollen stuffs, hosiery, glass, and leather. It is divided into 5 arrondissements, 26 cantons, and 446 communes. Capital, Troyes. Pop. in 1881, 255,326.

Aubenas, a town of France, in the department of Ardèche, is picturesquely situated on or near the river Ardèche, 14 miles S. W. of Privas. It stands in a magnificent basin, surrounded by the extinct volcanoes of the Vivarais. It has an old castle, a college, and manufactures of silk and woollen stuffs, paper, etc. Several important fairs are held here. Pop. in 1881, 8260.

Auber (Daniel François Esprit), an eminent French composer, born at Caen Jan. 29, 1782, a pupil of Cherubini, produced in 1813 "Le Séjour Militaire," an opera which was not successful, but his comic opera called "La Bergère Châtelaine" (1820) was warmly applauded. In 1821 he composed "Emma," an opera which was much admired. His works are remarkable for grace, originality, and ingenious combinations. The opera of "La Muette de Portici," or "Masaniello" (1828), is called his masterpiece. He was elected a member of the Institute in 1829. Among his most popular operas are "Fra Diavolo" (1830), "Le Domino Noir" (1837), "Haydée" (1847), and "Manon Lescaut" (1856). He was appointed chapel-master at the Tuileries by Napoleon III. Died May 12, 1871. (See Fétis, "Biographie Universelle des Musiciens;" L. de Loménie, "Galerie des Contemporains.")

Au′ber (Harriet), an English authoress, was born Oct. 4, 1773, and died Jan. 20, 1862. In 1829 she published "The Spirit of the Psalms," containing some of the best versions of modern times.

Au′berlen (Karl August), a prominent German orthodox theologian, born at Fellbach, in Würtemberg, Nov. 19, 1824. Among his works are "The Theosophy of Friedrich Christoph Oetinger" (1847) and "The Prophet Daniel and the Revelation of John considered in their Reciprocal Relations" (1854). Died in 1864.

Aubert (Jean Louis), Abbé, a French poet and fabulist, born in Paris in 1731. He edited a journal called "Les Petites Affiches," and published in 1756 a collection of fables which gained a European reputation. They were highly commended by Voltaire, who wrote to Aubert, "You have placed yourself beside La Fontaine.' He became professor of French literature in the College Royal, Paris, in 1773. Died in 1814.

Aubert du Bayet (Jean Baptiste Annibal), a French general, born in Louisiana Aug. 29, 1759. He fought for the U. S. under Rochambeau, and was chosen in 1791 a member of the French Legislative Assembly, in which he supported the same principles as La Fayette. He commanded at the siege of Mentz, which was taken by the Prussians in 1793, and was minister of war for several months in 1795. Died at Constantinople, where he was ambassador, Dec. 17, 1797.

Aubervilliers, a town in France, in the department of the Seine, 4 miles N. of Paris, and one of its suburbs. Pop. in 1881, 19,437.

Aubigné, d' (Merle). See D'Aubigné.

Aubigné, d' (Théodore Agrippa), a French Protestant historian and soldier, distinguished for his wit, learning, and audacity, was born in Saintonge Feb. 8, 1550. He studied in a college at Geneva, and at an early age joined the Huguenot army, then waging a civil war against the court. He afterwards entered the service of Henry of Navarre, whose favor he enjoyed. He fought for Henry against the Catholic League, and distinguished himself at the battle of Coutras (1587). His chief work is a history of his own times, entitled "Histoire Universelle depuis l'An 1550 jusqu' à l'An 1601" (3 vols., 1616–20). He left autobiographic memoirs ("Histoire secrète de T. A. d'Aubigné," 1729–31). He had a son, Constantine, who was the father of Madame de Maintenon. Died at Geneva April 29, 1630. (See M. A. Sayous, "Vie d'Aubigné;" Davila, "History of the Civil Wars of France.")

Aubin, a French town, department of Aveyron, 20 miles N. E. of Villefranche, in a mining region, with furnaces, etc. It contains a church of the twelfth century with remarkable sculpture, and has considerable trade in sheep, iron goods, etc. Pop. in 1881, 9317.

Au′brey (John), F. R. S., an English antiquary, born in Wiltshire Mar. 12, 1625, inherited a large estate, and became a member of the club of Commonwealth's Men. He was a collector of antiquarian documents, and left several valuable works in manuscript. His "Natural History and Antiquities of Surrey," was published in 1719. He also wrote memoirs of the English poets, which were published in 1813 under the title of "Letters written by Eminent Persons in the Seventeenth and Eighteenth Centuries." Died June 7, 1697.

Auburn, on R. R., Lee co., Ala. (see map of Alabama, ref. 5–E, for location of county), 60 miles E. N. E. of Montgomery, is the seat of the Alabama Agricultural and Mechanical College. Pop. in 1870, 1018; in 1880, 1161.

Auburn, on R. R., cap. of Placer co., Cal. (see map of California, ref. 3–B, for location of county), 36 miles N. E. of Sacramento. Fruit is extensively grown in the vicinity. There are near the town very rich quartz and gravel mines and numerous quartz mills. Auburn has a court-house and jail, a public hall, Masonic and Odd Fellows' halls. Pop. in 1870, 800; in 1880, 1229.

Auburn, on R. R., Sangamon co., Ill. (see map of Illinois, ref. 6–D, for location of county), 15 miles S. W. of Springfield. Pop. in 1880, 788.

Auburn, R. R. junction, cap. of De Kalb co., Ind. (see map of Indiana, ref. 2–G, for location of county). It has large manufactories of hubs, spokes, and staves, and stocking factory. Pop. in 1870, 677; in 1880, 1542.

Auburn, city on R. R., capital of Androscoggin co., Me. (see map of Maine, ref. 9–B, for location of county), 34 miles from Portland, on the Androscoggin and Little Androscoggin rivers, which furnish extensive water-power. It has manufactures of cotton and shoes. Pop. in 1870, 6169; in 1880, 9555.

Auburn, city and important R. R. centre, capital of Cayuga co., N. Y., 174 miles W. of Albany, and on both sides of the outlet of Owasco Lake, 2½ miles distant, which supplies its manufactories with water-power and is also the reservoir for the Auburn Waterworks Company (the Holly system). Many of the private houses display an elegant style of architecture, and are adorned with beautiful gardens. Auburn has sixteen churches and is the seat of a theological seminary under the direction of the Presbyterians, which has recently added large new buildings and is largely endowed. This city was long the home of the late Hon. William H. Seward. Here is a State Insane Asylum and a large stone State prison, celebrated for its system of discipline. The convicts, numbering sometimes 1000 or 1200, are employed in the manufacture of boots, shoes, saddlery-ware, etc.

Manufactures.—The census of 1880 showed 154 manufactories. Capital, $4,423,950; average number of hands employed, 4518; wages paid during the year, $1,658,826; value of products, $7,719,409. The city has manufactures of wool, cotton, iron, threshing-machines, etc. Here are also very large manufactories of reapers, mowers, and binders. Pop. in 1870, 17,225; in 1880, 21,924; in 1885 about 25,000. ED. "AUBURN ADVERTISER."

Auburndale, on R. R., in city of Newton, Middlesex co., Mass. (see map of Massachusetts, ref. 2–H, for location of county), 10 miles W. of Boston. It is the seat of Laselle Seminary.

Auburn Theological Seminary, or **The Theological Seminary of Central and Western New York,** occupies a large three-story stone building, with transept and wings, on elevated ground in the northern part of the city of Auburn. It was founded in 1820. In 1873 its removal was contemplated, but the friends of the seminary having by great exertions raised funds for its endowment, the institution will, it is understood, remain in Auburn. It is sustained by the Presbyterian denomination.

Aubusson, a town of France, department of Creuse, on the river Creuse, 22 miles S. E. of Guéret. It has a celebrated manufactory of carpets. Velvets and woollen stuffs are also made here. Pop. in 1881, 6782.

Aubusson, d' (PIERRE), grand-master of the order of St. John of Jerusalem, was born of a noble French family in 1423. At an early age he joined the order, the headquarters of which was at Rhodes. He distinguished himself by his energy and courage in fighting against pirates, and was employed on important missions to several courts. In 1458 he formed a league between the kings of France and Hungary against the sultan Mahomet II. He was elected grand-master of his order in 1476, and fortified Rhodes as an advanced post for the defence of Christendom against the victorious Turks. The great aim and idea of his life was the formation of a league of Christian princes against the infidels. Early in 1480, Mahomet II. commenced the siege of Rhodes with an army of about 100,000 men. The Turks were repulsed in several desperate assaults, in which Aubusson was severely wounded, and they were forced to abandon the enterprise in July, 1480. In 1501 he was chosen general-in-chief of the armies of the German emperor, the king of France, and the pope, who had formed a league against the Turks. His success was hindered by the jealousy and discord of these allies. Died in 1503. He is regarded as one of the ablest Christian statesmen and commanders of his time. (See BOUHOURS, "Histoire de Pierre d'Aubusson," 1676.)

Auch, ōsh (anc. *Augus'ta Ausco'rum* or *Elimberis*), an old town of France, capital of the department of Gers, on the river Gers, 43 miles by rail S. of Agen. In the time of Cæsar it was the capital of the Ausci or Auscii. It has a beautiful Gothic cathedral, an archbishop's palace, a royal college, a public library, a museum of natural science, and a town-hall. Here are manufactures of linens, cotton stuffs, leather, etc. Armagnac brandy is exported from this town, which was once the capital of Armagnac. Pop. in 1881, 14,186.

Auche'nia [from the Gr. ἀυχήν, the "neck" (so called from the length of their necks)], a genus of South American animals of the order Ruminantia and family Camelidæ. The genus comprises the alpaca and the llama, and other species, all of which inhabit the mountain-ranges of the Andes. They are nearly allied to the camel, which they resemble in general form and in the structure of the stomach. They differ from the camel in having no hump; also in dentition, and in the more cloven feet and movable toes. Some naturalists think that the alpaca is not a distinct species, but a variety of the llama. (See ALPACA.)

Auchmuty, å'mu-te (ROBERT), an eminent lawyer, born in Scotland, settled in Boston, Mass., about 1710. He held several high colonial offices. Died in 1750.

Auchmuty (ROBERT), an able lawyer, son of the preceding, practised at Boston, and was distinguished as an advocate in trials by jury. He was an admiralty judge (1767–76). Having become a zealous Tory in 1776, he went to England, where he died in 1788.

Auchmuty (SAMUEL), D. D., an Episcopal clergyman, a brother of the preceding, was born at Boston Jan. 16, 1722, and graduated at Harvard in 1742. He preached in Trinity church, New York, and obtained in 1764 the charge of all the churches in that city. He adhered to the royalist party in the Revolution. Died Mar. 6, 1777.

Auchmuty (Sir SAMUEL), a British general, a son of the preceding, was born in New York June 22, 1758, and graduated at King's (now Columbia) College in 1775. He fought against the U. S. in 1776–78, served many years in India, and in 1806 obtained command of an army sent to South America. He took the fortified city of Montevideo from the Spaniards in 1807, and captured Java from the Dutch in 1811. Died Aug. 11, 1822.

Auck'land, a seaport-town, former cap. of the British colony of New Zealand, is situated on the N. E. coast of the island of New Ulster; lat. 36° 50' S., lon. 174° 50' E. It has two fine harbors and considerable trade. It is connected by steamships with Sidney, Melbourne, Honolulu, and San Francisco. It is the see of an Anglican bishop, and has four banks, three newspapers, and many fine buildings. The mean temperature of the coldest month is about 50° F., and that of the warmest about 68°. Auckland was founded in 1840. Pop. in 1881, with suburbs, 39,966.

Auckland (GEORGE **Eden**), EARL OF, an English peer, born in 1784, inherited the title of baron at the death of his father in 1814. He acted with the Whigs, became president of the board of trade in 1833, first lord of the admiralty in 1834, and governor-general of India in 1835. He was created earl of Auckland in 1839, and returned to England in 1841. He died without issue in 1849.

Auckland (WILLIAM **Eden**), LORD, an English diplomatist and lawyer, was born in 1745. He was one of the three commissioners appointed in 1778 to negotiate with the revolutionists in the U. S. Having been sent as ambassador to France in 1785, he negotiated a commercial treaty with that nation. He published "Principles of the Penal Law" (1771) and other works. In 1793 he received the title of baron. Died in 1814.

Auckland Islands, a group of islands of volcanic origin, discovered in 1806 by the English, in the South Pacific, about 180 miles S. of New Zealand. The largest island is about 30 miles long and 15 miles wide, and has two good harbors. This group is valuable as a whaling-station.

Auc'tion [from the Lat. *augeo, auctum,* to "increase"], in law, the act of exposing property for sale by open competition to the highest bidder, by a person called an auctioneer. Every bid is deemed to be an offer, which is accepted by the auctioneer when his hammer falls. On general principles of the law of contracts, the offer may be withdrawn by the bidder at any time before acceptance. The acceptance of a higher offer is the rejection of the lower one. Such a sale must be fairly conducted, both on the part of the seller and buyer. The secret employment of "puffers" or fictitious bidders by the owner to unduly enhance the price is a fraud on the purchaser, who may avoid such a sale. The same rule applies to secret agreements between purchasers to stifle competition. Such sales frequently take place under conditions made known at the time of sale. These must be followed by the party to whom they are applicable. An auctioneer is to some extent an agent for both parties—as, for example, to sign on their behalf a written memorandum of sales, where that is required by law. The conduct of auctioneers is sometimes regulated by statute.

Audæus, or **Audius** [in Syriac *U'do*], the founder of a religious sect called Audians, was a native of Mesopotamia. He was banished to Scythia in 338 A. D., and died about 370 A. D. He incurred the enmity of the clergy by censuring their luxury and vices. The Audians are accused of professing anthropomorphism.

Aude, a maritime department in the S. of France, is bounded on the N. by the departments of Tarn and Hérault, on the E. by the Mediterranean, on the S. by the Pyrénées-Orientales, on the W. by Ariège and Haut-Garonne, and has an area of 2437 square miles. It was formerly part of the province of Languedoc. The surface is partly mountainous, being near the foot of the Pyrenees; the soil of the valleys is fertile and calcareous. It is intersected by the river Aude and the canal of Languedoc (or Canal du Midi). Among the mineral resources of Aude are iron, coal, and marble. The staple productions are grain, olives, wine, and fruits. It has manufactures of silk and woollen stuffs, paper, and brandy. Capital, Carcassonne. Pop. in 1881, 327,942.

Audebert (JEAN BAPTISTE), an eminent French artist and naturalist, born at Rochefort in 1759. He first acquired distinction as a miniature-painter, and subsequently applied himself to natural history, the love of which became his ruling passion. He published in 1800 a "Natural History of Apes, Lemurs, and Galeopitheci," with sixty-two admirably colored plates, printed in oil-colors by a new method which he invented. He was the first to use gold-leaf in illustrating the plumage of birds. His splendidly illustrated "History of Humming-birds, Flycatchers, Jacamars, etc." appeared in 1802. He died in 1800.

Au'denar'de, or **Oudenarde,** a town of Belgium, in East Flanders, on the Scheldt, 14 miles S. S. W. of Ghent. It has a fine Gothic town-hall. Tanning and brewing are the chief branches of industry. Pop. 4835. Here Prince Eugène defeated the French army in July, 1708.

Au'diphone, a new instrument for the deaf, invented by R. S. Rhodes of Chicago, Ill., shaped like a large fan, and made of a sheet of vulcanized rubber about $\frac{1}{22}$d of an inch thick, fastened to a handle of the same substance. This sheet is curved at the farther end, when used, by pulling a cord which is put through holes in the upper edge and passes along the inner side of the sheet into a slot in the handle. The curve required is very small, but the more deaf the person using the instrument the tighter must the rubber be drawn. When in use the straight or lower end of the sheet is kept in contact with the upper jaw-teeth, and any sound striking against the rubber sheet is communicated to the nerve of the ear through the teeth and bones of the head, so that ordinary conversation can be heard. The same result is produced in case of artificial teeth if well fitted.

Au'ditory Nerve, the nerve of hearing, is the seventh in order of origin from the base of the brain, counting from before backward. The seventh pair consists of the portio dura (or facial), the portio mollis (or auditory), and a small intermediate portion. The portio mollis apparently commences in the floor of the fourth ventricle; it then runs forward to the back of the petrous portion of the temporal bone, and enters the internal auditory meatus. It then divides into two portions, which diverge—the smaller one for the semicircular canals and the vestibule, the other for the cochlea. Those entering the semicircular canals divide into five branches, forming at last a nervous expansion somewhat analogous to the retina. (See EAR and ACOUSTICS.)

Audley (THOMAS), LORD AUDLEY OF WALDEN, an English lawyer, born in Essex in 1488. He became Speaker of the House of Commons in 1529, keeper of the great seal in 1532, and lord chancellor of England in 1533. He presided at the trial of Sir Thomas More. According to some authorities, he disgraced himself by his subservience to the arbitrary will of Henry VIII. Died April 30, 1544. (See LORD CAMPBELL, "Lives of the Lord Chancellors."

Audouard (OLYMPE). See APPENDIX.

Audouin (JEAN VICTOR), an eminent French naturalist and comparative anatomist, born in Paris April 27, 1797. He was one of the founders of the "Annales des Sciences Naturelles," first issued in 1824, and co-operated with Milne-Edwards in researches into the Crustacea and Annelida. He succeeded Latreille as professor of entomology at the Museum in 1833, and was chosen a member of the Institute in 1838. Among his works is a "History of the Insects which infest the Vine" (1840–43). Died Nov. 9, 1841.

Audran (GÉRARD), a French engraver of the first order, was born at Lyons Aug. 2, 1640. He studied under Carlo Maratta at Rome for several years, and returned to Paris about 1670. Having been appointed engraver to the king, he engraved for him the masterpieces of Le Brun, "The Battles of Alexander." Among his works are two cartoons of Raphael, representing the "Death of Ananias" and "Paul and Barnabas at Lystra," and "Coriolanus," after Poussin. He is estimated by some critics as the greatest historical engraver that ever lived. Died Feb. 8, 1691. (See FONTENAI, "Dictionnaire des Artists;" STRUTT, "Dictionary of Engravers."—Other members of the Audran family attained eminence as engravers: as Benoît (1661–1721), Claude père (1592–1677), Claude fils (1640–84), Germain (1631–1710), and Jean (1667–1756).

Audubon, R. R. junction, capital of Audubon co., Ia. (see map of Iowa, ref. 5–E, for location of county). Pop. in 1880, 792; in 1885, 1152.

Au'dubon (JOHN JAMES), a celebrated naturalist, born in Louisiana on the 4th of May, 1780. He was the son of an opulent French naval officer who owned a plantation in the then French colony. In his childhood he became deeply interested in the study of birds and their habits. He was educated partly in Paris, whither he was sent about 1794, and he studied design under David, the eminent painter. He returned to the U. S. about 1798, and settled on a farm which his father gave him, on the Perkiomen Creek, in Eastern Pennsylvania. Here he found time and opportunity for his favorite study. He married Lucy Bakewell in 1808, sold his farm, and became a merchant at Louisville, Ky. About 1810 he began to make extensive excursions through the primeval forests of the Southern and South-western States, in the exploration of which he passed many years. He made colored drawings of all the species of birds that he found. He resided with his wife and children for several years at Henderson, on the Ohio River. In 1824 he visited Philadelphia, where he met Charles Lucien Bonaparte, who encouraged him to publish a work on ornithology. Before this date he is said to have failed in trade and been reduced to poverty, and to have successively followed the occupation of portrait-painter and dancing-master. He went to England in 1826, and commenced in London the publication of his great work, for which he obtained a large number of subscribers at $1000 a copy. This admirable work was entitled "The Birds of America" (10 vols. folio, 1830–39), and was illustrated with 448 beautiful colored plates of 1065 species of birds, of the natural size. The work is divided into five volumes of letter-press, and five of engravings designed by the author. This was pronounced by Cuvier "the most magnificent monument that art ever raised to ornithology." Audubon returned to America in 1829, and again explored the forests, lakes, and coasts from Canada to Florida, to collect materials for another work. This was his "Ornithological Biography, or an Account of the Habits of the Birds of the United States, etc." (Edinburgh, 5 vols., 1831–39). He revisited England in 1831, and returned home in 1839, after which he resided on the Hudson River, near the city of New York. He published a cheaper edition of his "Birds of America" (7 vols. 8vo, 1844), and was associated with Dr. Bachman in the preparation of a work on "The Quadrupeds of North America," with plates (6 vols., 1846–50), the drawings of which were made by his sons, Victor Gifford and John Woodhouse Audubon. He died in New York City Jan. 27, 1851. (See "Life and Adventures of John J. Audubon," edited, from materials supplied by his widow, by ROBERT BUCHANAN, 1869.)

WILLIAM JACOBS.

Au'enbrug'ger von Au'enbrug' (LEOPOLD), called AVENBRUGGER by the French, a German physician who introduced percussion of the chest as a means of diagnosis, was born at Gratz, in Styria, in 1722. He announced his discovery in a work called "Inventum novum ex Percussione Thoracis Humani" ("New Discovery by the Percussion of the Human Chest," 1761). Died in 1809.

Auerbach (BERTHOLD), a very popular German author, born at Nordstetten in the Black Forest, Würtemberg, Feb. 28, 1812. He was intended for the synagogue, and was educated at Carlsruhe, Tubingen, Heidelberg, and Munich universities, but at eighteen announced his intention of devoting himself to literature. His earliest work was "Judaism and Modern Literature," but his merit was not recognized until he issued his "Village Tales of the Black Forest." During the Franco-Prussian war he was correspondent for one of the Berlin papers. Among his novels are "Baarfüssle," "Edelweiss," "On the Heights," "Joseph in the Snow," and "Waldfried" (1874). "The Professor's Lady" is perhaps his most characteristic work. Died Feb. 8, 1882.

Auerbach (HEINRICH), a German medical professor, whose proper name was STROMER, was born at Auerbach, in Bavaria, in 1482. He was a friend of Luther and a citizen of Leipsic. According to tradition, Doctor Faust rode out of Auerbach's cellar on a barrel. Died in 1542.

Auersperg (A. W. D.), PRINCE. See APPENDIX.

Au'ersperg', von (ANTON ALEXANDER), COUNT, a German poet whose *nom-de-plume* was ANASTASIUS GRÜN, was born at Laybach April 11, 1806. He displayed much wit and humor in a poem called "Spaziergänge eines Wienar Poeten" ("Promenades of a Poet of Vienna," 1831). Published a volume of poems ("Gedichte," 1838). D. Sept., 1876.

Auersperg (CARLOS), PRINCE, an Austrian statesman, born May 1, 1814. In 1867–68 he was for a short time president of the Cisleithan ministry. He has been a member of the Reichstag, of which he was president, and of the Bohemian Diet, where he acted with the German party.

Auerstädt, ŏw'er-stĕt, a village of Prussian Saxony, 10 miles W. of Naumburg, noted as the scene of an important victory gained by the French general Davoust over the Prussians, commanded by the duke of Brunswick, Oct. 14, 1806, which was also the date of the battle of Jena.

Au'erswald', von (HANS ADOLPH ERDMANN), a Prussian general, born Oct. 19, 1792, gained distinction by his scientific attainments, and was elected to the Parliament at Frankfort in 1848. As he was walking in Frankfort in company with Prince Felix Lichnowsky, a mob attacked and killed them, Sept. 18, 1848. His death appears to have been an incidental consequence of his being in company with the prince, who was obnoxious to the populace.

Auf'fenberg', von (JOSEPH), FREIHERR, a German dramatist and poet, born at Freiburg, in Brisgau, in 1798. Among his numerous works are "The Alhambra," a dramatic poem (1830), and "Louis XI. in Péronne," a drama. Died in 1857.

Au'fidus, the name of an ancient river in Italy, near the mouth of which was fought the great battle of Cannæ, 216 B. C. (See OFANTO.)

Au'geas [Gr. *Αὐγέας* or *Αὐγείας*], a mythical king of Elis, who is said to have owned 3000 oxen. One of the twelve labors imposed on Hercules by Eurystheus was to cleanse the Augean stables, in which the dung of these oxen had accumulated for many years. Hercules turned the rivers Alpheus and Peneus through the stables, and killed Augeas because he refused to pay his wages.

Augereau (PIERRE FRANÇOIS CHARLES), DUC DE CASTIGLIONE, a French marshal, born in Paris Oct. 21, 1757, became a fencing-master at Naples before the Revolution, enlisted as a private in the French army in 1792, and gained the rank of general of division in 1796. In 1796 he contributed to the victories of Lodi, Castiglione, and Arcola. He enforced the will of the majority of the Directory in the *coup-d'état* of the 18th Fructidor, 1797, and was chosen a member of the Council of Five Hundred in 1799. He became a marshal of France in 1804, duke of Castiglione in 1805, served with distinction at Jena in 1806, and was wounded at Eylau in 1807. In 1813 he displayed intrepid courage at Leipsic. He transferred his allegiance to Louis XVIII. in 1814. Died June 12, 1815.

Au'gian Co'dex, a defective uncial manuscript of a part of the New Testament, was found in the monastery of Augia Major, at Rheinau, was purchased by Dr. Bentley in 1718, and is now in Trinity College, Cambridge.

Augier (ÉMILE), born at Valence, Sept. 17, 1820, received an excellent education, was designated for the bar, but soon announced his intention of devoting himself to literature, and wrote his celebrated comedy in verse "La-Ciguë" (1844), which met with immense success. In 1849 his comedy "Gabrielle" caused a great sensation and gained the Montyon prize of the French Academy. But his two *chefs-d'œuvres* are "Les Effrontés," 1860, and "Le Fils de Giboyer," Dec. 1, 1862. Augier immediately took rank as the first dramatist of the French stage. His later works are "La Contagion" (1866), "Paul Forestier" (1868), and "Les Fourchambaults" (1878).

Au'gite [from the Gr. *αὐγή*, "splendor"], a crystalline mineral sometimes called **Pyroxene,** is nearly allied to hornblende. It often occurs in volcanic rocks, is composed of silica, lime, and magnesia, and is usually of a greenish color. It crystallizes in six or eight-sided prisms variously modified, and is an essential component of basalt, dolerite, and augite porphyry.

Augs'burg (anc. *Augus'ta Vindelico'rum*), an ancient and important city of Germany, in Bavaria, capital of the province of Swabia and Neuburg, is situated on the river Lech, at the mouth of the Wertach, 39 miles by rail W. N.W. of Munich; lat. 48° 21′ 42″ N., lon. 10° 54′ 16″ E. Several railways extend from it towards the four cardinal points, and connect it with Munich, Nuremberg, etc. The Roman emperor Augustus planted a colony here in 12 B. C. It became a free imperial city in 1276, after which it was an important commercial emporium. This city was also one of the chief centres of German art, and the native place of Holbein. It was also the native place of the Fugger family, at one time the richest family in Europe. Some decline in its prosperity occurred after 1500, but it still has an extensive trade and many large manufactories of cotton, silk, machinery, and paper. Augsburg is one of the principal money-markets of the Continent, and owes much of its importance to its banking-business and operations in stocks. The "Allgemeine Zeitung," issued in Augsburg, is one of the most celebrated and widely circulated journals of Germany. Pop. in 1880, 61,408.

Augs'burg Confes'sion, the first Protestant Confession of Faith, drawn up by Melanchthon, sets forth the doctrines held by Luther and his followers. This Confession was presented to Charles V. at a German Diet convened at Augsburg June 20, 1530. The original copies of this document, in German and Latin, are not known to be extant. The emperor forbade the publication of the Confession without permission obtained from himself; but a surreptitious and erroneous publication having been made, it became necessary for Melanchthon to issue correct copies of the text, both in German and Latin. This Confession, with its subsequent Apology, became a standard for the Reformers, and to this day is regarded as authoritative among the Lutheran churches. (See LUTHERANISM.)

Au'gur, a Latin word used by the ancient Romans to denote a soothsayer, a diviner, a person who professed to foretell events by the flight of birds or other omens. The augurs were supposed to be capable of interpreting the will of the gods, and divinely gifted with special qualifications for this service. Their office was considered as very important in the state, no public enterprise being undertaken unless they declared the omens favorable. Their divinations were called auguries or auspices, the latter of which terms, though properly applied to the inspection of the flight of birds, was extended by the Roman writers to other signs. In the early period of Roman history the number of augurs was only three or four, who must be patricians. The Ogulnian law, passed 300 B. C., rendered the plebeians eligible to the office of augur, and increased the number to nine. The augurs held office for life, and had the power of filling vacancies that occurred in their college. The college of augurs in some periods of Roman history had great political influence, it being contrary to the religion and usage of the Romans to hold an election, to commence a battle or campaign, or perform any important public business, without consulting the auspices. Sulla raised the number of augurs to fifteen, and Julius Cæsar to sixteen.

Augur (CHRISTOPHER C.), an American officer, born 1821 in New York, graduated at West Point in 1843, in infantry till Mar. 4, 1869, when he became brigadier-general U. S. army. He served chiefly at frontier posts 1843–61, in the military occupation of Texas 1845–46, in the war with Mexico 1846–48, engaged at Palo Alto, Resaca de la Palma, and as aide-de-camp to Brigadier-Generals Hopping and Cushing, scouting and on expeditions against Northern Pacific Indians 1855–56, engaged in several skirmishes, and as commandant of cadets at Military Academy 1861. In the civil war became, Aug. 9, 1862, major-general U. S. volunteers, and served in the defences of Washington 1861–62, in operations on Rappahannock and in the Shenandoah Valley 1862, in command of a division in the Fifth corps 1862, engaged at Cedar Mountain (severely wounded and brevet colonel), in General Banks's expedition to New Orleans 1862; in command of the district of Baton Rouge 1863, in expedition to Fort Hudson 1863 (brevet brigadier-general), engaged in action and siege of the place; in command of department of Washington 1863–66, of the Platte 1867–71, and of Texas since 1871. Brevet major-general Mar. 13, 1865, for gallant and meritorious services in the field. Retired July 10, 1885. GEORGE P. CULLUM.

Augur (HEZEKIAH), an American sculptor, born at New Haven, Conn., Feb. 21, 1791, was also noted for mechanical ingenuity. He invented a carving-machine which is in general use, and as sculptor produced "Jephthah and his Daughter." Died Jan. 10, 1858.

Au'gust [Lat. *Augus'tus;* Fr. *Août*], the eighth month of the year, was so named in honor of Augustus Cæsar. Before his time it was called *Sexti'lis*—that is, the *sixth* month, because the Roman year once began on the 1st of March. In the calendar of Julius Cæsar the first, third, fifth, seventh, ninth, and eleventh months consisted each of thirty-one days, and each of the other months of thirty, except February, which in common years had twenty-nine, and in leap-year thirty days. To gratify the vanity of Augustus, one day was taken from February and added to August.

Augusta, capital of Woodruff co., Ark. (see map of Arkansas, ref. 3–E, for location of county), on White River, 69 miles N. E. of Little Rock. Pop. in 1880, 702.

Augusta, city and important R. R. and commercial centre, capital of Richmond co., Ga. (see map of Georgia, ref. 3–J, for location of county), the third city in size in the State, situated on the left bank of the Savannah River, 231 miles from its mouth, 120 N. N. W. from Savannah, and 136 N. W. from Charleston. It is at the head of steamboat navigation on the Savannah. Lat. 33° 28′ N., lon. 81° 54′ W. From its position it is actively engaged in the cotton trade, receiving annually about 200,000 bales from a considerable portion of Georgia and South Carolina. Augusta also furnishes a good market for the general produce of its region. For many years it was the centre of the wagon-traffic, sending out goods in all directions in the great lumbering wagons of that time, and receiving cotton and produce in return. The Augusta Canal, 9 miles in length, brings the waters of the Savannah River from above the city at such an elevation as to give a head of water-power of 33 feet.

Manufactures.—Augusta is one of the largest manufacturing centres of the South. The census of 1880 showed 60 manufactories; capital, $2,069,275; average number of hands employed, 1680; wages paid during the year, $448,825; value of products, $3,139,029. The city had in 1883 cotton-mills valued at nearly $5,000,000, besides the Graniteville and Langley cotton-mills, which are practically a part of its manufacturing system. Here are also extensive manufactures of chemicals, flour, iron, lumber, ice, cotton-seed oil, tobacco, etc.

Education, etc.—Augusta has a medical school, the Medical College of Georgia, founded in 1830, a department of the State University at Athens. It has also an incorporated academy called the Richmond Academy, 3 high schools (one for colored pupils), 7 grammar schools, 12 intermediate schools, and 26 primary schools. Of the 12,000 children in the county of school age (six to eighteen) about 5000 are enrolled, and the average attendance in the city is about 3000. The income of the public schools is about $37,000. The city has 2 hospitals, connected with the medical college, a Masonic hall, the Augusta Orphan Asylum, richly endowed, 2 Roman Catholic orphan asylums, a widows' home, and some other charitable institutions.

Public Buildings and Monuments.—Among the principal are a costly and very beautiful city-hall, Odd Fellows' hall, the Masonic hall, Richmond Academy, the medical college, the opera-house, Independence and Confederate monuments, and several of the churches.

Streets, Avenues, etc.—These are spacious and elegant. The principal streets, Broad and Greene, have double rows of wide-spreading trees on each side of the commodious highways. The residences on lower Broad and Greene and other streets are tasteful and elegant. The streets cross each other at right angles. There is a well-regulated police force. The city cemetery, the Park, and the Cotton States' Agricultural Fair Grounds, near the city, are laid out in fine walks and drives, and are favorite places of resort. There is a horse-railroad from the city to Summerville, a beautiful suburb, which is one of the most noted resorts in the South for invalids. Water is supplied to the city from the Augusta Canal, which is now being enlarged and its power greatly increased. Augusta is lighted with gas. The assessed value of property is about $18,000,000. Pop. in 1870, 15,389; in 1880, 21,891.

History.—Augusta was settled by English colonists under Oglethorpe, and laid out in 1735 under royal charter, and was named in honor of an English princess. It was again chartered in Jan., 1798, and incorporated as a city in Dec., 1817. It was for many years the most important inland town of the colony. It had acquired a considerable trade at the commencement of the Revolutionary war, but in the beginning of 1779 was captured by the British and loyalists, who held possession of it till the spring of 1781, when the British force there was commanded by a loyalist named Brown. On May 23, 1781, an American force under command of General Henry Lee ("Lighthorse Harry") laid siege to it, and on the 5th of June Brown surrendered. The Americans lost 51 killed and wounded; the British lost 52 killed, and 334, including the wounded, were taken prisoners. Augusta was the capital of Georgia for a number of years after the Revolutionary war. During the war of 1812 or the Indian wars it was not molested. In the late civil war it was garrisoned by the Confederate troops, and twice threatened by Sherman—in his March to the Sea, when he passed between it and Macon; and in his march through the Carolinas, when he made feints against both Augusta and Charleston—but it was not visited by a hostile force. Patrick Walsh,

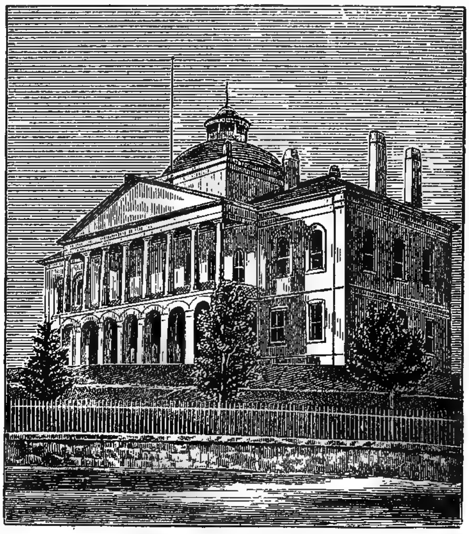
President of "Chronicle and Constitutionalist."

Augusta (anc. *Megara*), a town of Italy, in the province of Nolo, is situated on an island, which is connected by a bridge with the peninsula Cape San Croce, 19 miles by rail N. N. W. of Syracuse. Pop. 9223.

Augusta, Kan. See Appendix.

Augusta, city, Bracken co., Ky. (see map of Kentucky, ref. 2–I, for location of county), on R. R. and the Ohio River, 43 miles above Cincinnati, is the seat of Augusta Male and Female Coll. Pop. in 1870, 960; in 1880, 1282.

Augusta, city, on R. R., capital of the State of Maine, and seat of justice of Kennebec co. (see map of Maine, ref. 9–C, for location of county), is on the Kennebec River, at the head of tidal navigation, 43 miles from its mouth, and 63 miles by railroad N. N. E. of Portland; lat. 44° 19′ N., lon. 69° 50′ W. The Augusta division of the Maine Central R. R. passes through it. The main part of the city is on the right (W.) bank of the river, and many of the residences stand on ground which is much higher than the river. The State-house is a handsome granite structure. Among the public institutions are a hospital for the insane, a U. S. arsenal, and St. Catharine's school for young ladies. By the construction of a dam across the river just above the city, abundant water-power has been obtained, which is employed in manufactures of cotton goods and lumber. Augusta has a free library and the Maine State Library. The National Military Asylum is just outside the city limits. Nearly all the business portion of the city was consumed by fire in Sept., 1865. Pop. in 1870, 7808; in 1880, 8665.



State Capitol (Augusta, Me.).

Alden Sprague, Ed. of "Kennebec Journal."

Augusta, capital of Perry co., Miss. (see map of Mississippi, ref. 9–H, for location of county), on Leaf River, 110 miles S. E. of Jackson. Pop. in 1880, 52.

Augusta, city, on R. R., Eau Claire co., Wis. (see map of Wisconsin, ref. 4–C, for location of county), 22 miles E. S. E. of Eau Claire. Pop. in 1880, 1116; in 1885, 1263.

Augusta'na College and Theolog'ical Sem'inary was founded in 1860, and held its sessions in the basement of the Swedish Lutheran church in Chicago, Ill. In 1863 it was removed to Paxton, Ford co., Ill. Its primary object is the education of candidates for the gospel ministry of the Evangelical Lutheran Church among the Scandinavian population of this country. It was incorporated Feb. 16, 1865, and its charter was amended Mar. 10, 1869. The institution has a library of 7000 volumes. The first principal was the Rev. L. P. Esbjorn. In 1863, Rev. T. N. Hasselquist, D. D., was elected president. This institution has been removed to Rock Island, Ill.

T. N. Hasselquist.

Augusti (Christian Johann Wilhelm), born Oct. 27, 1772, at Eschenburg, near Gotha, Germany, studied at Jena, where he became a professor extraordinary in 1800, professor of Oriental literature in 1803, and professor of theology in 1807. In 1812 he became professor of theology at Breslau, and in 1819 at Bonn. In 1833 he became director of the conservatory at Coblentz, where he died April 28, 1841. He was a man of great learning, an orthodox conservative Lutheran. His writings are valued as books of reference, though they are not without serious faults. His best-known work is "Denkwürdigkeiten aus der Christlichen Archæologie" (12 vols., 1817–31). He published various other works, historical and dogmatical.

Au'gustine [Lat. *Aure'lius Augusti'nus*], SAINT, the most eminent of the Latin Fathers of the Church, was born at Tagaste, in Numidia, on the 13th of Nov., 353 A. D. He was a son of a pagan father and a Christian mother (Monica or Monnica), an excellent and devout woman, by whom he was instructed in religion. Educated at the best schools of Madaura and Carthage, he learned rhetoric, the Greek language, philosophy, etc. When, at the age of seventeen, he entered the great city of Carthage to complete his education, he was an eager, ambitious student and a youth of ardent passions, with a propensity to sensual pleasure. According to his own statement in his "Confessions," he deviated widely from the path of strict morality during this period, and became a father before he was married. About the age of nineteen he embraced the doctrines of the Manichæans, and returned to Tagaste, where he taught rhetoric and grammar. He adhered to Manichæism about nine years, during part of which he lectured on rhetoric at Carthage. In the mean time his mother, by her prayers and exhortations, strove to convert him to Christianity, without success. He wrote at Carthage in his twenty-seventh year a treatise, "De Apto et Pulchro," which is not extant. At length he perceived that the mystical phrases and futile speculations of the Manichæans were not capable of satisfying the wants of his spiritual nature. Much perplexed with doubts and unrest, he removed in 383 A. D. to Rome, and thence to Milan, where he was appointed professor of rhetoric in 384. He was deeply interested in the Platonic philosophy, and after he renounced Manichæism studied the Bible from a Platonic point of view. The sermons of Saint Ambrose, then bishop of Milan, made a deep impression on him, and after severe spiritual conflicts he became a Christian, and was baptized on Easter Eve, 387. In 388 he went back to Tagaste, was ordained presbyter at Hippo in 391, associate bishop in 395, and bishop in 396. Among his earlier writings was a treatise against the Manichæans ("De Genesi contra Manichæos"), and "On True Religion" ("De Vera Religione"). He published about 397 his "Confessions," in thirteen books, a very interesting autobiography. He was a zealous opponent of Pelagianism, against which he wrote two treatises, entitled "On the Grace of Christ" and "On Original Sin." Semi-Pelagianism was opposed by him, in 428, in two famous treatises on "Predestination" and on "Perseverance." He also wrote vigorously against the Donatists. He finished about 426 a work, "De Civitate Dei" ("On the City of God"), which is regarded as the greatest monument of his genius and learning. One aim of this book was to vindicate the Christian faith against those pagans who asserted that the capture of Rome by Alaric and other calamities were consequences of the prevalence of the new religion. Near the end of his life he wrote the "Retractationes," in which he reviewed carefully all his own works. Other important treatises are the "De Doctrina Christiana" and the "De Trinitate." He left behind him also exegetical treatises, sermons, and letters in great number. The best edition of his works is that published by the Benedictines at Paris (11 vols., 1679–1700). He died at Hippo while that city was besieged by the Vandals, on the 28th of Aug., 430 A. D. His character and writings exerted an immense and durable influence on the Church. "Of all the Fathers of the Latin Church," says Villemain, "Saint Augustine manifested the most imagination in theology, the most eloquence, and even sensibility, in scholasticism." For learning his reputation is not so high. He was a poor Greek scholar, and knew nothing of Hebrew. (See POSSIDIUS, "Vita Sancti Augustini;" G. MORINGO, "Vie de Saint-Augustin," 1533; TILLEMONT, "Mémoires Ecclésiastiques," 1702; RIVIUS, "Vita Sancti Augustini," 1646; POUJOULAT, "Vie de Saint-Augustin," 1852; BINDEMANN, "Augustine's Leben," 1844; BUTLER, "Lives of the Saints;" NEANDER, "History of the Church.")

REVISED BY R. D. HITCHCOCK.

Augustine, or **Austin,** SAINT, the "apostle of England" and first archbishop of Canterbury. He was a Benedictine monk, connected with a monastery in Rome, when he was sent by Pope Gregory I. to convert the Anglo-Saxons, in 596 A. D. He was received amicably by King Ethelbert, whose wife Bertha was already a Christian. He converted Ethelbert, and is said to have baptized 10,000 of his subjects. Augustine was appointed archbishop of Canterbury by the pope. Died in 604, or, as some say, 614. (See W. F. HOOK, "Lives of the Archbishops of Canterbury," vol. i.)

Augustin'ian Monks, a monastic order of the Roman Catholic Church. This order was formerly divided into three classes, of which two still remain: I. *Canons Regular.*—This class of ecclesiastics originated at Avignon in the year 1038, by authority of the bishop Benedict of Avignon. They were called Canons Regular because their ranks were recruited from the lay and clerical canons who had not previously taken monastic vows. They assumed the name and rule of Augustine in 1139. They had 170 houses in England and 28 in Scotland. II. The so-called *Hermits of St. Augustine,* one of the four great mendicant orders of the Church. This body incorrectly claims to have been founded by Saint Augustine. Its true origin was in 1256, when Pope Alexander IV. compelled eight small bodies of Italian monks to unite in one order under the rule of St. Augustine, and exempted them from the jurisdiction of bishops. The Hermits of St. Augustine have now about 200 houses. They are much diminished in importance. *The Special Congregations* consisted of those Augustinians who desired a severer rule and better discipline than commonly prevailed in the order. Martin Luther was a member of the Special Congregation of Saxony. III. *The Barefooted Augustinians* originated in 1582, by command of the king of Spain. They have a very severe rule. The number of monasteries in 1860 was about fifteen. This class is nearly or quite independent of the former.

Augustinian Nuns are of four classes: First, those under the guidance of Augustinian monks; secondly, those under the control of diocesan bishops; thirdly, barefooted nuns; fourthly, Augustines of the Interior of Mary. (See MIGUE, "Dictionnaire des ordres Religieux," tom. iv.; DUGDALE, "Onomasticon," vi. 37.)

Augusto'wo, or **Augustow,** a town of Russian Poland, in the government of Suvalki, on the Netta, 140 miles N. E. of Warsaw. It has manufactures of cotton and woollen goods. Pop. in 1882, 11,094.

Augustowo, Canal of, unites the Vistula with the river Niemen, and connects it with the Baltic at Memel. It is 150 miles long, extending from Wizna on the Narew to a point on the Niemen, 14 miles N. of Grodno.

Augus'tulus (ROMULUS), the last Roman emperor of the West, was a son of Orestes, a rich patrician. He obtained the title of emperor in 475 A. D., and was deposed by Odoacer in 476.

Augus'tus, a Latin word equivalent to the Gr. Σεβαστός, signifies "majestic," "sacred," "venerable." It was a name or surname conferred on Caius Julius Cæsar Octavianus by the Roman senate, 27 B. C.

Augus'tus (or **August**) **I.,** elector of Saxony, a son of Henry the Pious, was born at Freiberg in 1526, and succeeded his brother Maurice in 1553. He was an intolerant promoter of Lutheranism, and persecuted the Calvinists, but was a liberal patron of learning, and under his administration the manufactures, agriculture, and commerce of the country were greatly promoted and improved; he also introduced some valuable reforms in jurisprudence. He was chiefly instrumental in negotiating the peace of Augsburg (1555). He died in 1586, and was succeeded by his son, Christian I.

Augustus II. of Saxony (and **Augustus I.** of Poland), born at Dresden in 1670, was the second son of John George III., elector of Saxony, and Anna Sophia of Denmark. He possessed extraordinary physical strength, and was not deficient in mental faculties. He became elector of Saxony on the death of his brother in 1694, and was elected king of Poland in 1697, having, for the sake of the crown, adopted the Roman Catholic religion. His competitor in this election was the French prince of Conti. Augustus formed about 1700 an alliance with Peter the Great against Charles XII. of Sweden, by whom he was defeated in several battles. By a treaty signed in 1706 he renounced the crown of Poland, which Charles XII. gave to Stanislas Lesczynski. In consequence of the defeat of Charles XII. by the Russians in 1709, Augustus recovered the throne of Poland, and as an ally of Peter the Great waged war against Sweden for several years. Augustus was luxurious, licentious, and fond of splendor. He squandered the revenues of Saxony on his mistresses and on alchemists, whom he patronized. He had many illegitimate children, among whom was the famous Maurice of Saxony (Marshal Saxe). He died in Feb., 1733, leaving the throne to his son Augustus. (See FASSMANN and HORN, "Friedrich August des Grossen Leben," 1734; DESROCHES DE PARTHENAY, "Histoire de Pologne sous le Roi Auguste II.," 4 vols., 1734.)

Augustus III. (FREDERICK), king of Poland, born at Dresden in 1696, was a son of the preceding. He was inferior in talents to his father. Having joined the Roman Catholic Church, he married, in 1719, Maria Josephine, a daughter of Joseph, emperor of Austria. In 1733 he became elector of Saxony, and was chosen king of Poland by a party of the Diet. Favored by the courts of Austria and Russia, he prevailed over his rival Stanislas. In 1742 he formed an alliance with the empress Maria Theresa against Frederick the Great, who defeated the Saxons in 1745 and captured Dresden. This war was ended in 1746, but Augustus was soon involved in the Seven Years' war, which began in 1755, and his army was again defeated by the Prussians. He died in 1763, and his son, Frederick Christian, then became elector of Saxony.

Augustus (William), prince of Prussia, a younger brother of Frederick the Great, was born at Berlin in 1722. He distinguished himself at Hohen-Friedberg in 1745, became a general of infantry, and displayed skilful generalship at the battle of Lowositz in 1756. He died in 1758, and left a son, who became King Frederick William II.

Augus'tus Cæ'sar (often called simply **Augustus**), called in his youth Caius Octavius, and after he became the heir of Cæsar the dictator, Caius Julius Cæsar Octavianus, the first Roman emperor, was born at Velitræ in 63 B. C. He was the son of Caius Octavius, a senator, and Atia, who was a niece of Julius Cæsar. His father having died about 60 B. C., his mother was married to L. Marcius Philippus, who directed the education of young Octavius. At the age of sixteen he assumed the *toga virilis*, and was adopted as a son by Julius Cæsar, whom he attended in his expedition to Spain in 45 B. C. He became a pupil of Apollodorus of Pergamus, under whom he was pursuing his studies at Apollonia when Cæsar was killed, in Mar., 44 B. C. As he had been appointed the heir of the dictator, he hastened to Rome to claim his inheritance. Mark Antony, who then had the chief power in Rome, refused to deliver the property and papers of the late dictator. Octavius temporized, and in the turbulent and critical times that ensued exhibited the prudence and astuteness of a mature politician. He gained the favor of the senate, which in Jan., 43 B. C., gave him the command of an army which defeated that of Antony near Mutina (Módena). The adhesion of the army to his interest enabled him now to defy the authority of the senate. He marched to Rome, was elected consul in Aug., 43, and formed a triumvirate with Antony and Lepidus against Brutus, Cassius, and the senate. Antony and Octavius defeated Brutus and Cassius in the decisive battle of Philippi in 42 B. C., and, to confirm their power, proscribed and massacred thousands of their opponents in Italy. Augustus then obtained control of Italy by a new division of the provinces, but dissensions soon arose between him and Antony, who had command in Asia. An open rupture was, however, postponed, and Antony married Octavia, the sister of his great rival. About 38 B. C. the triumvirate was renewed for another period of five years, during which Octavius and Antony were virtually masters of the Roman world. Octavius defeated Sextus Pompey in battle in the year 36, and was chosen consul for the second time in 33. In the mean time, Antony, infatuated with passion for Cleopatra, neglected his own interests, and by his ill-treatment of Octavia broke the only bond of union with his colleague. The contest for supreme power was decided by a great naval victory which Octavius gained at Actium in 31 B. C., after which he was the sole master of the Roman empire. He was subsequently chosen consul several times, and professed an intention to restore the republic, but he usurped absolute power, partly disguised under republican forms. In 27 B. C. the title of Augustus was conferred on him by the obsequious senate, which retained the shadow of its former power. His favorite ministers and advisers were Agrippa, Mæcenas, and Asinius Pollio. He was thrice married; the names of his wives were Clodia, Scribonia, and Livia Drusilla. He had an only child, Julia. In 23 B. C. he accepted the *tribunitia potestas* (tribunitian power) for life. His reign was remarkably pacific and prosperous, and the Augustan Age was rendered the most brilliant in the Roman literature by the genius of Virgil and Horace, whom the emperor liberally patronized. He was a prudent and rather popular ruler, governing men with artful policy, and skilfully using their passions and talents to promote his own designs. The peace, order, and prosperity which his subjects enjoyed under his mild and modified tyranny reconciled them to the loss of their ancient liberty. He centralized the administration and enforced discipline in the armies. He adorned the city of Rome with public buildings, and made such improvement in that capital that it was said that he found it a city of brick and left it a city of marble. He was not happy in his domestic relations. His adopted sons, Caius and Lucius Cæsar, to whom he intended to leave the throne, died young. He was temperate in his diet and moderate and frugal in his style of living. He had studied oratory with some success, but on important occasions he would never speak without careful preparation. He composed numerous works in prose and verse on various subjects. Having designated his stepson Tiberius as his successor, he died in Aug., 14 A. D. (See Suetonius, "Life of Augustus" ("Vita Augusti"); Nicolas Damascenus, "De Vita Augusti;" Tacitus, "Annales;" Drumann, "Geschichte Roms;" Larrey, "Vie d'Auguste," 1840; Nougarède, "Histoire du Siècle d'Auguste," 1840; Beulé, "Auguste," 1867.) Revised by Abel Stevens.

Auk (*Al'ca*), a genus of web-footed oceanic birds of the family Alcadæ. The auks are remarkable for the shortness of their wings, which in some species are used as paddles or fins in swimming under water, while in others they are used in flight. These birds are adapted solely for an aquatic life, and swim with wonderful rapidity; they pass their lives mostly in the sea and on the shore near the water's edge. They are found only in the northern hemisphere, and are most abundant in the Arctic regions. The genus *Alca*, restricted by Cuvier, comprises only two species—the great auk (*Alca impennis*) and the razor-bill (*Alca torda*). The great auk is about as large as a goose, and resembles a penguin, having very short wings unfit for flight, and being compelled by the form and situation of its legs to hold itself in an erect position when on the land. It moves under the water with extraordinary rapidity. This bird, so numerous a few years ago, has been lost sight of, and is thought to be extinct. About thirty-four birds and forty-two eggs are known, they being distributed among the various scientific institutions of the world. The razor-bills or black-billed auks have longer wings, and can fly well. They breed in immense numbers within the Arctic Circle, and are very valuable to the Esquimaux, who eat their flesh and clothe themselves with their downy skins. They derive the name razor-bill from the sharpness of the edge of their bills. The common puffin (*Fratercula arctica*) is remarkable for the singular shape, enormous size, and the light colors of its beak, owing to which it is often called the *sea-parrot* or the *coulterneb;* it is also sometimes called the Labrador auk. The name of little auk is often given to a species of *Mergulus*.

Labrador Auk, or Arctic Puffin.

Au'la Re'gia, Latin words signifying "king's hall" or "court." This name was applied to a court established in England by William the Conqueror, and afterwards regulated by Magna Charta.

Au'lic [from the Lat. *au'la;* Ger. *Reichshofrath*] **Council,** one of the two highest councils or courts of the former German empire, co-ordinate with the imperial chamber. The aulic council, which was organized in 1495, consisted of a president, vice-president, and eighteen councillors, six of whom were Protestants, whose unanimous votes could not be overruled by the Catholic majority. The members and officers of this council were appointed by the emperor, and had jurisdiction over all matters of feudality in which the emperor was directly concerned; all questions of appeal made by states from decisions in favor of the emperor in inferior courts; and Italian affairs in which the emperor was interested. After the dissolution of the German empire in 1806, the term aulic council was applied to the emperor of Austria's council of state.

Au'lick (Commodore John H.), born in Virginia in 1787, entered the U. S. navy in 1809. He was promoted to be a lieutenant in 1814 for bravery in the fight between the Enterprise and Boxer. He afterwards served with great honor, becoming captain in 1841 and commodore in 1862. Died at Washington, D. C., April 27, 1873.

Au'lis, a town of ancient Greece, in Bœotia, on the Euripus, had a temple of Artemis (Diana). According to the poetical legend, Agamemnon here assembled the Grecian fleet before the siege of Troy, and here he offered his daughter Iphigenia as a sacrifice. Aulis was in the territory of Tanagra, and is supposed to have been about 3 miles S. of Chalcis. Its present name is Vatchi.

Aull'ville, on R. R., Lafayette co., Mo. (see map of Missouri, ref. 3–E, for location of county), situated 17 miles S. E. of Lexington, has manufactures of wagons, carriages, boots and shoes, etc. Pop. in 1880, 280.

Au'lus Gel'lius, a Latin author who lived during the reigns of Hadrian and the Antonines. Little is known of the events of his life. He resided much at Athens, where he composed his "Noctes Atticæ," probably before 150 A. D. His book is a mass of curious information upon a great variety of subjects, and, though ill-arranged, is valuable to critics, from the light it throws upon many obscure points of ancient history and literature. The edition of Conradi (1762) is one of the best.

Aumale (formerly **Albemarle**), a small town of France, department of Seine-Inférieure, 13 miles E. N. E. of Neufchâtel. Pop. in 1881, 2155. In the reign of Henry II. Aumale was erected into a duchy, and the title of duke of Aumale was given to Claude, a brother of Francis, duke of Guise. (See the next article.)

Aumale, d' (Claude II.), Duc, a French general, born in 1523, was a brother of the famous duke of Guise. He fought against the Huguenots at St. Denis (1567) and Moncontour (1569), and was one of the chief instigators of the massacre of St. Bartholomew (1572). He was killed in battle Mar. 14, 1573.—His son, Charles de Lorraine, duc d'Aumale, born about 1555, was an ardent partisan of the Catholic League. After the death of his cousin, Henry, duke of Guise, 1588, Aumale and the duke of Mayenne were the leaders of the League, and commanded the armies that fought against Henry IV. He had ill-success as a general. Having plotted treason with the king of Spain, he was condemned to death by Parliament in 1595, but escaped. Died at Brussels in 1631.

Aumale, d' (Henri Eugène Philippe Louis d'Orléans), Duc, the fourth son of Louis Philippe, king of the French, was born in Paris in 1822. He entered the army in 1839, served several campaigns in Algeria, and was rapidly promoted. In May, 1843, having defeated Abd-el-Kâder, whose camp and treasures became the spoil of the victors, he was raised to the rank of lieutenant-general. In Sept., 1847, he was appointed governor-general of Algeria, about three months after which Abd-el-Kâder surrendered to him. On learning the abdication of his father, he resigned his command, Mar., 1848, and went into exile, residing many years in England. He was chosen a member of the National Assembly in Feb., 1871, soon after which date that body annulled the decree or law which had excluded the Orleans princes from France. He was elected to the French Academy in the winter of 1871–72.

Aune [Lat. *ulna*, the elbow], an old European cloth measure, having many values in different places, varying between 27 and 54 inches. The French aune was about 46.8 inches. The name survives only in Switzerland, where it signifies a measure equal to four feet in length, the foot being thirty centimètres. The Swiss aune is therefore about 47¼ inches long.

Au'ra [a Latin word signifying a "breath," a "gentle breeze," from the Gr. ἄω, to "breathe"], a subtle vapor or exhalation.—*Aura electrica* (literally, the "electrical breeze"), the sensation as of cold air experienced when electricity is received from a sharp point.—*Aura epileptica*, the peculiar sensation felt by epileptic patients as of a cold fluid ascending towards the head.—*Aura hysterica*, the sensation as of cold air ascending to the head, said to occur sometimes in hysteria.—*Aura seminalis* or *aura seminis*, the supposed vivifying principle of the *semen virile*, formerly believed to ascend through the Fallopian tubes, thereby impregnating the ovum in the ovarium.—*Aura vitalis*, a name for the principle of life.

Aurantia'ceæ [from the Lat. *aurantium*, an "orange"], a natural order of exogenous trees and shrubs, natives of the warm parts of Asia and Northern Africa. All parts of these plants contain a fragrant volatile oil, which abounds especially in the leaves and in the rind of the fruit. The leaves are alternate, articulated with the petiole, and dotted or pellucid-punctate; the fruit is a *hesperidium*. The order comprises numerous species, some of which are remarkable for beauty and are highly prized for their fruits, as the orange, lemon, and citron. (See Citrus.) The fruits of *Ægle marmelos, Cookia punctata, Glycosmis citrifolia*, and many others are also edible. The *Skimmia Japonica*, a beautiful shrub of Japan, is more hardy than the other plants of this order, and flourishes in the open air in England. The order Aurantiaceæ has lately been added to the large order Rutaceæ.

Aure'lian, or **Aurelia'nus** (Claudius Domitius), a Roman emperor of humble origin, was born about 212 A. D. at Sirmium, in Pannonia, or, as some say, in Lower Dacia. He served with distinction in several campaigns, and raised himself by his merit to the highest rank in the army of Valerian. It is stated that he usually fought in the foremost rank. On the death of Claudius (270 A. D.), Aurelian was elected emperor by the army. Early in his reign the empire was invaded by the German tribe of Alemanni, whom he defeated. He abandoned Dacia to the Goths and Vandals, in order that the Danube might become the boundary of the empire. The most important and famous of his enterprises was an expedition against Zenobia, queen of Palmyra, whose extensive dominions included Syria and Egypt. Having defeated her army in battle near Emesa, he captured Palmyra and its queen in 273 A. D., after which he received at Rome a triumph of extraordinary magnificence. He recovered Gaul from Tetricus, who had usurped royal power, and obtained the title of "Restorer of the empire." His memory is stained by the judicial murder of Longinus the critic, and other acts of excessive severity. He was assassinated by his own officers between Byzantium and Heraclea in 275 A. D., and was succeeded by Tacitus. (See Vopiscus, "Vita Aureliani;" Tillemont, "Histoire des Empereurs;" Gibbon, "Decline and Fall of the Roman Empire," chap. xi.)

Aurelius Antoninus (Marcus). See Antoninus (Marcus Aurelius).

Aure'lius Victor (Sextus), a Roman historian who flourished about 360 A. D., under the emperor Constantius and his successors. He was appointed prefect of Pannonia Secunda by Julian the Apostate about 360, and was prefect of Rome under Theodosius I. He wrote a series of biographies of the Roman emperors from Augustus to Constantius, entitled "De Cæsaribus Historia," which is extant and was first printed at Antwerp (8vo, 1579), with the commentary of Schottus. Two other works are ascribed to him—namely, "The Lives of Illustrious Romans" and "Aurelii Victoris Epitome."

Aurelle de Paladines, d' (Claude Michel Louis). See Appendix.

Aure'ola, Au'reole [Lat. *aure'olus*, "golden"], in painting, the golden glory which encircles the heads, or even the whole bodies, of saints and martyrs. The circle or *nimbus* when it encloses a cross belongs to Christ alone; without the cross it indicates canonized saints. There is also a form of aureole appropriated to saints who are called *beati*, "blessed," but are not canonized, whose heads are decorated with a radiation of golden lines. The idea of placing an aureole around the head of divine or sainted personages did not, there is reason to believe, originate with the Christians of the primitive or Middle Ages. Aureoles essentially resembling those which surround the heads of the saints appear to have been common in India in the representations of the Hindoo gods from early times. (See Moor's "Hindu Pantheon.")

Au'reus, or **Dena'rius Au'reus,** the standard and most ancient Roman gold coin, first struck in 207 B. C. The average weight of the aureus was about 121 grains—a little less than the Greek stater, and about the same as the Persian daric.

Au'ricle [Lat. *auric'ula*, the diminutive of *au'ris*, the "ear"], the external portion of the ear.

Auricles of the heart [Lat. *auricu'læ cor'dis*], the term applied to those cavities of the heart which receive the blood returning from the veins, and convey it to the ventricles. The auricles are popularly called "deaf-ears." (See Heart.)

Auric'ula (*Prim'ula Auric'ula*), a plant of the order Primulaceæ, nearly related to the primrose, is much cultivated in flower-gardens. It is a native of the Alps and other mountains of Europe and Asia. It is prized for the beauty and fragrance of its flowers, which grow in the form of an umbel on a scape. The size and color of the flowers have been much improved by cultivation. Among the colors prevailing in the 1200 or more cultivated varieties are red, pink, crimson, and mulberry. Some varieties present a single color, and others are variegated or are adorned with a green margin. The flowers are covered with a fine meal or powder. The auricula blooms in April or May, and often has a second crop of flowers in autumn. It prefers a rich, light soil, and the finer varieties are usually cultivated in pots. The chief requisites of a good auricula are large flowers, which are nearly round, and have in the centre a white or yellow eye which is distinct and round, its color not mixed with the ground color; and a long scape, strong enough to hold itself erect.

Auricula, a genus of Auriculidæ, a family of Mollusca of the class Gasteropoda. They have a spiral shell covered with a horny epidermis. The spire is obtuse or short, and the aperture elongated and narrow. They have respiratory organs adapted for breathing in air, and they frequent salt marshes or the vicinity of the sea. They are chiefly found in and near warm seas. Several species are fossil.

Auric′ular Confes′sion [Lat. *auricula*, the "external ear"], private confession of sins to a priest. For certain offences the early Church required confession. In the fifth century, owing to some scandals in public confession, Leo the Great (440–461) authorized the parish priest to receive confessions. By the twenty-first canon ("*Omnis utriusque sexus fidelis*") of the Fourth Lateran Council, in 1215, under Innocent III., it is enjoined upon the faithful to confess their sins once a year, at least, to the parish priest, under pain of losing Christian burial.

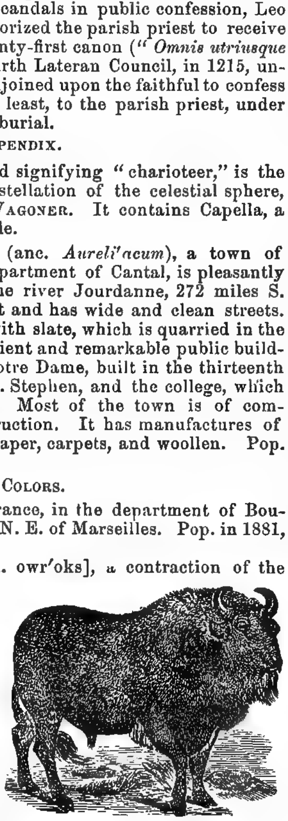
Aurifaber. See APPENDIX.

Auri′ga, a Latin word signifying "charioteer," is the name of a northern constellation of the celestial sphere, sometimes called THE WAGONER. It contains Capella, a star of the first magnitude.

Aurillac, ō′re′yăk′ (anc. *Aureli′acum*), a town of France, capital of the department of Cantal, is pleasantly situated in a valley on the river Jourdanne, 272 miles S. of Paris. It is well built and has wide and clean streets. The houses are covered with slate, which is quarried in the vicinity. Among its ancient and remarkable public buildings are the church of Notre Dame, built in the thirteenth century, the castle of St. Stephen, and the college, which has a valuable library. Most of the town is of comparatively modern construction. It has manufactures of copper kettles, jewelry, paper, carpets, and woollen. Pop. in 1881, 13,727.

Aurin. See PHENOL COLORS.

Auriol, a town of France, in the department of Bouches-du-Rhône, 16 miles N. E. of Marseilles. Pop. in 1881, 2942.



Aurochs.

Au′rochs [Ger. pron. owr′oks], a contraction of the German *Auer-Ochs* (*i. e.* "wild-ox"), the *Bos urus* of some naturalists, and *Bison bonassus* of others, is a European species of BISON (which see). Though once found in great numbers in many parts of Europe, it is now chiefly, if not wholly, limited to the forests of Lithuania, Moldavia, Wallachia, and the Caucasus. It bears many points of similarity to the American bison. It is a very powerful animal, being somewhat larger than an ordinary ox, and, though clumsy in appearance, can run rapidly for a short distance. The body of this animal exhales a strong odor, somewhat resembling musk. The aurochs is a good swimmer, and delights in dabbling in the water and rolling in the mud. Its food consists in a great part of lichens, of which it is especially fond.

Auro′ra, a Latin word signifying "morning," or the "goddess of morning," corresponding to the Greek 'Εως. The poetical legend represents her as the daughter of Hyperion, the wife of the Titan Astræus, the mother of Hesperus, Boreas, Zephyrus, and Memnon. According to one mythical tradition, she loved Tithonus (a son of Laomedon), for whom she asked and obtained immortality, but forgot to ask perpetual youth. She lived with him at the end of the earth, on the banks of the Oceanus, and when he grew old she nursed him, until at last his voice disappeared and his body became dry and shrivelled. She then transformed him into a cricket and locked him up in her chamber. After that time—the Greek mythology continues—she adopted the habit of carrying off young men distinguished for their beauty, such as Orion, Cleitus, and others, until Father Zeus became angry and put a stop to that practice. She was sometimes represented as dressed in a saffron-colored robe, with a torch in her right hand.

Aurora, a post village of York co., Ontario, Dominion of Canada, on the Northern Railway, 30 miles N. of Toronto. It has three churches and a public park. Pop. in 1881, 1540.

Aurora, city and R. R. centre, Kane co., Ill. (see map of Illinois, ref. 2–F, for location of county), on Fox River, 39 miles W. S. W. of Chicago. It has a city-hall, which cost $75,000, and a fine building for the Young Men's Christian Association. It has a variety of manufactures, and the shops and works of the Chicago Burlington and Quincy R. R., which employ 1500 men. It has also excellent public schools, and is the seat of Jennings' Seminary. The city is protected from fire by the Holly waterworks system. Pop. in 1870, 11,162; in 1880, 11,873.

Aurora, Dearborn co., Ind. (see map of Indiana, ref. 8–G, for location of county), on R. R. and the Ohio River, 25 miles W. by S. from Cincinnati. It has large barrel-factories and various manufactures, Ohio and Mississippi R. R. car-shops, and an extensive hay-trade. Pop. in 1870, 3304; in 1880, 4435.

Aurora, on R. R., capital of Hamilton co., Neb. (see map of Nebraska, ref. 7–J, for location of county). Pop. of precinct in 1880, 1232; in 1885, 2047; of v., 1178.

Aurora, former capital of Esmeralda co., Nev. (see map of Nevada, ref. 4–D, for location of county), on a level space at the junction of two ravines which extend between Silver, Middle, and Last Chance Hills, and about 100 miles S. E. of Carson City. Its altitude is about 7500 feet above the level of the sea. Rich silver-mines have been opened here. Pop. in 1870, 160; in 1880, 341.

Aurora, on R. R., Cayuga co., N. Y. (see map of New York, ref. 4–F, for location of county), finely situated on the E. side of Cayuga Lake, 25 miles N. W. of Ithaca. It is a place of summer resort, has many fine residences, some manufactures, and is the seat of Wells college for ladies and of Cayuga Lake Academy. Pop. in 1870, 450; in 1880, 444.

Auro′ra Borea′lis (*i. e.* "northern light"), called also **Northern Lights,** the term applied to a certain luminous phenomenon generally appearing in the northern part of the sky, and presenting a light somewhat resembling the dawn or break of day. It is most frequent and brilliant in high northern and high southern latitudes; in the latter case it is called "aurora australis" or "southern light." The appearances are extremely various. Not unfrequently it seems to proceed from a sort of horizontal cloud or haze in the northern part of the sky, rising a few degrees above the horizon, and stretching from the north towards the east and west, so as to form an arc which in some instances has been observed to extend upward of one hundred degrees. The upper edge of the cloud is whitish and luminous, the lower part often dark or thick, and sometimes the clear sky may be seen between it and the horizon. From the upper part of the cloud streams of light shoot up in columnar forms, reaching sometimes only a few degrees, sometimes to the zenith, or even beyond it. Instances have occurred in which the whole hemisphere was covered with coruscations, but the brilliancy is greatest and the light strongest in the north, near the main body of the meteor. The streamers have in general a tremulous motion, and when close together present the appearance of waves or sheets of light following each other in rapid succession. When several columns, issuing from different points, meet at the zenith, a small meteor is formed of greater brilliancy than the separate columns. The aurora sometimes continues a few hours, occasionally the whole night, and even for several nights in succession. The height of the aurora above the earth has been variously estimated by different scientists. By taking observations of the altitude of the highest point of the arch of the same aurora at different stations, heights varying from five to five hundred miles have been calculated. It is now almost universally admitted that the aurora borealis occurs at various heights, and that it is seldom found less than forty-five miles above the surface of the earth. The distance of the stations at which the same aurora has been visible indicates the enormous geographical extent, and likewise the great altitude, which the phenomenon frequently attains. One aurora, for instance—that which occurred on Sept. 3, 1839—was seen in the Isle of Skye; at Paris; at Asti, in the Sardinian states; at New Haven, in Conn., and at New Orleans. That of Sept. 2, 1859, was seen all over Europe and North America, and in the Sandwich Islands. The aurora of Feb. 4, 1872, was seen in the U. S., Europe, and British India. On the other hand, observers of eminence assert that the aurora sometimes descends to the region of the clouds. The noise that is alleged to accompany the aurora would indicate for it a moderate height. Some compare it to the noise that is produced by the rolling of one piece of silk upon another, and others to the sound of the wind blowing against the flame of a candle, or that attending the discharge of fireworks. It is proper to observe, however, that scientific Arctic voyagers, such as Parry and Franklin, throw doubt on the existence of any such noise, for not one of the numerous and brilliant auroras seen by them was attended with the faintest sound. It is now certain that the aurora has an electric origin, and it is believed by some that its phenomena are due to the passage of electric currents through highly attenuated air at considerable distance from the earth. Telegraphic communications are frequently so interrupted by electric currents upon the wires during the continuance of an aurora that messages for the time cannot be sent. Occasionally, however, the auroral current is so strong and continuous that it can be utilized in sending despatches.

Periodicity in auroral displays has lately been asserted. A maximum occurs about once in ten years, and a period of remarkable brilliancy about once in sixty years. Some physicists associate these periods with the variations in the sun's spots and with the planetary rotations.

Aurungâbâd′, a city of Hindostan, in the territory of the Nizam, on the Doodna, 68 miles N. E. of Ahmednuggur; lat. 19° 54′ N., lon. 75° 33′ E. It was a favorite residence of Aurung-Zeb, in whose honor it was named. Among the monuments of its former grandeur are a ruined palace of Aurung-Zeb, and a mausoleum with domes of white marble erected by that monarch to the memory of his daughter. Many of the mosques and other public buildings are substantial, but signs of decay are visible. Pop. estimated at 60,000.

Au′rung-Zeb, or **Aurang-Zebe** (*i. e.* the "ornament of the throne"), afterwards called **Alum-Geer** or **Alam-Gîr** ("conqueror of the world"), a famous Mogul emperor of Hindostan, was born Oct. 22, 1618. He was a younger son of Shah Jehân, who ceased to reign in 1657. The elder sons, Dara and Shuja, then contended for the crown in battle, while Aurung-Zeb affected indifference to temporal power, and craftily concealed his designs under the cloak of piety. Having procured the assassination of Dara and Shuja, he became master of the empire in 1658, and detained in prison his father until his death in 1666. As a bigoted Moslem he persecuted the Hindoos and provoked the Mahrattas to revolt. He added Bejapoor and Golconda to his empire, and was one of the most powerful of the Mohammedan monarchs of India. His long reign was a period of outward and specious prosperity, but the empire was diseased at heart, and soon entered a state of decadence, which was partly the effect of his policy, duplicity, and intolerance. Conscious of the crimes by which he obtained power, he lacked confidence in his ministers, and is said to have lived in continual fear of treachery. Died Feb. 21, 1707. (See Elphinstone, "History of India;" Bernier, "Voyages et Description de l'Empire Mogol;" J. Mill, "History of British India.")

Ausculta′tion [Lat. *ausculto, ausculta′tum,* to "listen"], a method of determining the condition of the heart and lungs by listening to the sounds produced in the cavity of the chest. This is done either by the unassisted ear (called *immediate auscultation*), or by the aid of a simple sound-conveying instrument, the stethoscope (termed *mediate auscultation*). The stethoscope was invented by Laennec in 1816. By care and attention the normal sounds produced by respiration and the beating of the heart may be distinguished from the several abnormal sounds indicating disease. Auscultation is classed among the most important of discoveries in modern medical science. Its details were ably explained by Laennec, who published a treatise on it in 1819. Recent leading writers upon it have been Skoda in Germany, Walshe in England, and Flint in the U. S. (See Stethoscope.)

Auso′nius (Decimus Magnus), an eminent Latin poet, born at Burdigala (Bordeaux) about 309 A. D. He was liberally educated, practised law in his early life, and gained distinction as a professor of rhetoric at Burdigala. In 367 A. D. he was appointed tutor to Gratian by the emperor Valentinian. He held several high offices under the reign of Gratian, who raised him in 379 to the dignity of consul. The learned disagree on the question whether he was a Christian or a pagan. He wrote epigrams, epistles, idyllia, etc., which were admired by his contemporaries, but display little genius, and are very faulty in style. Died about 394 A. D. (See M. de Puymaigre, "Vie d'Ausone;" J. Demogeot, "Études historiques et littéraires sur Ausone," 1837.)

Au′spices [from the Lat. *auspiç′ium* (*i. e. avispicium,* the "observing of birds"), from *avis,* a "bird," and *specio,* to "see"], a term applied by the ancient Romans to divinations founded on the flight of birds or other omens, by which the augurs or soothsayers professed that they could ascertain the will of the gods and predict events. (See Augur.) No important enterprise or business was undertaken without consulting the auspices. In performing this ceremony the augur with a wand marked out a portion of the sky for his observations, which portion, called a *templum,* was divided into right and left. If the birds appeared on the right hand, the omen was favorable; if they flew towards the left (*ad sinistrum*), it was unfavorable. The chief magistrates also had the right to conduct this ceremony, and the commander of the army in time of war had the exclusive power of taking the auspices. If a victory was gained by his legate or lieutenant, it was said to be won under the auspices of the general-in-chief. Thus originated the common English phrase, "under the auspices" of some one. In such cases "auspices" signifies influence, patronage.

Aus′sig, an Austrian town, in Bohemia, on the Elbe, 46 miles W. N. W. from Prague, has coal-mines in the vicinity, and manufactures of linen, gold, and silver work. Pop. in 1880, 16,524.

Aus′ten (Jane), an English authoress, born at Steventon, in Hampshire, Dec. 16, 1775. She was educated by her father, who was rector of Steventon, and after his death she lived at Southampton and Chawton. She is said to have been beautiful in features. Her first novel, "Sense and Sensibility," appeared anonymously in 1811. She afterwards produced "Pride and Prejudice," "Mansfield Park," "Emma" (1816), "Northanger Abbey" (1818), and "Persuasion" (1818), the first three of which were anonymous. These works represent with great fidelity the ordinary life of the middle classes of England. According to Sir Walter Scott, "she had a talent for describing the involvements, feelings, and characters of ordinary life which is to me the most wonderful I have ever met with." Died July 18, 1817. (See the "Quarterly Review" for Jan., 1821; "Atlantic Monthly" for Feb., 1863.)

Aus′terlitz, a small town in Moravia, on the Littawa, 12 miles E. S. E. of Brünn. It has a fine castle. Pop. in 1880, 3487. It is celebrated as the scene of a great victory which Napoleon I. gained over the combined armies of Austria and Russia, commanded by their respective emperors, on Dec. 2, 1805. Napoleon had taken Vienna about Nov. 12, after which he fixed his head-quarters at Brünn, where he had about 75,000 men. The armies of the allies, amounting to about 85,000, advanced in five columns to offer battle to the French, who occupied high ground partly covered by wooded eminences, morasses, and small lakes. The battle began about 7 A. M., when the allies attempted to turn the right wing of Napoleon, who attacked them in flank and at various points with great advantage. While a portion of the allied army was retreating across a frozen lake, the ice was broken by the French artillery, and nearly 2000 men perished in the water. The allies lost about 30,000, killed, wounded, and prisoners, and the French about 12,000. Among the results of this victory was the treaty of Presburg, Dec., 1805.

Austin, city and important R. R. centre, capital of Texas and of Travis county, in lat. 30° 16′ 25″ N., lon. 97° 43′ 58″ W. (see map of Texas, ref. 5–H, for location of county), is situated on the left bank of the Colorado River, which is a clear and beautiful stream, but is not navigable. Austin is surrounded by fine scenery, and became the capital of the republic of Texas in 1839; was chosen capital of the State in 1850, and in 1872 was made permanent capital by vote of the people. The Colorado

State Capitol (Austin, Tex.).

River is spanned by two fine bridges opposite the city front.

Austin was originally built on a beautiful plateau in the bend of the river, but now extends back from the original front about 2 miles and along the river about 2½ miles.

Streets and Avenues.—It is intersected by two central avenues 120 feet wide, extending from the Capitol grounds (about 10 acres, situated on Capitol Hill, a beautiful eminence near the centre of the city proper) E., W., N., and S. to the original city limits, which are bounded E. and W. by avenues 200 feet wide. Most of the other streets are 80 feet wide, and none less than 60 feet. The principal streets are shaded and the hills and valley studded with live oaks and other forest trees.

Public Buildings.—The old Capitol, recently destroyed by fire, is now being replaced by a magnificent stone edifice, for the cost of which 3,000,000 acres of State lands have been appropriated. The chief public buildings besides the Capitol are the temporary State-house, the post-office, general land-office, and graded-school building (all handsome and commodious stone edifices), the asylum for lunatics, mutes, and blind, and the governor's mansion. The State University, a fine brick building to cost $150,000, is now in course of erection on College Hill, in the northern part of the city. Austin has 2 daily newspapers, 3 weeklies, 1 semi-monthly, and 3 monthlies. Pop. in 1870, 4428; in 1880, 11,013; in 1885, about 15,000.

James B. Goff, Ed. "State Journal."

Austin, city and R. R. junction, capital of Mower co., Minn. (see map of Minnesota, ref. 11–F, for location of county), on the Red Cedar River, 104 miles S. of St. Paul. Pop. in 1870, 2039; in 1880, 2305; in 1885, 2505.

Austin, capital of Tunica co., Miss. (see map of Mississippi, ref. 4–F, for location of county), on the Mississippi River, 44 miles by land and 75 miles by water S. W. of Memphis, Tenn. Pop. in 1880, 252.

Austin, city on R. R., capital of Lander co., Nev. (see map of Nevada, ref. 3–D, for location of county), on the eastern slope of the Toyabe range of mountains, 90 miles S. of Battle Mountain Station, and 6 miles E. of Reese River. There are several quartz-mills and many rich silver-mines here. Pop. in 1870, 1324; in 1880, 1679.

Austin (Coe F.). See Appendix.

Austin (James Trecothic), LL.D., an American lawyer, born at Boston Jan. 7, 1784. He graduated at Harvard in 1802, and became in 1806 a son-in-law of Elbridge Gerry. He was attorney-general of Massachusetts from 1832 to 1843. He published, besides other works, a "Life of Elbridge Gerry." Died May 10, 1870.

Austin (Jonathan Loring), a patriot, the father of the preceding, was born in Boston Jan. 2, 1748, and graduated at Harvard in 1766. He was sent to Paris in 1777 as a bearer of despatches, and remained there two years as Dr. Franklin's secretary. After the Revolutionary war he was secretary of state in Massachusetts. Died May 10, 1826.

Austin (Moses), an American pioneer, born in Durham, Conn., about 1776. He emigrated to Texas about 1820, and obtained from the Mexican government a grant and permission to plant a colony in that province. As he was returning to Missouri for settlers, he died June 10, 1821, but the colony was founded by his son, Stephen F. Austin.

Austin, Saint. See Augustine, Saint.

Austin (Samuel), D. D., an American Congregational clergyman, born at New Haven, Conn., Oct. 7, 1760, graduated at Yale in 1783, was pastor at Fair Haven, Conn., for three years from 1786, and afterwards at Worcester, Mass., for nearly twenty-five years. In 1815 he accepted the presidency of the University of Vermont, which post he occupied for about six years. The last years of his life were spent in much bodily weakness and mental depression. Died Dec. 4, 1830.

Austin (Sarah), an English writer and accomplished translator, was a member of the eminent Taylor family of Norwich. She was married to John Austin, a barrister of London. She wrote, besides other works, "Characteristics of Goethe" (3 vols., 1833), which was very successful, and "Sketches of Germany from 1760 to 1814." She produced a good translation from the German of Prince Pückler-Muskau's "Travels in England," and also one of Ranke's "History of the Popes" (3 vols., 1840), which was highly commended by Macaulay. Died in 1867.

Austin (Stephen F.) was a son of Moses Austin, noticed above. About 1821 he conducted a company of emigrants from New Orleans, and planted a colony where the town of Austin now stands. The grant made to his father was confirmed to him in 1822 or 1823. Early in 1833 the Texan colonists formed a constitution, to obtain a ratification of which Austin and other delegates went to the city of Mexico. In consequence of the frequent revolutions and anarchy of Mexico they did not obtain the admission of Texas into the confederacy. In 1835, Austin was chosen commander of the Texan army, and joined in the movement for the liberation of Texas. He went as a commissioner to the U. S. to obtain the recognition of Texas as an independent state. Died Dec. 27, 1836. (See Yoakum, "History of Texas," 1856.)

Australa′sia (*i. e.* "Southern Asia"), a part of Oceanica, extending between the equator and lat. 47° S., comprises Australia, Van Diemen's Land (Tasmania), New Zealand, and those parts of the Malay Archipelago and Polynesia between lon. 130° and 170° E.—viz. Papua, the Arroo Islands, New Britain, Timor-Laut, New Ireland, New Caledonia, and the Admiralty, Solomon, New Hebrides, and Queen Charlotte's Islands. Its area is estimated by Behm and Wagner at 3,425,000 square miles, and its population at 4,365,000.

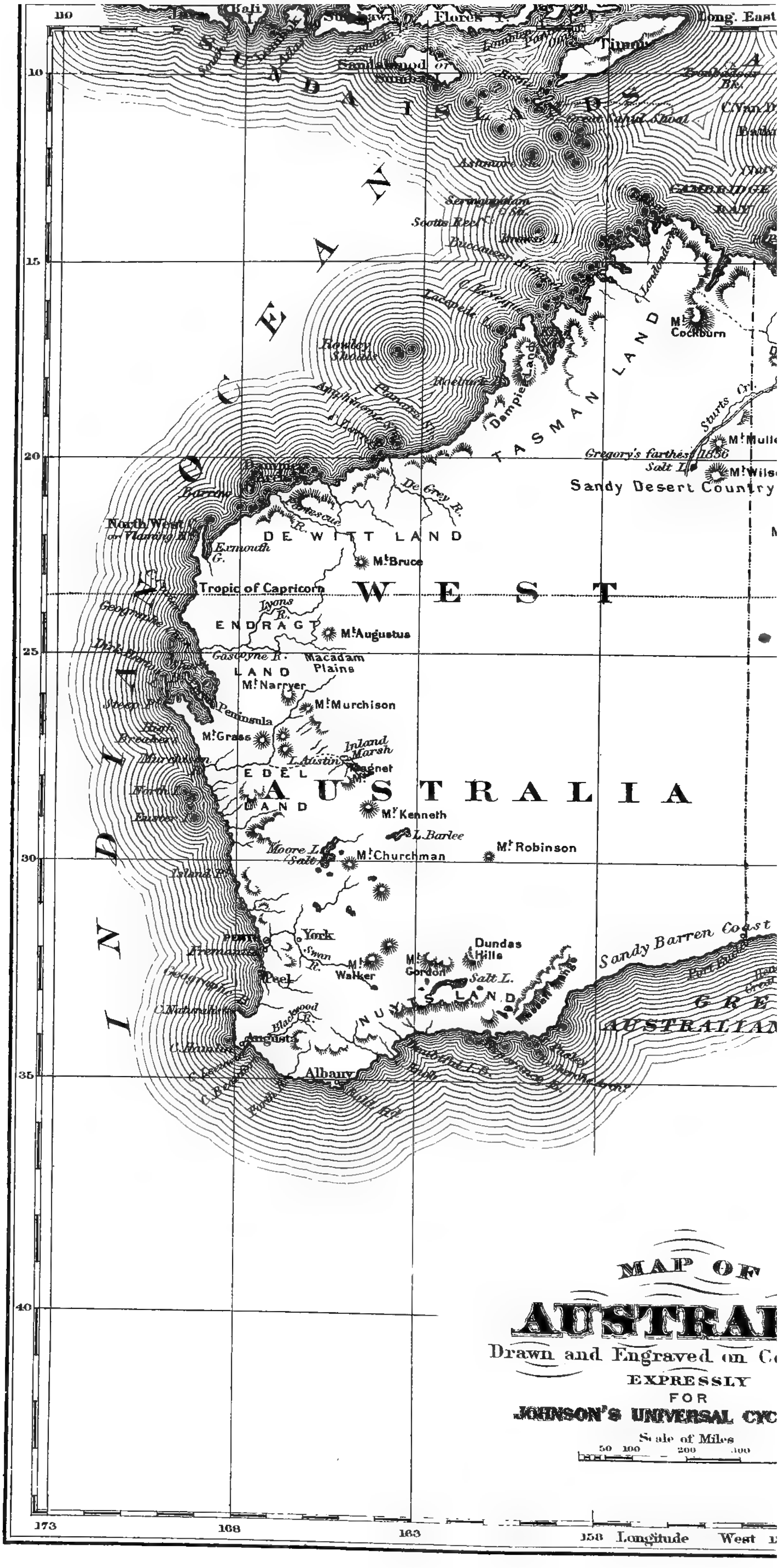
Australia, aws-trā′li-a (formerly **New Holland**), the largest island on the globe, sometimes reckoned as a fifth continent, derives its name from its geographical location (*austra′lis*, "southern"). Lying to the S. of Asia, between lat. 10° 47′ and 39° 11′ S., and 113° and 153½° E. lon., its area is about 2,900,000 square miles, somewhat less than the U. S. without Alaska. From E. to W. it is 2500 miles, and from N. to S. 1600 miles. The coast-line is indented by singularly few bays, except on the northern shore, where the Gulf of Carpentaria forms an inlet of about 360 miles diameter.

Geology and Physical Features.—The peculiar features of Australia suggest the probability of its having been at no remote period the bed of an ocean. Its few mountain-ranges are of insignificant height, the Australian Alps, Grampians, etc. rising to an average of 1500 feet only above the sea, though there are occasional summits in the S. E. of near 7000 feet. The vast plain lying between the coast-ranges is a lowland surrounded by plateaus of sandstone formation 1000 to 3000 feet in height. Tertiary deposits are found in Victoria and on the west coast, while wholly absent in Eastern Australia. Granite occurs largely along the coast and in the east drifts, and igneous rocks are found with fragments of palæozoic strata. In the interior occur great deposits of animal bones. Australia's principal river, the Murray, 1100 miles long, is navigable in the interior, but its outlet is a shallow lagoon. The Victoria runs in a deep channel through cliffs 300 feet high. Other rivers are the Glenelg, flowing through a fertile country and partially navigable, the Prince Regent, Brisbane, Richmond, Clarence, Swan, etc.

Climate.—The vast dry plains of Australia, becoming heated by the sun, have been compared to an oven, very little of the moist sea-air penetrating inland. Southern Australia gets little rain, while Victoria and New South Wales have from 32 to 44 inches annually. Here the seasons of America and Europe are reversed, January and February being the hottest months of summer, and July the coldest of winter. Inland the heat rises to the almost incredible height of 100° to 140° in the shade, while the coast-regions are quite temperate, with a mean annual temperature of 58° to 62°. Protracted droughts and violent floods characterize Australia, which has a marked poverty of fresh-water reservoirs of a permanent kind.

Soil and Productions.—The part of Australia lying in the tropical regions has forest products of great luxuriance, while the highlands, almost bare of trees, abound in pasture grass and herbaceous vegetation. The dry climate in the N. favors evergreen growth, while there is a marked absence of mosses and lichens. Of the eucalyptus, or gum tree, four hundred species are found, some being 150 to 200 feet high, with stately trunks. About 10,000 species of indigenous Australian plants are described, but none of the cereals and few of the esculent fruits or roots are natives of the soil. Cattle are abundantly raised by herdsmen. The marsupial animals predominate among the Australian mammals. There are found the kangaroo, opossum, flying-squirrel, bear, wild-dog, etc., but no ruminant beasts. The birds embrace near 700 species, among which are the white eagle, black swan, parrot, emu, lyre-bird, honey-eater, etc. Saurians or lizards are numerous. Food-fish abound, several species being peculiar to Australia. Gold was discovered in 1851 in Victoria and New South Wales, and later in Queensland. The annual value of gold exports was $50,000,000 for several years. Victoria alone has produced an aggregate of $900,000,000 in gold. Large coal-fields exist, also profitable copper-, iron-, and lead-mines. Wool is a great staple of Australia, sheep-farming being easy and profitable. Wheat, cotton, sugar, and tobacco are produced, and the grape flourishes. Aggregate exports reach nearly $170,000,000 annually.

Inhabitants.—The aborigines of Australia, though similar to the Africans in thick lips, flat noses, etc., are lighter in color, being dusky brown, and having well-shaped

MAP OF
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Sandy Barren Coast
GREAT AUSTRALIAN
Flores I.
Timor
Sandalwood or Sumba I.
Ashmore R.
Scotts Reef
Rowley Shoals
Cambridge Bay
Mt. Cockburn
Sturts Cr.
Gregory's farthest 1856
Salt L.
De Grey R.
Fortescue R.
North West C.
Exmouth G.
Mt. Bruce
Lyons R.
Mt. Augustus
Gascoyne R.
Macadam Plains
Mt. Narryer
Mt. Murchison
Peninsula
Mt. Grass
Inland Marsh
L. Austin
Mt. Magnet
Mt. Kenneth
L. Barlee
Mt. Robinson
Moore L. Salt
Mt. Churchman
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York
Fremantle
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Mt. Walker
Mt. Gordon
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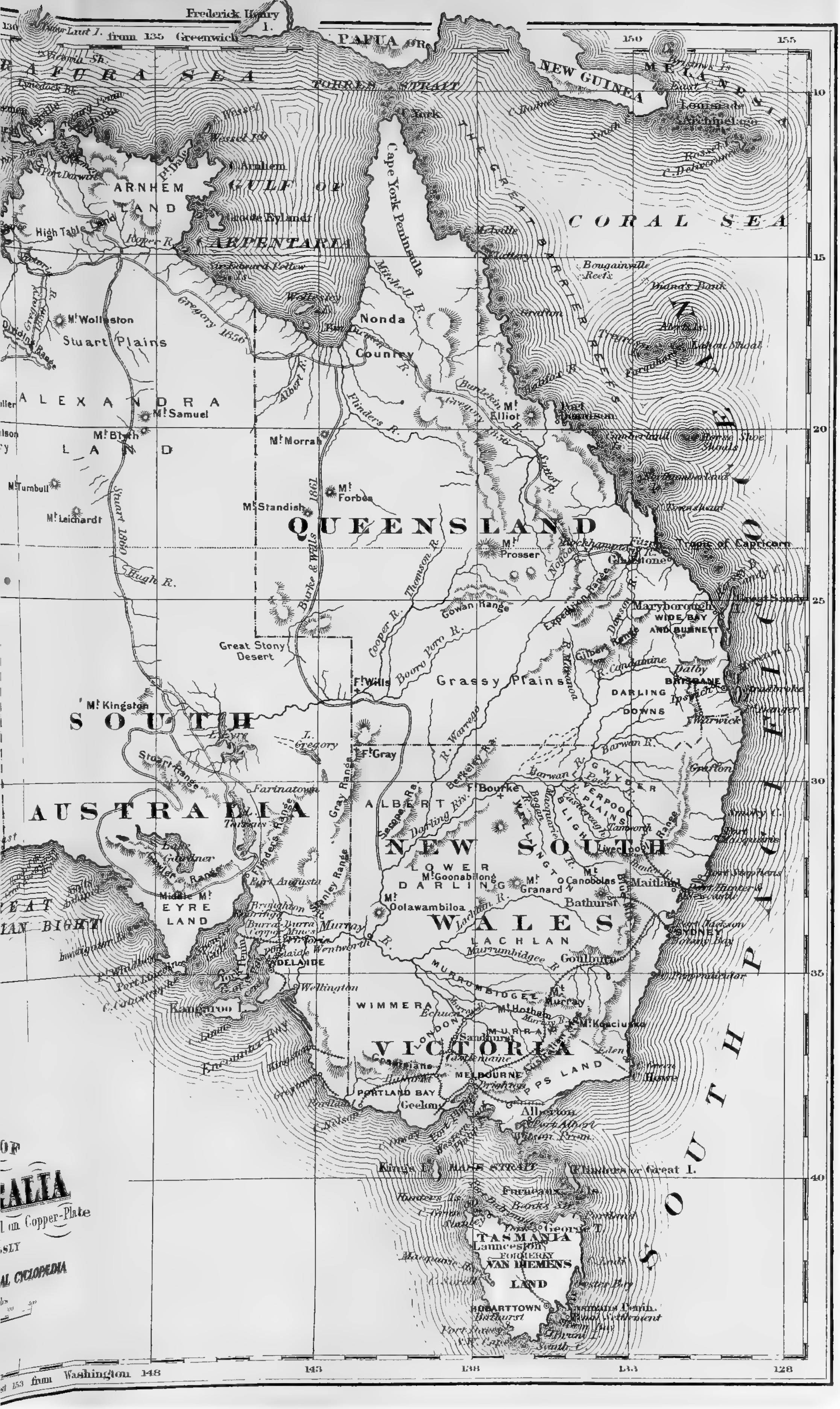Frederick Henry I.
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NEW GUINEA
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155
MELANESIA
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C. Deliverance
ARAFURA SEA
TORRES STRAIT
C. York
Wessel Is.
C. Arnhem
Port Darwin
ARNHEM LAND
GULF OF CARPENTARIA
Groote Eylandt
High Table Land
Roper R.
Cape York Peninsula
THE GREAT BARRIER REEFS
CORAL SEA
C. Melville
Sir Edward Pellew Is.
Wellesley Is.
Bougainville Reefs
Diana's Bank
Mitchell R.
Gregory 1856
Mt. Wollaston
Stuart Plains
Nonda Country
Flinders R.
Albert R.
Burdekin R.
Mt. Elliot
Port Denison
Cumberland Is.
Horse Shoe Shoals
Northumberland Is.
ALEXANDRA LAND
Mt. Samuel
Mt. Blyth
Mt. Morrah
Mt. Forbes
Mt. Turnbull
Mt. Standish
Mt. Leichardt
Stuart 1860
Burke & Wills 1861
QUEENSLAND
Mt. Prosser
Rockhampton
Fitzroy R.
Gladstone
Tropic of Capricorn
Thomson R.
Hugh R.
Gowan Range
Expedition Range
Maryborough
WIDE BAY AND BURNETT
Great Sandy I.
Great Stony Desert
Cooper R.
Booro Booro R.
Ft. Wills
Grassy Plains
R. Maranoa
Condamine
Dalby
BRISBANE
Ipswich
Stradbroke I.
DARLING DOWNS
Warwick
Mt. Kingston
SOUTH AUSTRALIA
L. Eyre
L. Gregory
Ft. Gray
Gray Range
Stuart Range
Farinatown
R. Warrego
Barwan R.
GWYDIR
Grafton
LIVERPOOL PLAINS
Ft. Bourke
Darling Riv.
ALBERT
Tamworth
BLIGH
NEW SOUTH WALES
L. Gairdner
Gawler Range
Flinders Range
Stanley Range
Port Augusta
LOWER DARLING
Mt. Goonabilong
Mt. Granard
Mt. Canobolas
Bathurst
Maitland
Port Stephens
Newcastle
Middle Mt.
EYRE LAND
Mt. Oolawambiloa
Lachlan R.
LACHLAN
Port Jackson
SYDNEY
Botany Bay
GREAT AUSTRALIAN BIGHT
Burra Burra Copper Mines
Murray
Wentworth
ADELAIDE
Murrumbidgee R.
MURRUMBIDGEE
Goulburn
Port Lincoln
Kangaroo I.
Wellington
WIMMERA
Echuca
Mt. Hotham
Mt. Murray
Mt. Kosciusko
Sandhurst
MURRAY
Encounter Bay
VICTORIA
Castlemaine
Grampians
MELBOURNE
GIPPS LAND
Eden
C. Howe
PORTLAND BAY
Portland
Geelong
Port Phillip
Western Port
Alberton
Port Albert
Wilson Prom.
King's I.
BASS STRAIT
Flinders or Great I.
Furneaux Is.
Hunter's Is.
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Launceston
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AL CYCLOPEDIA

limbs and straight or curly black hair. Their intelligence is of a low order, their knowledge of mechanic arts very slight. They build no permanent dwellings, but only hovels. The sole dress is a single garment, the skin being tattooed. Their hatchets are of stone, with spears and axes of hard wood, as is their peculiar weapon the boomerang. The tribal relation exists and cannibalism prevails. They have no religion beyond believing in the god Buddai, a giant sleeping for ages, whom they expect some day to awake and eat up the world. The native Australians are computed at about 80,000. The rapidly increasing European population is almost wholly British, who have founded thriving settlements, advanced in civilization and all the arts of life.

History.—Australia was first discovered by the Dutch and Spaniards in 1606. Capt. Cook in 1770 explored the eastern coast. In 1788 the first settlement of New South Wales began, Botany Bay following as a penal colony. Western Australia was set apart in 1829, Southern Australia in 1834, Victoria in 1851, and Queensland in 1859. Explorations of the almost unknown interior were conducted by Sturt in 1845; Leichhart (who never returned) in 1847; Stuart, 1858; Waterhouse, 1860; Burke, 1860; Howitt, 1861; M'Kinlay, 1861; Gosse and Warburton, 1873; Giles, 1876; and Barclay, in 1878, developing the fact that the unexplored interior is more fertile than was previously believed. (See SMITH, "Gold Fields and Mineral Districts of Victoria;" CHRISTMANN, "Australien," and PETERMANN, "Australien in Mittheilungen." Also "South Australia," by WILLIAM HARCUS (1876), and "History of Australia" by G. W. RUSDEN (1883).)

Political Divisions.—Australia is thus divided:

COLONIES.	Square miles.	Population.
New South Wales, 1881	308,467	750,000
Queensland, 1879	668,058	217,851
South Australia, 1881	903,690	277,000
Victoria, 1879	88,424	899,333
Western Australia, 1879	975,531	28,668
Total	2,944,170	2,172,852

A. R. SPOFFORD.

Austra'lian Alps, a range of mountains in the south-eastern part of Australia, in the colonies of New South Wales and Victoria. They are called Warragong Mountains by the natives. They are the highest mountains in Australia, but their tops hardly reach the line of perpetual snow. The highest peak is Mount Kosciusko, 7176 feet.

Austra'sia, the E. dominions of the Franks under the Merovingians, made a kingdom by Clovis, 511 A. D., comprising the present Lorraine, Belgium, and adjacent territory. It was merged in the empire of Charlemagne.

Aus'tria, Archduchy of, is the nucleus around which the Austrian empire has grown. Area, 12,285 square miles. It is bounded on the N. by Bohemia and Moravia, on the E. by Hungary, on the S. by Styria, and on the W. by Bavaria. It is intersected by the Danube, and is divided by the river Enns into two provinces, Upper Austria (Oberoesterreich) and Lower Austria (Unter- or Nieder-oesterreich), in which Vienna is situated. Pop. of Upper Austria in 1880, 759,620; of Lower Austria, 2,330,621. Both provinces are mountainous and abound in beautiful scenery. The Noric Alps extend along the southern boundary, and the northern parts of the archduchy are occupied by mountains called the Böhmerwald. The climate is moderate, the average annual temperature of Vienna being 51° F. The soil in the valley of the Danube is fertile, and the hilly regions produce valuable timber. Among the staple products are grain, wine, and excellent fruits. Lower Austria has a more extensive commerce than any other province of the empire.

Austria-Hungary, aws'tri-a hung'ga-re [Ger. *Oesterreich-Ungarn*], or, as it is generally called in non-official style, **Austria,** is situated in the south-eastern part of Central Europe, between lat. 42° and 51° N., and bounded by Italy, Switzerland, Bavaria, Saxony, Prussia, Russia, the Danubian principalities, Turkey, and the Adriatic Sea.

Divisions and General Statistics.—The Austrian empire is composed of 5 kingdoms (Hungary, Bohemia, Galicia, Illyria, and Dalmatia), 1 archduchy (Austria), 2 principalities (Transylvania and Bosnia), 1 margraviate (Moravia), 1 county (Tyrol), and some countries without any definite title (Croatia, Slavonia, Herzegovina, etc.). As these provinces—or, as they are called, crown-lands—were gathered originally around two different centres, the archduchy of Austria and the kingdom of Hungary, which afterward were united in the possession of the house of Hapsburg, the Austro-Hungarian monarchy consists of two distinct states—the Cisleithan or German or Austrian, and the Transleithan or Magyar or Hungarian—the river Leitha forming the dividing-line, the Germans and the Magyars the two most prominent nationalities. To the former of these divisions belong the fourteen first crown-lands mentioned in the list below; to the latter, the four next. But to these two divisions must further be added Bosnia and Herzegovina, which were acquired by the treaty of Berlin of July 13, 1878, which decided that they should be occupied and administered by Austria-Hungary, which decision was carried out in the course of the year.

PRÓVINCES OF THE EMPIRE, or CROWN-LANDS.	Sq. miles.	Population.
Lower Austria	7,654	2,330,621
Upper Austria	4,631	759,620
Salzburg	2,767	163,570
Styria	8,670	1,213,597
Carinthia	4,005	348,730
Carniola	3,856	481,243
Littoral	3,084	647,834
Tyrol	11,324	912,549
Bohemia	20,060	5,560,819
Moravia	8,583	2,153,406
Silesia	1,987	565,475
Galicia	30,307	5,958,907
Bukowina	4,035	571,671
Dalmatia	4,940	476,101
Hungary	87,043	11,744,471
Transylvania	21,215	2,116,132
Croatia and Slavonia	16,773	1,732,261
Town of Fiume	[illegible]	17,865
Total	240,942	37,754,972

As Bosnia comprises 16,417 square miles with 862,202 inhabitants, Herzegovina 4308 square miles with 207,970 inhabitants, and the additional portion of the sanjak of Novi-Bazar 3522 square miles with 142,000 inhabitants, the whole Austrian empire comprises an area of 265,189 square miles with 38,967,144 inhabitants. Practically belonging to Austria-Hungary, though not incorporated by any treaty, is the small principality of Liechtenstein; area, 68 square miles, pop. 8320.

Configuration, Products, Industry, and Commerce.—Austria is, next to Switzerland, the most mountainous country in Europe, resting S. on the east continuations of the Alps, and N. on the easternmost ranges of the mountain-system of Central Europe. The Alps enter the country from the Swiss canton of the Grisons; form in Tyrol, under the name of the Rhætian or Tyrolese Alps, a confused mass of mountains, whose highest peak, the Orteler Spitze, rises 12,814 feet above the level of the sea; and separate then into four distinct though not parallel ranges, of which the Noric Alps, 12,000 feet high, fill Salzburg, Styria, and Austria proper, the Cornic Alps, 9000 feet high, Carinthia, Carniola, and Croatia, and the Julian and Dinaric Alps, 5000 feet high, Dalmatia and Bosnia, where they connect with the Balkan. To the N., the Bohemian Forest, not much more than a range of wooded hills, the Riesengebirge rising in the Schneekoppe 5330 feet above the sea; the Erzgebirge and the Sudetes enclose the Bohemian table-land and connect eastward with the Carpathians, which in the Eisthaler Thurm rise 8378 feet above the sea, form in a large arch the boundary between Hungary and Galicia, and fill the whole of Transylvania. Between these two systems of mountain-ranges the intermediate country is occupied by the basin of the Danube and its affluents. In Austria proper they approach each other very closely; farther to the E. they separate widely and give room for the extensive Hungarian plain. The Galician plain, N. of the Carpathians, is by no natural boundary separated from the plains of Poland and Russia. The principal river is the Danube; next, the Volga, the greatest river in Europe and navigable in its whole course through Austria, about 820 miles. Where it enters the country it is 898 feet above the sea; where it leaves it and passes through the Iron Gate into the Wallachian plains, only 132 feet. It receives from the Alps the Inn, the Drave, the Save, etc., and from the Carpathians the great river Theiss. To the North Sea runs the Elbe; to the Baltic, the Oder and the Vistula; to the Black Sea, the Dniester; but none of these rivers have any mercantile or military importance to the country.

The mountains abound in metals and useful minerals, are well wooded with oak, ash, elm, and fir, and present excellent grazing grounds. The valleys are fertile, in the southern part covered with vineyards, olive- and mulberry-groves, and orchards producing the choicest fruits. The plains are the granaries of Europe. Though one-third of the productive area, about 66,000 square miles, is covered with forests, and though agriculture, the principal industry of the country, is in a somewhat backward state, 400,000,000 bushels of grain are annually raised—rye, oats, wheat, barley, maize, and millet—especially in Hungary and Galicia; 375,000,000 gallons of wine are annually produced, 72 per cent. of it in Hungary, and some of these wines are very celebrated, as, for instance, the Tokay. Flax and hemp are extensively cultivated in Moravia, Silesia, Bohemia, etc., and many kinds of very fine linen are manufactured. The tobacco-plant and the beet-root are also grown; the former, both its cultivation and its manufacture, is a government monopoly. An immense quantity of beer is manufactured—not less than 186,000,000 gallons a year; there are 3200 breweries in the country, of which about 1000 are in Bohemia. Next to agriculture, cattle-raising and horse-breeding are the most important industries. Austria-Hungary contains 12,705,404 head of cattle, of which 5,279,193 are in Hungary, and 3,525,842 horses, of which 2,158,819 are in Hungary; the latter enjoy a high reputation. Leather is annually manufactured to the value of about £10,000,000. The number of sheep in the country is about 20,000,000, of which about 15,000,000 are in Hungary. They are raised principally for the sake of the wool, and woollen-manufactories flourish, especially in Bohemia. Finally must be mentioned the highly-developed mining industry. Inexhaustible stores of coal are found at various places in the country, and about 6,000,000 tons are annually raised from the mines. Gold and silver are found in Hungary and Transylvania, iron in Silesia, Styria, etc., copper in Tyrol, rock-salt in Galicia; 75,451 persons are employed in the mines, and 13,857 in the smelting- and casting-works. The commerce of Austria is, of course, much impeded by its inland position and the mountainous character of its territory; its only seaports are Trieste and Fiume. Nevertheless, the value of its imports of merchandise amounts to 579,547,828 florins, and of its exports to 698,302,513 florins: and the value of its imports of bullion amounts to 28,300,000 florins, and of its exports to 15,100,000 florins.

Population, Religion, Education, and Military Organization.—The inhabitants of Austria-Hungary belong to three distinct races—Slavs, Germans, and Magyars—different in blood, language, manners and customs, religion, etc. The Slavs number 16,540,000, and would thus form the dominant nationality in the empire if they were not cut up into several minor divisions which have nothing in common but the mere descent—4,480,000 Czechs in Bohemia, 3,360,000 Ruthens and 2,370,000 Poles in Galicia, 1,220,000 Slovens, 1,940,000 Slovaks, 1,520,000 Croats, etc. The Germans number about 9,000,000; the Magyars, about 5,600,000. Besides these three large groups, there are in Austria-Hungary 2,940,000 Rumäni or Wallachians, 1,105,000 Jews, 515,000 Italians, 140,000 gypsies, etc. The majority of the population, about 24,000,000, belong to the Roman Catholic Church, about 7,000,000 to the Greek Catholic Church, about 4,000,000 to the Protestant churches. There are in all about 34,000 ecclesiastics, and 950 convents with 8500 monks and 5700 nuns. Popular education has of late received much attention from the government, and every child of the proper age is now compelled to attend the common schools, if school-education is not provided for it in some other way. There are in Austria 15,054 common schools, with 32,137 male and 2814 female teachers, of whom 12,225 are ecclesiastics and 1036 nuns; the common schools of Hungary number about 16,000, with about 28,000 teachers. The universities, of which there are six in Austria (Vienna, Grätz, Innsbrück, Prague, Cracow, and Lemberg) and one in Hungary (Pesth), are in a flourishing condition, numbering 707 professors and 10,900 students. The middle schools or gymnasiums and the special schools for mining, military science, etc. are best developed. Military service is compulsory on all citizens capable of bearing arms, and the service lasts for twelve years—three in the standing army, seven in the reserve, and two in the so-called *Landwehr*. The standing army numbers in peace 268,204 men; in war, 1,031,621. The navy consisted in 1882 of 62 steam-vessels. The largest ship is the Custozza, 302 feet long.

History and Government.—The history of Austria is the history of the house of Hapsburg. When Rudolph of Hapsburg became emperor of Germany, and Ottokar, king of Bohemia and duke of Austria, Styria, and Carinthia, refused to take the oath of allegiance, the emperor succeeded in dispossessing him of his fiefs (1278), and subsequently conferred them, with the consent of the electors of the German empire, on his son (1282). Thus the dynasty of Hapsburg was founded. In the first half of the sixteenth century Duke Ferdinand of Austria was elected king of Hungary by one party, while John Zapolya of Transylvania was chosen by another. After several wars, in which John was supported by the Turks, Ferdinand finally came out victorious and united Hungary to Austria. Thus possessed of a large territory fertile and densely peopled and regularly elected emperors of Germany, the house of Hapsburg was for several centuries the richest and most powerful family in Europe. But humiliations came thick and heavy with Napoleon. Driven out of Germany, the emperor Francis assumed Aug. 11, 1804, for himself and his successors, the title of emperor of Austria. But, besides Germany, he also lost his possessions in Italy, and was completely shut out from the sea. After the fall of Napoleon, Austria was restored to its former size, and under the administration of Metternich it also regained its former prestige in European politics. But it was internally weak, and its weakness became surprisingly apparent—first by the revolution of 1848, when only the support of Russia prevented the whole fabric from falling to pieces, and then after the battle of Sadowa, 1866, when for the second time it was driven out of Germany and lost its hold on Italy. Since that time the Austrian government has been principally occupied with the internal reconstruction of the empire, and it is now constituted as a double state, Austria and Hungary, each with a representation of its own, out of which is formed a parliament, in which all common affairs—army and navy, foreign policy, commerce, railroads, post and telegraph, etc.—are treated. In 1882 the budget of Austria showed 448,155,793 florins receipts and 485,720,951 florins expenditure; that of Hungary, 301,967,214 florins receipts and 328,235,311 florins expenditure; and that of the common affairs of both states, 117,149,549 florins receipts and expenditure.

Clemens Petersen.

Autobiog′raphy [from the Gr. *αὐτός*, "self," *βίος*, "life," and *γράφω*, "to write"], a life of a person written by himself. Such memoirs are divisible into two classes—those in which the object of the writer is to illustrate the history of his own mind and heart, as the "Confessions" of Saint Augustine and Goethe's "Dichtung und Wahrheit;" and those in which his purpose is to give a sketch of the events which have occurred within his own experience, and of characters with which he has associated. The "Mémoires d'Outre-Tombe" of Chateaubriand may be said to combine the characteristics of both classes. The autobiography of Franklin, the "Confessions" of Rousseau, and the "Recollections of a Busy Life" by Hon. Horace Greeley are valuable autobiographic works.

Autoch′thones [Gr. *αὐτόχθονες*, from *αὐτός*, "self," and *χθών*, "ground," "country"], a Greek term applied to the original inhabitants of a country, implying that they were sprung from the soil. The Athenians claimed to be autochthones, and wore on their headdress an emblematic grasshopper in reference to their origin. The same claim was made by many other peoples.

Au′to-de-Fé (*i. e.* "act of faith"), the Spanish name of a public ceremony held in Spain and Portugal at the execution of heretics who were burned by order of the Inquisition. Multitudes of spectators assembled to witness the execution and the procession of monks and priests which formed a part of the ceremony. The first ceremony of this kind is said to have taken place at Valladolid in 1560. In 1761 an auto-de-fé was held at Lisbon, at which upwards of fifty persons perished.

Au′tograph [from the Gr. *αὐτός*, "one's self," and *γραφή*, "writing"], a manuscript written by the hand of the author; an original manuscript as distinguished from a copy. The term is sometimes applied to a specimen of the handwriting of any eminent person. In modern times many persons devote much time to the collection of autographs, which are articles of literary trade. Some men study autographs as exponents of the character or temperament of the writers. The signature of Shakspeare is one of the most scarce and highly prized of autographs. (See John G. Nichols, "Autographs of Royal, Noble, Learned, and Remarkable Personages conspicuous in English History from the reign of Richard II. to that of Charles II." (1829), and "Isographie des Hommes Célèbres," Paris, 3 vols., 1828–30.)

Autol′ycus [Αὐτόλυκος], a Greek astronomer and mathematician, born at Pitane, in Æolis, lived about 325 B. C. He wrote a work on the revolving sphere, and another on the rising and setting of the fixed stars; both are extant.

Autom′aton, plu. **Autom′ata** [from the Gr. *αὐτόματος*, "acting spontaneously"], a piece of mechanism so constructed as to imitate the actions of an animal. This exercise of mechanical ingenuity is of very ancient origin. Dædalus was among the first who excelled in this art. Archytas of Tarentum, who lived about 400 B. C., is said to have made a dove that could fly. Among the most wonderful automata of modern times was the flute-player which Vaucanson exhibited in Paris in 1738. This had the form of a man, and performed with its fingers. He also produced an automaton duck which swam, dived, ate and digested barley (!), and quacked like a real duck. Kempelen constructed a famous automaton chess-player, the mechanism of which was very ingenious and complex. This automaton could beat the most of the players who tested its skill, but it was long suspected that a man was concealed in it—a Russian officer who had been sentenced to death and escaped by this contrivance. It was afterwards fully proved that the supposed skill of the automaton was due to the presence of a living man, who was concealed within the machine.

Auton'omy [from the Gr. *αὐτός*, "one's self," and *νόμος*, a "law"], the power or right of self-government; political independence. The term is used to designate the characteristic of the political condition of ancient Greece, in which nearly every city was a separate state, and the people were very tenacious of the independence and sovereignty of their respective cities. For this reason they could not form a large centralized republic or stable government.

Au'toplasty [Lat. *autoplas'tia*, from the Gr. *αὐτός*, "one's self," and *πλάσσω*, to "form"], an operation by which lesions are repaired by means of healthy parts being taken from the patient himself (usually from the immediate neighborhood of the lesion to be repaired), and made to supply the deficiency caused by wounds or disease. The operations for this purpose have different names, according to the part affected, as *cheiloplastic* (the operation for the lips), *rhinoplastic* (for the nose), etc.

Autrefois Acquit [Fr. "formerly acquitted"], a plea by a person indicted for a crime or misdemeanor that he has previously been tried for the same offence and acquitted.

Autrefois Convict ("formerly convicted"), a plea by a defendant under the same circumstances as in the case of *autrefois acquit*, that he has previously been tried and convicted of the same offence. These pleas, if true, are a bar to the action by the rules of the common law. They are in this country established as constitutional rights, both by the U. S. Constitution and those of the respective States. The constitutional provision is that no person shall be subject for the same offence to be put twice in jeopardy of life or limb. This rule does not apply where a new trial is ordered for errors in a previous trial, nor where the judge in the course of a trial, in the exercise of a sound discretion, discharges the jury, so that there is no acquittal nor conviction. In each of these cases the accused may be tried again as often as the case arises. In a legal sense he has not been in jeopardy. The rule upon this point is the same in England under the common law as in the U. S. under constitutional provisions.

Au'tumn [Lat. *autum'nus;* originally, *auctum'nus*, from *au'geo, auc'tum*, to "increase," because it is in autumn that the earth yields its increase], the season of the year which follows summer, sometimes in the U. S. called Fall, in reference to the fall of the leaves. In a vague and popular sense it comprises September, October, and November. In the language of astronomy it is the time which elapses between the autumnal equinox and the winter solstice. In the southern hemisphere, March, April, and May are the months of autumn. Autumn may be regarded as occupying the same relative position among the seasons of the year as evening among the periods of the day, and mature age among the stages of human life.

Autun (anc. *Bibrac'te* and *Augustodu'num*), a city of France, department of Saône-et Loire, on the river Arroux, 26 miles by rail N. W. of Chalons-sur-Saône. It is picturesquely situated at the foot of mountains, has a fine Gothic cathedral, a college, and library; also manufactures of cloth, paper, and carpets. It is the seat of a bishop. The ancient Bibracte was the chief city of the Ædui. Here are ruins of an amphitheatre, temples, and other Roman antiquities. Autun was the scene of hostile operations between Garibaldi and the Germans in the winter of 1870–71. Pop. in 1881, 14,049.

Auvergne [o-vairn'] (anc. *Arver'ni* or *Alver'nia*), a former province in the S. central part of France, coincided nearly with present depts. of Cantal and Puy-de-Dôme. It is a mountainous district of volcanic formation, presenting many conical and dome-like summits of extinct volcanoes. The soil in some parts is fertile, especially near the river Allier. Auvergne has produced many eminent men, among whom were Pascal, Turenne, Desaix, and La Fayette. The chief towns were Clermont and Aurillac.

Auvergne, d' (Latour). See Latour d'Auvergne.

Auvergne, Mountains of, a branch of the Cevennes, situated in the French departments of Cantal and Puy-de-Dôme. They separate the basins of the Allier, Cher, and Creuse from those of the Lot and Dordogne. The highest summits of these volcanic mountains are Mount d'Or, 6188 feet high, Cantal, 6093, and Puy-de-Dôme, 4806 feet high. The last is a remarkable specimen of an extinct volcano. They are generally like truncated cones. The scenery of Auvergne is grand and picturesque.

Auxerre (anc. *Autissiodo'rum*), a town of France, capital of the department of Yonne, on the left bank of the Yonne, 93 miles S. S. E. of Paris, with which it is connected by railway. It has a fine Gothic cathedral, a college, a museum, and a public library of 25,000 volumes. Calico, serge, hosiery, and good wine are manufactured here. Pop. in 1881, 16,986.

Auxonne, a town of France, in the department of Côte-d'Or, on the Saône, here crossed by a bridge, 20 miles by rail S. E. of Dijon. It has an arsenal, a barrack, and a magazine, with manufactures of woollen cloth and nails. Pop. in 1881, 6849.

Auzoux (Théodore Louis). See Appendix.

A'va, a city, the former capital of the Burman empire, is situated on a plain on the river Irrawaddy, 350 miles N. of Rangoon. The official native name of it is *Ratnapura*, "the city of pearls." It stands on an island formed by the Irrawaddy and two of its affluents. The most substantial buildings of this city were destroyed by an earthquake in Mar., 1839, after which the seat of government was removed to Monchobo. Pop. about 30,000.

Ava (Kingdom of). See Burmah.

A'va, or **Ka'va** (*Macro'piper methys'ticum*), a narcotic plant of the natural order Piperaceæ, is a native of many South Sea islands, the inhabitants of which intoxicate themselves with a fermented liquor prepared from its root (rhizome). It is a shrubby plant, with cordate, acuminate leaves, and was formerly classed with the genus *Piper*. The effect of this liquor is a stupefaction like that caused by opium, and is followed by copious perspiration. The liquor is prepared by maceration in water.

Ava, Mo. See Appendix.

Avadu'tas, a sect of Hindoo Brahmans, who practise excessive austerities, and mortify themselves by painful and disgusting forms of penance. They hold their bodies in contorted positions until they become permanently deformed. They procure a subsistence by begging.

Av'alanche [Fr. *lavanche*], a mass of snow or ice which collects on the steep declivity of a high mountain, and sliding down the side gathers accessions of snow until it attains an enormous bulk, and descends to the valley with ruinous momentum. Drift or powder avalanches consist of dry, loose snow which is set in motion by the wind and accumulates in its descent; these occur mostly in winter. Another kind is formed in spring, when the snow begins to melt, and slides down the declivity by its own weight, carrying with it trees and rocks which sometimes bury cottages in ruins. Avalanches are common among the Alps, but are rare in the Andes. A touch of the foot or a slight movement of the air, even that produced by the sound of a bell, is sometimes sufficient to set the avalanche in motion. On account of the frequent occurrence of avalanches, some parts of the Alpine valleys remain uninhabited.

Avallon (anc. *Abal'lon*), a town of France, department of Yonne, on the river Voisin, 18 miles S. E. of Auxerre. It has manufactures of paper and woollen cloth. The adjacent country is fertile, and renowned for its picturesque beauty. Pop. in 1881, 6139.

Ava'ri, or **A'vars,** a warlike tribe of Mongolians that entered the countries near the Don, the Caspian Sea, the Volga, and westward. Part of them remained near the Caucasus, and another part proceeded about 555 A. D. to Dacia. They served in the army of Justinian, and fought against the Gepidæ. They in 568 obtained Pannonia. They oppressed the Slavi, and made inroads into Germany and Italy. In 769 they were defeated by Charlemagne, and nearly exterminated. They used to intrench themselves in circular walled camps, traces of which, called "Avarian rings," are still visible in Hungary. The Avars penetrated into Greece and established colonies in the Morea. Navarino derives its name from them. (See Thierry, "Attila.") They appear to have amalgamated with the Bulgarians, or rather to have adopted the Bulgarian language, and their descendants are confounded with the Bulgarians, of whom numbers are found throughout Greece.

Av'atâr, or **Avatâra** [from *ava*, "off," "away," "down," and *târa*, a "crossing over" or "passing from one thing to another"], in Hindoo mythology signifies "descent" or "transformation," and is applied to incarnations of some of the principal deities, especially Brahma, Siva, and Vishnu. The avatars of Vishnu, which are particularly celebrated, are reckoned as follows: 1, Matsya, the "fish;" 2, Kûrma, the "tortoise;" 3, Varâha, the "boar;" 4, Narasingha, the "man-lion;" 5, Vâmana (or Wâmana), the "dwarf;" 6, Parasurâma (called in the common dialect Pŭrasoorâm); 7, Râma Chandra; 8, Krishna; 9, Buddha; the tenth, yet to come, is called Kalki, the "horse."

Avat'cha, or **Avatch'ka,** a bay in the south-eastern part of Kamtchatka, affords the best harbor of the whole peninsula. The capital, Petropaulowski, is on this bay, a few miles from which is a volcano called Avatcha or Avatchinskaya. (See next article.)

Avatchinskay′a, or **Mount Avatcha,** an active volcano in Kamtchatka, near the sea; lat. 53° 15′ N., lon. 158° 50′ E. It has an altitude of 9055 feet, has a crater at its summit, and another at a height of 5000 feet.

A′vebury, A′bury, or **Abiry,** a small village of England, in Wiltshire, 25 miles N. of Salisbury. It is the site of extensive remains of the pre-historic period in Europe, and is in the vicinity of several remarkable barrows and cromlechs of great antiquity. The principal relics, formerly ascribed to the Druids, consist of 100 large blocks of stone placed on end in a circle, enclosing a level area of about 470 yards in diameter, which was surrounded by a ditch and a high embankment. Some of the stones measure twenty feet high above the ground. Nearly a mile S. of this temple is a barrow or conical artificial mound called Silbury Hill, which is 170 feet high, and covers a space of five acres. This was undoubtedly constructed long before the Roman conquest of Britain, and the opinion of the later archæologists refers the whole group to times of very remote antiquity.

Avei′ro, a seaport-town of Portugal, province of Beira, at the mouth of the Vouga, 35 miles by rail N. W. of Coimbra. It is the seat of a bishop, and has a considerable trade in oil, wine, sardines, oranges, salt, etc. Pop. 1878, 6852.

Avellane′da, de (GERTRUDE GOMES), a Spanish poetess, born in the island of Cuba in 1816. She became a resident of Madrid about 1840, and published a volume of lyric poems in 1841. Soon after this date she produced several novels, and successful tragedies entitled "Alfonso Munio" and "Egilona." She was married in 1846 to Don Pedro Sabator, who died the same year. Among her works are "La Cruz," a poem, and dramas called "The Glories of Spain" (1850) and "Sonambula."

Avellino (formerly called **Principato Ulteriore**), a province of Southern Italy, is bounded on the N. by Benevento, on the E. by Foggia and Potenza, on the S. by Salerno, and on the W. by Caserta. Area, 1410 square miles. The country is throughout mountainous. The soil everywhere is extremely fertile, and the harvests are therefore generally very large. The country is traversed by the Calore and the Ofanto. The chief products are cattle, Salami, linen, and leather. Chief town, Avellino. Pop. in 1881, 393,228.

Avelli′no (anc. *Abelli′num*), a fortified town of Italy, the capital of the above province, is 25 miles E. of Naples, and at the foot of Mount Vergine. It is the seat of a bishop, has a cathedral, a college, manufactures of paper, woollen goods, and maccaroni, and an extensive trade in hazelnuts (*Nuces Avellanæ*), chestnuts, and grain. It was much damaged by an earthquake in 1694. Pop. 22,920.

A′ve Mari′a, or **Angel′ica Saluta′tio,** a form of prayer to the Virgin Mary (commencing Ave Maria, "Hail Mary"), which in the time of Damiani (died 1072) was simply the "annunciation" or salutation of the angel in Luke i. 28, but grew by successive additions till it reached its present form in the time of Pius V. (1566–72). (See ROSARY.)

Avenger of Blood. In early ages, as now in barbarous countries, the infliction of the penalty for murder did not take place by the action of public authorities, but was left to the nearest male relative of the murdered person, whose duty was to pursue and slay the murderer. He was called the "avenger of blood" (in Hebrew *göel*, which term, however, was of wider signification). The Mosaic law did not set aside this custom, but placed it under regulations, prohibiting the commutation of the penalty of death for money, and appointing six cities of refuge, three on either side of the Jordan, for the manslayer who was not a murderer. The Koran sanctions the avenging of blood by the kinsman, but also sanctions the pecuniary commutation. The custom prevails among the Arabs at present, as well as in other rude nations.

Avent (BENJAMIN WARD), M. D. See APPENDIX.

Aventi′nus (JOHANNES), a German historian whose proper name was THÜRMAIER or THÜRNMAIER, was born at Abensberg, in Bavaria, in 1466. He was invited to Munich in 1512, and appointed tutor to the sons of the duke of Bavaria. His principal work is a "History of Bavaria" ("Annales Boiorum," 1554), which was highly esteemed. The most complete edition is that published by Cisner in 1580. Died Jan. 9, 1534. (See J. ZIEGLER, "Vita Aventini.")

Aven′turine, a name applied to certain varieties of quartz or felspar which contain bright red, brown, or golden scales of mica, oxide of iron, etc. It is often used as a gem.

Aventurine Glass, also called **Gold Flux** or **Gold Stone,** a variety of glass used as an ornamental stone by jewellers. The ground is of a rich yellowish-brown color, with innumerable golden scales. It may be made by fusing together 300 parts of powdered glass, 40 parts of copper filings, 80 parts of iron filings, and cooling slowly.

Av′erage [Lat. *avera′gium*, from *ave′ro*, to "prove," to "estimate"], a mean proportion; a medial sum or quantity intermediate between several unequal quantities. The relation of the average to the other quantities is such that the sum of the excesses of the greater above the average is equal to the sum of the defects of the less below it. The average of several quantities—for example 3, 7, 9, and 13—is obtained by adding them together, and dividing the sum by the number of quantities. The sum, 32, divided by 4, gives 8 as the average.

Average, in law, is a term employed in maritime commerce, and is used in different senses when preceded by the words general, particular, or petty.

1. *General Average.*—This means the case where several interests connected together, as being engaged in a common adventure at sea, such as ship and cargo, are exposed to a marine peril, and one of these interests is voluntarily sacrificed, either in whole or in part, as the price of the safety of the residue of the property at risk; or expense is incurred for the same reason, and the amount of such sacrifice or expenditure is charged by law upon the respective interests in proportion to their value. The act of voluntarily casting away property under such circumstances is termed a "jettison." The elements of a general average case are said to be these: there must be a sacrifice of property, it must be voluntary, and must be successful. There is no general average allowed in cases of goods laden on deck, unless it is usual to place the goods there on a voyage such as the one in which this question arises. The master of the ship by the maritime law is entrusted with the power to order a jettison when the circumstances justify it. The American law allows general average where a ship which would have foundered is voluntarily wrecked in such a manner as to save the cargo or a part of it. Expenditures of money in some instances justify a contribution of the nature of general average, as where they are incurred for the preservation of the ship or cargo from extraordinary perils, or where they are necessary for the completion of the adventure in which all the interests at risk are concerned; as, for example, for the prosecution of the voyage. The property upon which the contribution is assessed is the ship, cargo, and freights. The property lost contributes as well as that which is saved. The general principle is substantially this: as the whole property at risk is to the whole amount of the loss, so is each owner's particular interest to his share of the loss. This rule results in assessing a certain percentage of the loss on each owner, according to the value of his interest. The values are estimated by rule: the ship and appurtenances are valued as at the end of the voyage, and the cargo at its value at the time and place of discharge. An adjustment made at the end of a voyage at the port of arrival is deemed to be valid everywhere, according to a settled maritime rule. The special rules applicable to the cases in which general average is allowed are not precisely the same in England and in the U. S., and the subject branches out into much detail in the books of maritime law. Practically, it is closely connected with the business of marine insurance, as the insurance on ship, cargo, and freight may be made by different underwriters, and under the law of abandonment the rights to claim general average, as well as the burden of its assessment, may vest in and rest upon the respective insurers. 2. *Particular Average.*—This signifies damage happening to interest (ship, cargo, and freight) at risk at sea in consequence of pure accident. The loss in such a case rests upon the owner of the property injured or upon his insurer. 3. *Petty Average.*—This term refers to certain petty charges in port for pilotage, lights, towage, anchorage, and the like, which were formerly apportioned upon the owners of the ship and cargo. The modern practice is to include these charges in the freight.

T. W. DWIGHT.

A′verell (WILLIAM W.), born in the State of New York 1830, graduated at West Point 1855, appointed lieutenant Mounted Riflemen; served on frontier and fighting Indians till 1859, when wounded. During the civil war he was present at the battle of Bull Run, July, 1861; colonel Third Pennsylvania Cavalry, 1861; commanded cavalry brigade about Washington, D. C. In Virginia peninsular campaign 1862 was engaged at Yorktown, Williamsburg, Fair Oaks, Malvern Hill. In 1862 he was appointed brigadier-general of volunteers; engaged at Fredericksburg Dec., 1862; in command at Kelly's Ford Mar., 1863; participated in Stoneman's cavalry expedition towards Richmond April–May, 1863; engaged in, and in command of, skirmishes, actions, and raids in West Virginia, Tennessee, Shenandoah Valley; at Opequan Sept. 19, 1864, and Fisher's Hill Sept. 22, 1864; captain Third Cavalry U. S. A. July, 1862, and brevetted major, lieutenant-colonel, colonel, brigadier-general, and major-general U. S. A. Resigned May, 1865. Appointed U. S. consul-general to Canada, 1866; president of manufacturing company, New York, 1875.

Aver'nus [Gr. Ἄορνος, from α, priv., and ὄρνις, a "bird"], a famous lake [It. *Lago d'Averno*] of Italy, 10 miles W. of Naples. It occupies the crater of an extinct volcano, is about a mile in diameter and 170 feet deep. It was supposed that the name Avernus was given to it because the mephitic vapors killed the birds that flew over it. The ancients imagined that this lake was the entrance to the infernal regions. Agrippa opened a canal from Avernus to the sea, converting it into a harbor, but the canal was destroyed by an earthquake in 1538. It was specially dedicated to Proserpine, and an oracle was maintained here. This lake seems to have originally had no outlet. It is often visited by tourists.

Aver'roës, or **Averrhoes**, originally **Ibn-Roshd**, a celebrated Arabian philosopher and physician, was born at Cordova, in Spain, 1120. He rose to great dignity in the Moorish kingdom, but was accused of heretical opinions and deprived of his office, from which time he lived in poverty until the accession of the caliph Al-Mansur-Billah, whom he followed to Morocco, where he died in 1198. He was a great admirer of Aristotle, on whom he wrote a celebrated commentary. In the Middle Ages he was called "The Commentator," and was said to have translated Aristotle into Arabic, which story was repeated over and over again until in 1852 E. Renan proved it to be a fable; indeed, Averroës did not understand the Greek language.

Aver'sa (anc. *Atella*), a town of Italy, in the province of Caserta, and in a beautiful plain 9 miles N. of Naples. It is the seat of a bishop, is well built, has a cathedral, several convents, about ten churches, and a lunatic asylum. Pop. in 1881, 21,473.

A'very (Waightstill), born at Groton, Conn., May 3, 1745, graduated at Princeton in 1766, became in 1769 a lawyer in Mecklenburg co., N. C. He was an early and constant patriot in the Revolutionary war, being one of the signers of the Mecklenburg Declaration (1775), a member of the Hillsborough congress (1775), of the State congress (1776), first attorney-general of the State (1777), and was in 1779 a colonel of militia in active service. Died in Burke co., N. C., Mar. 15, 1821.

A'verysboro', Harnett co., N. C. (see map of North Carolina, ref. 3–G, for location of county), on Cape Fear River, about 40 miles S. of Raleigh. During Gen. Sherman's Carolina campaign, while his army was marching toward Goldsboro', a strong force of Confederates under Gen. Hardee was intrenched in front of Averysboro' (Mar. 16, 1865) to check Gen. Sherman and gain time for the concentration of forces at Smithfield under Gen. Johnston. After three or four hours' severe fighting the Confederates fell back to a second and stronger line. The attack being renewed along this line, fighting continued through the day, the Confederates being driven within their intrenchments; during the night, which was dark and stormy, their works were evacuated, and on the morning of the 17th it was found that the army of Gen. Hardee was retreating toward Smithfield. The Federal loss was about 600, killed and wounded; the Confederate loss was probably smaller, except in prisoners, of which many remained in Gen. Sherman's hands. This battle is known as the battle of Averysboro'. Pop. of village in 1880, 38.

Avery's Gores, a number of tracts of land in Vermont, granted to Samuel Avery in 1791. One of them is in Granville township, Addison co., near the top of the Green Mountains. Another in Franklin co., in the northern part of the State, on the W. side of the Green Mountains, had a population of 34 in 1870 and 16 in 1880.

Aveyron, a department in the S. part of France, is bounded on the N. by Cantal, on the E. by Lozère, Gard, and Hérault, on the S. by Tarn, and on the W. by Lot. Area, 3376 square miles. It is intersected by the river Lot and the Tarn, and also drained by the river Aveyron. The surface is mountainous, and the chain of the Cevennes extends along the south-eastern border of the department. Among its mineral resources are coal, copper, lead, zinc, and iron. The coal-mines are very valuable. It has manufactures of cotton yarn, paper, woollen stuffs, carpets, and leather. It is divided into 5 arrondissements, 42 cantons, and 285 communes. Among the chief articles of export is Roquefort cheese. Capital, Rodez. Pop. in 1881, 415,075.

Avezac, d' (Auguste Geneviève Valentin), a lawyer, born in St. Domingo (Hayti) in 1777, was a brother-in-law of Edward Livingston. He practised medicine in Virginia, and law in New Orleans with great success. He served in the army in the war of 1812, and afterwards removed to New York. He was chargé d'affaires at The Hague in 1831 and 1845–49. Died Feb. 15, 1851.

Avezac, d' (Pierre Valentin Dominique Julian), an uncle of the preceding, was born in St. Domingo July 17, 1769. He became a citizen of New Orleans, and translated Scott's "Marmion" into French. Died Feb. 1, 1831.

Avezza'na (Giuseppe), an Italian republican and patriot, born in Piedmont Feb. 19, 1797. He fought against Bustamente in Mexico in 1832, and became a merchant in the city of New York in 1834. Early in 1848 he returned to Italy to fight for the independence of his country, and was appointed commander of the national guard at Genoa. In Mar., 1849, he was chosen minister of war of the Roman republic and commander of the army. Rome was taken by the French in July of that year, and Avezzana escaped to the U. S. D. Dec., 1879.

Avia'no, a town of Italy, in the province of Udine, 48 miles N. N. E. of Venice. Pop. 6184.

Avicen'na [Fr. *Avicenne*], the Latin form of **Ibn-Sînâ**, the most eminent of Arabian physicians, was born near Bokhara in 980 A. D. He was well versed in mathematics, astronomy, philosophy, and other sciences. Before he was twenty years old he was reputed the most learned man of his time. He was employed as a physician by several Samanide sovereigns, and resided at Ispahân and Hamadân. He wrote in Arabic a large number of works on medicine and philosophy, the most important of which is his "System of Medicine" ("Canon Medicinæ"), which, translated into Latin by Gerardius Cremonensis (2 vols., 1595), was for five centuries a standard book of the highest authority in the schools of Europe. He died in 1037. (See S. Klein, "Dissertatio de Avicenni Medico," 1846; Ibn-Khallikân, "Biographical Dictionary," edited by De Slane, Paris, 1842; Freind, "History of Physic.")

Avicen'nia, a genus of plants of the natural order Myoporaceæ, consists of trees or shrubs resembling mangroves, and growing in salt swamps in tropical regions and in the southern hemisphere. The *Avicennia tomentosa*, the white mangrove of Brazil, has cordate, ovate leaves, downy on the lower side. Its bark is used for tanning. Its gum is used as food in New Zealand, and its seeds in India.

Avid'ius (Cassius), an able Roman general, born in Syria, commanded for Marcus Aurelius an army which defeated the Parthians in 165 A. D. Having become governor of Syria and commander of several legions, he revolted in 175 A. D., and took the title of emperor. He obtained possession of Egypt and part of Asia. He was killed by his own officers in 175 A. D.

Avigliano, a town of Italy, in the province of Potenza, 11 miles N. W. of Potenza, is near the Apennines. It has a fine church and a college. It was the scene of a landslip in 1824, which caused great destruction. P. 9236.

Avignon (anc. *Ave'nio*), an ancient city of France, capital of the department of Vaucluse, is situated on the left bank of the Rhone, 74 miles by rail N. N. W. of Marseilles. It is the seat of an archbishop, and is surrounded by a rich country with delightful scenery. It contains a college, a public library of about 45,000 volumes, a museum of natural history, a botanical garden, a fine theatre, a lunatic asylum, etc. Among the interesting and ancient public edifices is the former palace of the popes, a vast irregular Gothic structure, for a long time used as a barrack and prison, but recently restored, and now the episcopal residence; and the cathedral called Notre Dame des Dons, rebuilt by Charlemagne, and containing a richly-sculptured chapel. Petrarch passed several years at Avignon and at Vaucluse (which is about three miles distant), where he first saw Laura. The manufacture of silk is the principal branch of industry in this city, which also has several paper-mills, iron-foundries, and manufactures of velvets and woollen stuffs. It has an active trade in wine, brandy, grain, etc. Avenio was the capital of the Cavares before the time of Cæsar. It was taken by the Saracens in 730 A. D., and after many changes was purchased in 1348 by Pope Clement VI., and became the seat of the papal government. Seven successive popes resided at Avignon in the fourteenth century, during which it had about 100,000 inhabitants. The papal court was transferred to Rome in 1377, and Avignon was annexed to France in 1791. Pop. in 1881, 37,657.

A'vila, a province of Spain, in Old Castile, is bounded on the N. by Valladolid, on the E. by Segovia and Madrid, on the S. by Toledo and Caceres, and on the W. by Salamanca. Area, 3407 square miles. The surface is mountainous, except the northern part. The chief article of export is merino wool. Capital, Avila. Pop. in 1877, 180,457.

Avila (anc. *Ob'ila* or *Ab'ula*), an episcopal city of Spain, the capital of the above province, is on the river Adaja, 71 miles by rail N. W. of Madrid. It was once a rich and more populous city, having a flourishing university, founded about 1482 and abolished in 1807. It has a fine cathedral and convent. Pop. 6892.

A'vila y Zuñi'ga, de (Luis), a Spanish historian and diplomatist, born in Estremadura about 1490. He enjoyed the favor of Charles V., who sent him as ambassador to Rome about 1558. He wrote "Commentaries on the War of Charles V. in Germany in 1546 and 1547" (1548). This work has considerable literary merit, but is not impartial. Died probably after 1560.

Aviler' (Augustin Charles), born at Paris in 1653, studied in Rome the profession of an architect, aided by a pension from the king. He was engaged for some time with Mansard in Paris, and afterward erected some fine buildings at various places, among them being the palace of the archbishop of Toulouse. He wrote "Course of Architecture" (1691) and "Dictionary of all the Terms of Architecture, Civil and Hydraulic." Died in 1700.

A'viles, a Spanish town at the mouth of the river of the same name, 15 miles W. N. W. of the city of Oviedo, is one of the most important trading-places in the province of Oviedo. Pop. in 1877, 8979.

A'vis, or **Aviz,** an order of knighthood in Portugal, instituted by King Alphonso I. in 1143 to promote the defeat of the Moors. The king of Portugal is grand master of the order.

Av'ison (Charles), born about 1710, was a noted English musician, musical critic, and organist at Newcastle-upon-Tyne, where he spent most of his life. He studied under Geminiani, and wrote "Essays on Musical Expression" (1752). His best compositions were concertos. Died 1770.

Avi'tus (Alcimus Ecdicius), Saint, a poet and bishop of Vienne, obtained this dignity about 490 A. D. He was an adversary of Arianism. He wrote a poem on the "Creation of the World and on Original Sin," which is said to present some analogy to Milton's "Paradise Lost." Many other of his writings are extant.

Avitus (Marcus Mæcilius), a Roman emperor, born in Auvergne about 400, was the father-in-law of Sidonius Apollinaris. He became prefect of Gaul, and succeeded Maximus as emperor of the West in 455 A. D. He was deposed by Ricimer in 456. Died in 457 A. D.

Avlo'na, or **Valona** (anc. *Aulo'na*), a fortified town and seaport of Albania, on the Gulf of Avlona, which is an inlet of the Adriatic 10 miles long. It is 30 miles S. W. of Berat, and has the best harbor on the Albanian coast. Here are manufactures of arms and woollen stuffs. Pop. about 6000.

Avo'ca, or **Ovo'ca,** a small river in Wicklow county, Ireland, enters the sea at Arklow. It runs through a very narrow and picturesque valley, enclosed between wooded banks from 300 to 500 feet high. The Vale of Avoca is the subject of one of Moore's songs.

Avoca, on R. R., Pottawatomie co, Ia. (see map of Iowa, ref. 6–D, for location of county), 35 miles N. E. of Council Bluffs. Pop. in 1880, 1600; in 1885, 1607.

Avoca'do Pear, or **Alligator Pear** (*Per'sea gratissima*), a fruit tree of the order Lauraceæ, a native of the warm parts of America. It has leaves which resemble those of the laurel. The fruit is a drupe, like a pear in shape, and has a soft pulp of delicate flavor, which dissolves like butter in the mouth, and is called "vegetable butter." It is much esteemed in the West Indies, and grows in Southern Florida.

Av'ocet, or **Avoset** (*Recurviros'tra*), a genus of web-footed birds, of the order Grallatores, having long legs, and very long, slender bills. They are easily distinguished from other wading birds by the upward curvature of the bill, which is like elastic whalebone, and is adapted to seeking in the mud for its food, which consists almost wholly of worms, insects, and little crustaceans. They are birds of powerful wing, and better adapted for flying and walking than swimming. The *Recurvirostra Americana* abounds in the U. S. Another species, *Recurvirostra avocetta,* is common in Europe. The length of both species is about eighteen inches.

Avocet.

Avoid'ance, in English ecclesiastical law, is the term by which the vacancy of a benefice is signified. It is the condition of a benefice void of an incumbent.

Avoirdupois', or **Averdupois,** the name of the common system of weights by which we ascertain the weight of all commodities except medicines, gems, and precious metals. A pound avoirdupois contains 7000 grains, the legal standard of which is such that a cubic inch of water weighs 252.458 grains. The pound is divided into 16 ounces, and an ounce into 16 drams. An ounce is equal to 437½ grains.

TABLE OF AVOIRDUPOIS.

27$\frac{11}{32}$ grains	= 1 dram,	dr.
16 drams	= 1 ounce,	oz.
16 ounces	= 1 pound,	℔.
28 pounds	= 1 quarter,	qr.
4 quarters	= 1 hundredweight,	cwt.
20 hundredweight	= 1 ton,	ton.

A cubic foot of water weighs 997.17 ounces avoirdupois.

Avo'la, a seaport-town of Sicily, in the province of Noto, 13 miles S. W. of Syracuse, is supposed to occupy the site of the ancient *Ibla* or *Hybla*, famous for honey. It has an active trade in grain, cattle, oil, and fruits. An earthquake in 1693 destroyed the ancient *Avola.* Pop. 11,912.

A'von, R. R. junction, delightfully situated in Livingston co., N. Y. (see map of New York, ref. 5–D, for location of county), on the right bank of the Genesee River, 18 miles S. S. W. of Rochester. Avon stands on a terrace 100 feet above the river. Here are sulphur springs, with several hotels, which are much frequented in summer by invalids. Pop. in 1870, 900; in 1880, 1617.

Avon (river). There are several rivers bearing this name in England, Wales, Scotland, and France. The principal of them in English rivers are noticed below. Scotland has an Avon River which flows into the Clyde, another into the Forth, and a third into the Annan. France has two Avon rivers in the Loire system, and two connected with the Seine.

A'von, Lower, a river of England, rises in Wiltshire, flows southward, then nearly north-westward, passes by Bath and Bristol, and enters the Bristol Channel after a course of about 80 miles. It is navigable for large vessels to Bristol, 7 miles. The valley of the Avon is very picturesque. Another river called Avon, or East Avon, rises in Wiltshire, flows southward, passes Salisbury, and enters the English Channel at Christ Church.

Avon, Middle, or **Little,** a river of England. Its whole course is in Gloucestershire, entering the Severn a little below the town of Berkeley.

Avon, Upper, a river of England, rises near Naseby, in Northamptonshire, flows in a general S. W. direction through Warwickshire and Worcestershire, passing Rugby, Warwick, and Stratford, the birthplace of Shakspeare, and joins the Severn at Tewkesbury. It is about 100 miles long. Its tributaries are the Alne, Leame, Stour, and Swift.

Avranches (anc. *Abrin'cæ*), a town of France, in the department of the Manche, 32 miles S. W. of Saint Lo. It was an important Roman military station, and came into the possession of England at the Norman conquest. The Bretons captured the town in 1203. In the fourteenth century the English got possession of it, and held it until 1450. It was once a bishop's see, and its cathedral, destroyed in the time of the first French revolution, was the finest in Normandy. It is beautifully situated on a hill, and has a ruined cathedral, a college, and a convent. Here reside many English families, attracted by the beauty of the position and the cheapness of living. Pop. 8057.

Avrillon (John Baptiste Elias), an eloquent Franciscan monk, was born at Paris in 1632; made profession Jan. 3, 1671, in the convent of the Minims (called *Bons-hommes*) at Nigeon. He was a noted preacher 1676–1728, and left many devotional works, which are greatly esteemed in the Roman Church. Some of them have been translated by the Romanizing party of the Church of England. Among these are "Guide for Passing Advent Holily" and "Eucharistic Meditations." Died May 16, 1729.

'Awaj, the ancient Pharpar, one of the two rivers of Damascus. (2 Kings v. 2.)

Award' [from the Old Fr. *awarder*, to "adjudge"], the result of an arbitration. (See Arbitration.) An award is governed by well-established rules, such as that it must conform to the agreement whereby the matters in dispute were submitted to arbitration; it must embrace them all; it must be final, as well as certain and reasonable. Where several matters are submitted, it is not necessary that each one should be specifically referred to in the award. If the arbitrators purport to dispose of the things submitted by a general result, it will be presumed that each subject was acted upon and embraced in their conclusion. An award does not have the force of a judgment in a court of justice.

If not performed, an action may be brought upon it. If a sum of money were directed to be paid, a debt would be created which could be collected by action. Statutes sometimes allow a clause to be inserted in the submission that judgment in a court of justice may be entered upon the award. In such a case no action is necessary, and a judgment may be taken in accordance with the statute.

Awe, Loch, a lake of Scotland, in the county of Argyle, 8 miles N. W. of Inverary, extends 24 miles in a direction N. E. and S. W. Its average width is about 1 mile, but in some places it is 2½ miles wide. The adjacent scenery is very picturesque. The north-eastern end is overshadowed by rugged mountains, one of which, Ben Cruachan, is 3669 feet high. The water of this lake is discharged through the river Awe into Loch Etive. Loch Awe encloses many islands, and abounds in trout. Its scenes are favorites with artists and with tourists. On its islands are the ruins of several convents and castles.

Awn (*aris′ta*), the botanical name of a stiff and pointed bristle which occurs in the flowers of many grasses, forming the extremity of a glume or palea, as the beard of wheat and barley. The flowers of some grasses are awnless. The parts which are furnished with this organ are called *aristate.* The awn is a prolongation of the midrib of a glume or palea, or is a rigid, barren branch of inflorescence. Sometimes it is twisted, and liable to twist and untwist hygrometrically; sometimes it is serrate, as in barley.

Aw′yaw′ (Aga-Ojo or **Oyo)**, the capital of Yoruba, in Central Africa. Pop. about 70,000.

Axe, a tool used by carpenters and others for cutting wood, is of very ancient origin. Savage peoples of antiquity formed axes of stone, copper, bronze, etc. The axe of modern civilized nations is constructed of wrought iron, with a cutting edge of steel, which is welded to the iron when they are heated to a white heat. After it has been hammered and ground into the proper form, it is carefully tempered by heat and cold water.

Axe′stone, a mineral regarded as a variety of nephrite, is hard, tough, and more or less translucent. It occurs in primitive rocks in Saxony and New Zealand; the natives of the latter use it to make axes, hence the name.

Ax′holme Isle, a level and once marshy tract of England, in the N. part of Nottinghamshire, was drained in 1634 by a Dutchman named Vermuyden, and was for a long time inhabited by French and Dutch Protestant refugees. After much litigation between the colonists and the proprietors, the lands were divided in 1691, and about one-sixth was given to the former. It is now extremely fertile of all kinds of crops.

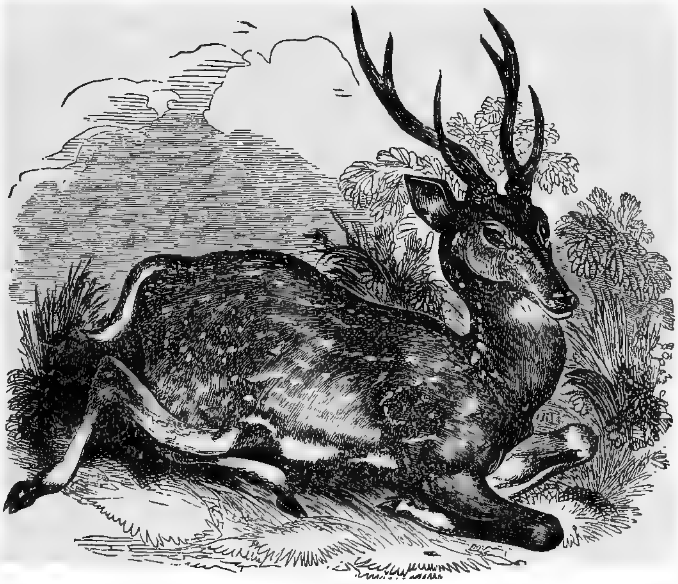
Ax′ia, a town of ancient Etruria, whose remains are identified with the sculptured tufaceous rocks at Castel d'Asso, 6 miles W. of Viterbo. Here are many chambers believed to be sepulchral. There are many Etruscan inscriptions. The architecture is of the Tuscan order, closely resembling the Doric Greek. These remains were discovered in 1808. It is probable that Axia never was a large town, but it must once have been quite important.

Ax′inite [from the Gr. *ἀξίνη*, an "axe"], an anhydrous silicate of alumina, lime, etc. with boracic acid, so named because it occurs crystallized in oblique rhomboidal prisms, so flat as to appear tabular and sharp like the edge of an axe. The crystals have a brilliant, glassy lustre, and are translucent or sub-translucent.

Ax′iom [Gr. *ἀξίωμα*, from *ἀξιόω*, to "think worthy," also to "demand"], in geometry, a proposition which admits of no demonstration, but is taken for granted as a self-evident truth; as, "The whole is greater than its part." Every rational science requires such fundamental propositions and established principles, to which the assent of the student is demanded without proof as a basis for further argument. It is an axiom in logic that he who admits a principle admits its consequence.

Ax′is, plu. **Axes,** a Latin word signifying "axle." A straight line, real or imaginary, about which a body revolves is called the axis of rotation. Axis is an important term in astronomy, botany, crystallography, geometry, and mechanics. The axis of the earth or other planet is that diameter about which it revolves. In botany, the axis is the central part of a plant, around which various organs are arranged. The stem is called the ascending axis, and the root is the descending axis. The stem is an axis for the branches, the branch is an axis for the leaves, and the rachis is an axis of inflorescence. In geometry, the axis of any geometrical solid is the right line which passes through the centre of all the corresponding parallel sections of it, or the right line about which the parts of the figure are symmetrically disposed. Thus, the axis of a cone is a right line drawn from the vertex to the centre of the base. The axis of a curved line is formed by a right line dividing the curve into two symmetrical parts. A right line drawn through the foci of an ellipse is its transverse axis. The lines upon which the abscisass and ordinates of plane curves are measured are called co-ordinate axes, of which one is the axis of abscissas and the other the axis of ordinates. For determining points in space a third axis is used. In crystallography, each form of crystal except the hexagonal prism and the rhombohedron has three axes, one vertical and two lateral. In anatomy, the axis is the second cervical vertebra, which in man is the pivot on which the head turns. *Ax′is in Peritro′chio,* an old term for one of the five mechanical powers, commonly called the Wheel and Axle. It consists of a wheel fixed immovably to an axle, so that both turn together around the axis of motion. *Axis of Elevation,* in geology, the line or direction in which rocks have been elevated by an internal force. This line generally governs the strike of the strata, or the direction of a horizontal line upon them, when removed from their natural or original position and inclined to the horizon.

Axis (*Axis maculatus*), a species of deer found in India and in many of the East Indian islands, is sometimes called *chittra* by the natives; *axis* is the ancient name of a kind of deer or antelope mentioned by Pliny. It resembles in size and color the European fallow-deer, but its horns are slender, pointed, and little branched. The female has no horns. It is easily domesticated, and is kept in parks in Europe. Other species, or marked varieties, are known. The horns are brought to Europe and used for knife-handles.

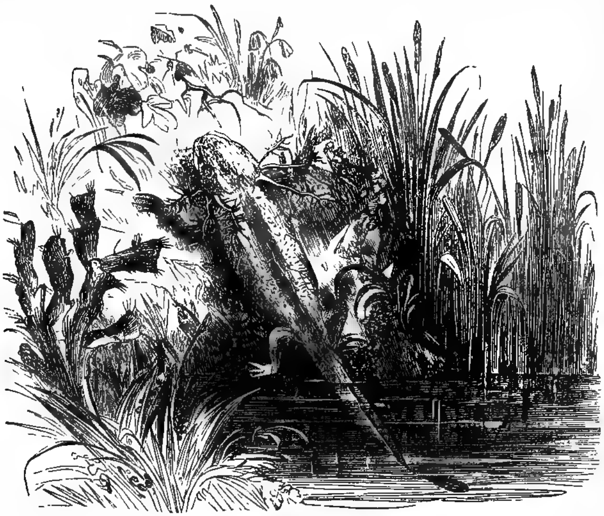


Axis Deer.

Ax′le [Lat. *ax′is*], a bar of iron or a wooden shaft which supports the body of a carriage or wagon, and is supported on two wheels, in the hubs or naves of which its ends are inserted. Also, the part of machinery which forms the centre of the revolving portion, or the immediate bearing of the revolution of a piece of machinery which revolves on its own centre. Axles of railway cars, instead of revolving in the hubs of the wheels, are strongly keyed in them, and journals are turned on the portions outside the wheels. These journals pass through and revolve in boxes.

Ax′minster, a town of England, in the county of Devon, 16 miles E. of Exeter. It has manufactures of woollen and cotton goods, etc. The Axminster carpets, whose manufacture was formerly the chief employment of the inhabitants, are excellent imitations of those of Persia and Turkey, but the so-called Axminster carpets are now made elsewhere. Pop. in 1881, 2872.

Ax′olotl′ (*Siredon lichenoides*), a remarkable batrachian found in the Mexican lakes, is a permanent larva of the Amblystoma type of salamanders. It resembles a fish in its general form, has four legs, and a long, compressed, and tapering tail. On each side of the neck the gills form three long feather-like processes, which give it a remarkable appearance. Length, about ten inches. It is much esteemed as food by the Mexicans. (See Siredon.)



Axolotl.

Ax′um, or **Axoom** [Gr. Αὐξούμη or Ἀξώμη], an ancient and decayed town of Abyssinia, the former capital of the Axumite empire, is in the province of Tigre, 85 miles N. W. of Antalo. Here is a Christian church, built about 1657, which is held in great veneration. Among the antiquities of Axum and the monuments of its former grandeur are several finely-sculptured prostrate obelisks, and one granite monolith sixty feet high, which is still standing. The Axumite empire extended over Abyssinia and Yemen in Arabia. Through Adule, a port on the Red Sea, the people of ancient Axum carried on commerce with Arabia and India. Pop. between 2000 and 3000.

Ayacu′cho, a department of Southern Peru, bounded on the N. by Junin, on the E. by Cuzco, on the S. by Arequipa, and on the W. by Huancavelica. Area, estimated at 42,000 square miles. It is drained by the Apurimac and its affluents. Gold and silver are found here, and in agricultural respects it is the richest part of Peru. Pop. about 130,000.

Ayacucho, a town of Peru, in the above province, 25 miles E. N. E. of Huancavelica. Here the armies of Colombia and Peru completely defeated the Spaniards on the 9th of Dec., 1824. This victory, gained by General Sucre, ended the Spanish dominion on the American continent, and was followed by the speedy surrender of all the Spanish soldiers in Peru. Pop. about 25,000.

Ayamon′te, a seaport-town of Spain, in the province of Huelva, on the Guadiana River, about 2 miles from its mouth, and 71 miles W. S. W. of Seville. It has two churches, one hospital, and a town-house. The chief occupation of its people is fishing. Pop. 5969.

Aye-Aye (*Chei′romys Madagascarien′sis*), a very singular quadruped of Madagascar, ranked by Cuvier among the Rodentia, but placed by other naturalists in the family of lemurs. It has a long, bushy tail, and is about as large as a hare. Each of its four extremities has an opposable thumb, and the digits are armed with pointed nails, which it sometimes uses to pick kernels out of nuts. It sleeps during the day, and is very active in the night, feeding on insects and fruits.

Aye-Aye.

A′yer (Peter), one of the founders of the society of Shakers, was born in Canterbury, N. H., in 1760. He served in the war of the Revolution. Died Sept. 14, 1857.

Ayer, an important R. R. centre, Middlesex co., Mass. (see map of Massachusetts, ref. 2–H, for location of county), 35 miles N. W. of Boston, and formerly known as Groton Junction, was incorporated as a separate town in 1870. Pop. of township in 1880, 1881; in 1885, 2190.

Ay′eshah, or **Aieshah** [Ger. *Aischah*], the favorite wife of the prophet Mohammed, born at Medina about 610 A. D., was a daughter of Abu-Bekr, who afterwards became calif. Mohammed wrote a chapter of the Koran expressly to vindicate her chastity, which had been questioned. After his death she took an active part in public affairs as an enemy of the calif Othman and his successor Ali, who defeated her in battle. Died in 677 A. D. (See Irving, "Mahomet and his Successors.")

Aylesbury, an ancient market-town of England, the capital of the county of Bucks, is 38 miles by railway N. W. of London. It returns two members to Parliament. Many ducks are reared here for the London market. It has some manufactures of silk and lace. Pop. in 1881, 7795.

Aylesford, Earls of (1714, in the peerage of Great Britain), and barons of Guernsey (1703, in the English peerage).—Heneage Finch, the seventh earl, was born Feb. 21, 1849, and succeeded his father in 1871. D. Jan. 13, 1885.

Ayl′mer, a lake in British North America, about 80 miles N. of Great Slave Lake. It is about 50 miles long and 30 miles wide.

Ayl′mer, or **El′mer** (John), a learned English Protestant bishop, born at Tilney, in Norfolk, in 1521. He was tutor to Lady Jane Grey, and became an exile on the accession of Queen Mary. He published in 1559 an answer to John Knox's "Blast of the Trumpet against the Monstrous Regiment of Women." He was appointed bishop of London in 1576, after which he treated the Catholics and Puritans with severity. Died June 3, 1594. (See Wood, "Athenæ Oxonienses.")

Ayl′mer (Matthew), Lord, born about 1643, became a rear-admiral in the British navy in 1692, having distinguished himself at the battle of La Hogue. He became in 1709 lord commissioner of the admiralty, admiral, and commander-in-chief of the fleet; was superseded in 1710, but restored in 1714. He was raised to the Irish peerage as Lord Aylmer, baron of Balrath, in 1718. D. in 1720.

Aylmer (Matthew Whitworth), Lord, an English general, born in 1775, succeeded to the peerage Oct. 22, 1785; entered the army as ensign in 1787; served at the siege of Copenhagen, also in Portugal in 1809, in the peninsular campaigns, and was made full general in 1825. He was governor-general of Canada 1828–33. Died in London Feb. 23, 1850.

Ay′loffe (Sir Joseph), born in Sussex, England, about 1708, was a famous antiquary, and became fellow of the Royal Society in 1731. Wrote "Calendars of the Ancient Charters, and of the Welsh and Scotch Rolls now remaining in the Tower of London" (1772). Died 1781.

Ayr, a small river of Scotland, flows nearly westward through Ayrshire, and enters the sea at the town of Ayr.

Ayr, a handsome seaport-town of Scotland, the capital of Ayrshire, is at the mouth of the Ayr, 32 miles S. S. W. of Glasgow. The river is here crossed by three bridges, which connect this town with Newton-upon-Ayr. Among the principal edifices are the assembly-rooms, with a spire 217 feet high, and the Wallace Tower. Ayr has many elegant villas, and is a place of fashionable resort. In the vicinity are objects of interest connected with the memory of the poet Burns. Coal is the chief article of export. Pop. in 1881, 9984.

Ayres (Romeyn B.), an American officer, born 1825, in New York, graduated at West Point 1847; promoted to colonel Second Artillery July 28, 1879, and Nov. 29, 1862, brigadier-general of U. S. volunteers; served in war with Mexico 1847–48, at various posts 1848–73, and on expedition to Yellow Medicine River 1857. In the civil war, served in the Manassas campaign 1861, engaged at Blackburn's Ford and Bull Run as chief of artillery of division 1861–62, and of corps 1862–63, in Virginia Peninsula 1862, engaged at Yorktown, Williamsburg, New Bridge, Garnett's Farm, Gaines's Mill, Golden's Farm, and Glendale; in the Maryland campaign 1862, engaged at South Mountain and Antietam, in Rappahannock campaign 1862–63, engaged at Fredericksburg and Chancellorsville, in the Pennsylvania campaign, in command of a division 1863; engaged at Gettysburg (brevet major), in suppressing New York draft riots in 1863, Rapidan campaign 1863, engaged at Rappahannock Station and Mine Run, in Richmond campaign 1864–65, engaged at Wilderness (brevet-lieutenant-colonel), Laurel Hill, Spotsylvania, Jericho Ford, Tolopotomy, Bethesda Church, Petersburg (wounded), Weldon

Railroad (brevet colonel), Chapel House, Rowanty Creek, Dabney's Mill, Five Forks (brevet brigadier-general), and Appomattox Court-house; in command of a division in the district of Shenandoah 1865–66, and member of tactics board 1867–69. Brevet major-general U. S. army Mar. 13, 1865, for gallant and meritorious services in the field, and brevet major-general U. S. volunteers Aug. 1, 1864, for conspicuous gallantry in battles of Richmond campaign.
George W. Cullum.

Ayr'shire, a maritime county of Scotland, bounded on the N. by Renfrew, on the E. by Lanark and Dumfries, on the S. by Kirkcudbright and Wigtown, and on the W. by the Frith of Clyde. Area, 1149 square miles. The surface is generally undulating or hilly, and the south-eastern part mountainous. It is drained by the Ayr, the Doon, the Lugar, and other small streams. The county is rich in minerals, especially coal, limestone, freestone, and iron. Silurian and Devonian strata occur here. The soil is generally fertile and well cultivated. Ayrshire is noted for its good dairies and superior breed of milch cows. It has important manufactures of cotton and wool. Capital, Ayr. Pop. in 1881, 217,504.

Ay'toun (William Edmondstoune), an eminent British poet and essayist, born in Edinburgh in 1813, was educated in the university of that city. He studied law, was called to the bar in 1840, and married a daughter of Prof. John Wilson. He became professor of rhetoric in the University of Edinburgh in 1845. Under the assumed name of "Augustus Dunshunner" he contributed many articles to "Blackwood's Magazine," and distinguished himself as a humorist as well as a poet. In 1849 he produced "The Lays of the Scottish Cavaliers, and other Poems," which had great success. Among his other works are a humorous tale called "How I Became a Yeoman," "Firmilian, a Spasmodic Tragedy" (1854), and "Bothwell," a narrative poem (1856). Died Aug. 4, 1865. (See Theodore Martin, "Memoir of William E. Aytoun.")

Ayuntamien'to (literally, a "joining" or "meeting"), the name of Spanish councils or governing bodies of towns, which acquired much political influence and importance during the wars between the Moors and Spanish Christians. The Spanish kings granted to the towns municipal privileges and institutions which were similar to those of the ancient Romans, and promoted a spirit of liberty. The councils were elected by the vote of the citizens. These institutions were abolished under the Bourbon kings, and were restored in 1837. They were deprived of political power in 1844.

Azad'irine, a bitter principle found in an East Indian tree (*Melia Azedirach*), used to some extent as a substitute for quinine. This tree is called "Pride of China" in the U. S.

Azaïs (Pierre Hyacinthe). See Appendix.

Aza'lea [from the Gr. ἀζαλέος, "parched," probably so called because it is usually found in dry situations], a genus of plants of the order Ericaceæ and the Linnæan class Pentandria. It comprises 100 species or more, natives of North America, China, and other countries. Many of them are cultivated for their flowers, which are beautiful and fragrant. The *Azalea Pontica*, a small shrub growing near the Black Sea, has fragrant flowers covered with glutinous, hairy glands. The whole plant is narcotic and poisonous. Among the American species (which have deciduous leaves) are the *Azalea nudiflora*, sometimes called honeysuckle, which is cultivated in English gardens, and the *Azalea viscosa*, which has glutinous and fragrant flowers. The *Azalea Indica*, a native of India, is a favorite of florists, and is remarkable for its brilliant colors. The *Azalea calendulacea*, found in the Southern U. S., is said sometimes to clothe the mountains with a robe of living flame-color. Many hybrid azaleas are cultivated as flowering shrubs.

Aza'ni, an ancient and ruined city of Asia Minor, in Anatolia, on the Rhyndacus, which is here crossed by two Roman bridges, 73 miles S. S. W. of Brusa. Here are extensive remains, among which are an Ionic temple of Jupiter, with eighteen columns standing, and a theatre 232 feet in diameter.

Aza'ra, de (Don Felix), a Spanish naturalist, born in Aragon May 18, 1746. He was a member of a commission sent in 1781 to South America to determine the boundary between the Spanish and Portuguese possessions, and he remained there twenty years. He prepared numerous maps of South America, and published in Spanish "Observations on the Quadrupeds, Reptiles, and Birds of Paraguay and La Plata" (5 vols., 1802). He also wrote "Travels in South America," which were published in French (4 vols., 1809). These works are highly esteemed. He died in Aragon in 1811. (See Walckenaer, "Notice sur F. Azara," prefixed to his "Voyage dans l'Amérique Méridionale," 1809.)

Azari'ah [Heb. אֲזַרְיָה, "the Lord helps"], a name of frequent occurrence in the Old Testament: (1) Another name for Uzziah, the tenth king of Judah, who began to reign, according to Winer, 809 B. C. (2) One of Daniel's three friends, a noble of the tribe of Judah, carried captive to Babylon in 605 B. C., whose name was changed to Abednego. (3) The name of some twelve other persons mentioned in the Old Testament, most of whom were either priests or high priests.

Aze'glio, d' (Massimo Taparelli), Marquis, an eminent Italian statesman, author, and artist, was born at Turin Oct. 2, 1798. He studied and worked as an artist in Rome, where he passed eight years (1821–29), and became a skilful landscape-painter. Having removed to Milan, he married a daughter of the celebrated author Manzoni. He published in 1833 a historical novel entitled "Ettore Fieramosco," which was very popular. He stimulated the national spirit and patriotism of the Italians by another popular historical romance, "Niccolo di Lapi" (1841). His political principles were liberal but moderate. He wrote numerous political treatises, and fought against the Austrians at Vicenza in 1848. In May, 1849, he was appointed president of the council (prime minister) by King Victor Emmanuel. In this position he rendered important services to his country. He was superseded by Cavour in 1852. Died Jan. 11, 1866.

Azela'ic Ac'id, one of the products of the oxidation of oleic acid by nitric acid.

Azeve'do-Couti'nho (Joze Joaquim), a bishop of Pernambuco and writer, born in Brazil Sept. 8, 1742. He wrote an essay on commerce, a pamphlet against the abolition of the slave-trade, and other works. Died Sept. 12, 1821.

Az'imuth [Arab. *as sumût*, "the path," a name of the zenith], an astronomical term, denotes the angle made at the zenith by the meridian and the vertical circle in which a heavenly body is situated, or the angle measured along the horizon between the north or south point and the point where a circle passing through the zenith and the body cuts the horizon. In trigonometrical surveys on the surface of the earth the accurate determination of the azimuth of an object is very important. It is usually performed with a theodolite. Azimuth circles or vertical circles are great circles of the sphere, passing through the zenith and intersecting the horizon at right angles.

Azobenzole, $C_{12}H_{10}N_2$, produced by reducing nitrobenzole or oxidizing benzidine. It is obtained in reddish yellow scales.

Azobenzoyl', $C_{21}H_{15}N_2$, a white crystalline powder formed by the action of ammonia on crude oil of bitter almonds.

Azo-Colors, a new class of dyes prepared chiefly from materials derived from coal-tar. They belong to the class of Azo-Compounds (which see). Among the most important of these colors are: *anisol red*, anisol-azo-beta-naphthol sodium sulphite; *roccelline*, beta-naphthal-azo-naphthalin-sulpho-acid; *biebrich scarlet*, beta-naphthol-azo-benzol-sodium-sulphite-azo-benzol-sodium-sulphite; *tropæolin OOO*, or *orange II*, beta-naphthol-azo-benzol-potassium sulphite. (For further information see Schultz, "Die Chemie des Steinkohlentheers," Braunschweig, 1882.)
C. F. Chandler.

Azo-Compounds and **Diazo-Compounds** [*azo*, from *azote*, the French name for nitrogen]. These bodies are derived from the aromatic hydrocarbons and their compounds by the substitution of two atoms of nitrogen for two atoms of hydrogen. In the azo-compounds two aromatic groups are linked together by the two nitrogen atoms, thus: *Azo-benzol* is $C_6H_5—N=N—C_6H_5$. In the diazo-compounds one aromatic group is linked by the two nitrogen atoms to a halogen element or to an acid residue, thus: *Diazo-benzol nitrate* is $C_6H_5—N=N—NO_3$. The azo-compounds are best prepared by reducing nitro-derivatives of the aromatic bodies; the diazo, by the action of potassium nitrite on aromatic amido-compounds in the presence of nitric acid. This class of compounds has recently become very important from the large number of new artificial dyes which it has furnished. (See Azo-Colors.) (For further details see recent works on organic chemistry.)
C. F. Chandler.

Az'of, Azoph, or **Azov, Sea of** (the anc. *Pa'lus Mæo'tis*, called by the Russians *More Asovskoe*), is a large body of water situated in the south-eastern part of Europe, between Russia and the Black Sea, with which it communicates by the Strait of Yenikale or Kertch (anc. *Cimmerian Bosporus*). It extends from the Crimea to the mouth of the Don, about 200 miles, and is in some places 100 miles wide or more. Its area is estimated at 14,000 square miles. The navigation is generally obstructed by ice from November to March. This sea, the water of which is nearly fresh, contains a great abundance of fish.

Azof, or **Azov** (anc. *Tan'ais*), a small town and fort of Russia, in the government of Ekaterinoslav, near the mouth of the river Don, 25 miles E. S. E. of Taganrog. It has declined in population and importance. Its harbor is shallow. Azof was taken from the Turks by Peter the Great. It was settled by the Carians, and in ancient times had the name Tanais. After the taking of Constantinople by the Italians it passed into the hands of the Venetians, who held it until, in 1410, it was captured by the Tartars. The Christians were put to death by the captors, from whom came its present name.

Azores [Port. *Aço'res*, from *açor*, a "hawk"], or **Western Islands,** are situated in the North Atlantic, about 500 miles W. of Portugal, to which they belong, and between lat. 36° 55′ and 39° 44′ N., and lon. 25° 10′ and 31° 16′ W. They are arranged in three groups, one of which consists of Flores and Corvo. About 114 miles S. E. of this group is the central group of Terceira, St. George, Pico, Fayal, and Graciosa. St. Michael and St. Mary form the third group, which is nearly 70 miles S. E. of the central group. St. Michael, the largest of all, is 50 miles long, and varies in width from 5 to 12 miles, and has an area of 340 square miles. They are of volcanic formation, and have fertile soils, though the surface is mostly mountainous. The highest point is the Peak of Pico, which has an altitude of 7613 feet. Volcanic disturbances of a terrible character have occurred at various times. Whole towns have disappeared in opening chasms, and in 1811 an island emerged suddenly from the deep, and later disappeared. The sugar-cane, coffee-plant, orange, and grapevine flourish here, but the soil is not well cultivated. The chief articles of export are wine, brandy, grain, and oranges. The inhabitants are very ignorant. The land is held by feudal tenure, and under such restrictions that the farmers never think of improving it, and simply gather the products which grow wild. It is owned in immense entailed estates. The people are extremely fond of music. They are not intemperate in their habits, are very clean in their dress, but are prone to the grossest superstition. The Azores have no good harbors. The Portuguese took possession of these islands in 1449. Area, 966 square miles. Pop. in 1878, 259,800.

Az'otized Bodies (or **Principles**) are substances which contain nitrogen (azote), and form part of the living structure of an animal or plant. Among them are albumen, fibrine, caseine, gelatine, and kreatine.

Azo'tus, the Greek name of *Ashdod*, an ancient city and stronghold of the Philistines, in Palestine, about 3 miles from the Mediterranean and 21 miles S. of Jaffa. (See Ashdod.)

Azoxybenzole, $C_{12}H_{10}N_2O$, a body which crystallizes in beautiful yellow needles. It is produced by the action of potassic hydrate on an alcoholic solution of nitrobenzole.

Az'tec Children, the name commonly applied to a boy and a girl who were taken from America to England in 1853, and were represented as descendants of the Aztecs. They were under three feet high, had long black hair, olive complexions, and very prominent noses. They were exhibited to the public for money by a person who told an incredible story of their antecedents, and pretended that they had been abducted from the ancient city of Iximaga. It was commonly believed by naturalists that they were monstrosities—dwarfs that never attained their proper development.

Az'tecs, a name of a Mexican nation which inhabited the table-land of Anahuac at the time of the Spanish conquest of Mexico. According to tradition, they came originally from Aztlan to Mexico, which was inhabited by the Toltecs before the migration of the Aztecs. It is supposed that the latter founded the city of Mexico (or Tenochtitlan) about 1325, some say as early as 1216, and became the most powerful and dominant people of Mexico or Anahuac. They made considerable progress in civilization and the useful arts, derived partly from the Toltecs. They were a warlike people, and conquered several neighboring tribes. "At the beginning of the sixteenth century," says Prescott, "the Aztec dominion reached across the continent from the Atlantic to the Pacific." The government was an elective monarchy, and the sovereign was selected from the brothers or nephews of the preceding king, so that the choice was always restricted to the same family. As they had never learned the art of alphabetical writing, their laws were exhibited to the public in hieroglyphical paintings or picture-writing. Their religion was a gross polytheism. They sacrificed human victims to their gods on a larger scale than other nations—*i. e.* about 20,000 annually. Astronomy was the science which they cultivated with most success. "We cannot," says Prescott, "contemplate the astronomical science of the Mexicans without astonishment." They were acquainted with the cause of eclipses, and they recognized some of the most important constellations. They adjusted the times of their festivals by the movements of the planets, and fixed the true length of the tropical year with great precision. An immense dial, disinterred in 1790 in the great square of Mexico, has supplied us with interesting facts. The calendar engraved on it shows that they settled the hours of the day precisely; also the periods of the solstices and equinoxes, and the transit of the sun across the zenith. The Aztecs were diligent cultivators of the soil, and had acquired respectable proficiency in agriculture, but they had no horses, oxen, or other animals of draught. Their staple productions were maize and the agave or Mexican aloe, which supplied them with food, drink, and clothing. They were ignorant of the use of iron, but found a substitute in bronze, an alloy of copper and tin, of which they made weapons and tools. They also cast golden and silver vases of large size. In mimetic art they were much inferior to the Egyptians. The Spanish conquerors of Mexico destroyed nearly all the manuscripts which they found in the country, and it is not probable that the art of reading the picture-writing will ever be recovered. "The Aztec character," says Prescott, "was perfectly original and unique. It was made up of incongruities apparently irreconcilable. It blended into one the marked peculiarities of different nations, not only of the same phase of civilization, but as far removed from each other as the extremes of barbarism and refinement. It may find a fitting parallel in their own wonderful climate, capable of producing on a few square leagues of surface the boundless variety of vegetable forms which belong to the frozen regions of the north, the temperate zone of Europe, and the burning skies of Arabia and Hindostan." (See Prescott, "Conquest of Mexico," vol. i.)

Revised by R. D. Hitchcock.

Az'uline, a fine permanent blue dye prepared from certain constituents of coal-tar. (See Aniline Colors.)

Azuline (phenyl blue). See Phenol Colors.

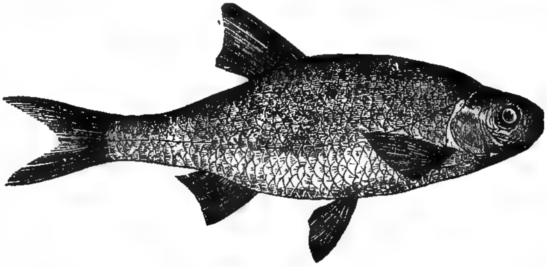
Azulin'ic Ac'id, a brown substance produced by the spontaneous decomposition of hydrocyanic (prussic) acid.

Azu'ni (Dominico Alberto), an Italian writer known from his researches in maritime law, born Aug. 3, 1749, was a judge in Genoa. He published "Droit Maritime de l'Europe" (Paris, 1805), and "Dizionario Universale ragionato della giuresprudenza mercantile."

A'zure [Fr. *azur*], the fine blue color of the sky; also the blue pigment which is produced by melting a mixture of a salt of cobalt with quartz-sand and potash, and is used in coloring porcelain. In heraldry, azure is one of the colors employed in blazonry, and is represented in engraving by horizontal lines. It is equivalent to the color of sapphire among precious stones. In painting, azure is a sky-colored blue, called ultramarine.

Azure Stone. See Lapis-Lazuli.

Az'urine (*Leucis'cus cœru'leus*), a fresh-water fish resembling the red-eye or rudd, is found in Lancashire, England (where it is called the blue roach), and in Switzerland. The color of its back is a slate-blue.



Azurine or Blue Roach.

Az'urite, a beautiful blue carbonate of copper, sometimes called **Blue Malachite.** It occurs in blue crystals which are very brittle, consequently this malachite is not well adapted for the ornamental purposes for which green malachite is so extensively used. Its composition is $2CuCO_3 + CuH_2O_2$. The most beautiful specimens are found at Chessy, near Lyons. The name *azurite* has also been applied to Lazulite (which see).

Az'ymites [from the Gr. α, priv., and ζύμη, "leaven"], a name given to Christians who use unleavened bread in the sacrament, as the Latins, Armenians, and Maronites. The Greek and Protestant churches use the leavened bread.

B.

B, the second letter of most alphabets, is a consonant of the class known as labial mutes. It is cognate with the mutes *p* and *f*, and etymologically interchangeable with them and with the liquid *m* and the semi-vowels *w* and *v*. In ancient Rome, B sometimes stood for 300, and $\overline{\text{B}}$ for 3000. The Greek β stood for 2, and ,β for 2000. In music, B is the seventh letter in the natural diatonic scale. B also stands for *basso* as an abbreviation in music. On old French coins B stands for Rouen; on Prussian, for Breslau. B in chemistry is the symbol of the element boron. As an abbreviation, B., or b., signifies "born," and sometimes "book."

Baader, von (F. X.). See APPENDIX.

Ba'al, or **Bel,** the principal god of the Phœnicians, Chaldæans, and Carthaginians, is regarded as a personification of the sun. Among the Phœnicians, Baal was the god of the sun, the vivifier of nature, and Astarte (or Baaltis) the goddess of the moon. Baal was identical with the Bel or Belus of the Babylonians and Assyrians. The worship of Baal prevailed among the ancient Jews in the time of the prophet Elijah and earlier. (See 1 Kings xviii. and Romans xi. 4.) The word *Baal* enters into the composition of many Hebrew, Chaldee, and Carthaginian proper names, as Jezebel, Hannibal, Baal-Peor, Baal-bec, and Beelzebub.

Baal'bec, Balbec, or **Baalbek** [the final *bek* derived, perhaps, from the Arabic *bakka*, "to be thronged"], (called by the Greeks *Heliop'olis, i. e.* "city of the sun"), an ancient and magnificent city of Syria, situated in a valley or plain near the foot of Anti-Libanus, about 42 miles N. W. of Damascus; lat. 34° 1′ 30″ N., lon. 36° 11′ E., and about 3800 feet above the level of the sea. Its origin and early history are not known. It was formerly one of the most populous and important cities of Syria, and contained many palaces and monuments. Antonius Pius built here a grand temple, which subsequently became a Christian church. In 636, Baalbec fell into the hands of the Mohammedans, and in 748 was sacked by the calif of Damascus. The site is now occupied by a small modern village and extensive ruins of ancient temples, among which was the great temple of the sun. This was 324 feet long, and had a peristyle of fifty-four Corinthian columns, about seven feet in diameter and eighty-nine feet high, including capital and pedestal. Six of these columns are now standing. Some of the stones used in the walls or substructions of this temple are sixty-four feet long and twelve feet thick. The chief material of these temples was limestone or marble and granite. (See WOOD and DAWKINS, "Ruins of Baalbec," 1757; CASSAS, "Voyage Pittoresque de la Syrie," 1799; VOLNEY, "Voyage en Syrie;" ROBINSON'S "Later Biblical Researches," 1852, pp. 505–527.)

Ba'ba-Dagh, a town of European Turkey, in Bulgaria, on a tributary of the Danube, is 93 miles N. E. of Silistria. It has considerable commerce with the coasts of the Black Sea, and has a Tartar high school. It was stormed by the Russians in 1771 and 1828, and was ineffectually besieged in 1854. Pop. about 10,000.

Babahoy'o, a town of Ecuador, in the province of Guayaquil, 20 miles N. E. of Guayaquil, on the Cabacol. The goods sent from Guayaquil into the interior go to this place, and are thence sent farther by mules. In consequence, there are large warehouses here. But Babahoyo is, in spite of this great trade, only a small, poorly-built town.

Bab'bage (CHARLES), F. R. S., an English mathematician, born Dec. 23, 1792, graduated at Trinity College, Cambridge, in 1814. He became professor of mathematics at Cambridge in 1828, and published in 1832 a work "On the Economy of Manufactures and Machinery," which was translated into several languages. Among his other works is a "Ninth Bridgewater Treatise" (1837). He invented and partly constructed a calculating-machine, which was never completed, although about £17,000 of the public money was expended on it. Died Oct. 20, 1871.

Bab'bitt (ISAAC) was born at Taunton, Mass., July 26, 1799. He was a goldsmith, and made at his native town the first Britannia ware produced in this country. In 1841 he received a gold medal for his valuable invention of the alloy which bears his name. Congress also gave him $20,000. He afterwards engaged extensively in the manufacture of this alloy, and also of soap. Died insane at the McLean Asylum, Somerville, Mass., May 26, 1862.

Bab'bitt's Met'al, a soft alloy invented by Mr. Isaac Babbitt of Boston, and used in lining boxes for axles and gudgeons, in order to diminish the friction and abrasion. These boxes are extensively used in the machinery of steamboats and locomotives. The alloy is prepared thus: to 4 pounds of melted copper add gradually 12 pounds of the best Banca tin, then 8 pounds of antimony, and finally 12 pounds more of tin.

Bab'cock (C. A.), U. S. N., born June 12, 1833, in the city of New York, entered the navy as a midshipman April 8, 1850, became a passed midshipman in 1856, a lieutenant in 1859, a lieutenant-commander in 1862, a commander in 1869. From 1862 to 1864 he commanded the steamer Morse, North Atlantic blockading squadron, and was repeatedly in action with Confederate batteries and troops while co-operating with our army on the James, York, and Pamunkey rivers. He was highly commended for his services by Rear-Admiral Lee, who, in the latter part of 1864, upon being appointed to the command of the Mississippi squadron, selected Babcock as his fleet-captain. D. at New Orleans June 29, 1876. F. A. PARKER.

Babcock (ORVILLE E.), an American officer, born in Berkshire, Franklin co., Vt., Dec. 25, 1835; graduated at the U. S. Military Academy July 6, 1861, and entered the army as second lieutenant of engineers; promoted to be first lieutenant Nov., 1861; captain, 1863; major, 1867; lieutenant-colonel, 1884; upon graduating he was assigned to active duty as assistant engineer on the defences of Washington, and subsequently on the staff of Gen. Banks on the Upper Potomac. In the Virginia Peninsula campaign of 1862 he served with the engineer battalion at Yorktown and subsequent operations of the campaign; in Jan., 1863, he was appointed lieutenant-colonel of volunteers, and served as assistant inspector-general of the 6th army corps; as chief engineer and assistant inspector-general of the 9th corps; chief engineer department of the Ohio; and in 1864 was appointed aide-de-camp to Gen. Grant, with whom he served in the battle of the Wilderness and subsequent operations terminating with the surrender of the Confederate armies in Virginia and North Carolina; in July, 1866, he was appointed colonel and A. D. C., and continued to serve as such to Gen. Grant until the latter was inaugurated President, when he was assigned to duty with the President as his secretary. In 1871, in addition to his other duties, he was placed in charge of public buildings and grounds in the city of Washington, and also made engineer in charge of the Washington aqueduct, which duties he performed till 1877; also pres. of board of directors of Columbia Hospital for Women and Lying-in Asylum. D. June 2, 1884. GEO. C. SIMMONS.

Babcock (RUFUS), D. D., was born at North Colebrook, Conn., Sept. 18, 1798, and graduated at Brown University in 1821. He was ordained pastor of a Baptist church in Poughkeepsie, N. Y., in 1823, was president of Waterville College (1833–36), and has been pastor of churches in Salem, Mass., Philadelphia, Paterson, N. J., etc. He has published a number of biographical and religious works. D. at Salem, Mass., May 4, 1875.

Ba'bel, or **Ba'bil** [Assyrian *Bab-ili*, "the gate of God"], was the Hebrew name of the city commonly called Babylon, which is the Greek form of the word Babel; it was also the name of the famous tower which the descendants of Noah began to build soon after the Deluge, on the plain of Shinar, but in consequence of the confusion of tongues they could not finish it. The projectors of the tower said, "Go to, now; let us build us a city, and a tower whose top may reach unto heaven, and let us make us a name, lest we be scattered abroad upon the face of the whole earth." (Genesis xi.) There is no evidence that the work was ever raised above the foundations, but several extravagant reports or traditions of its immense height have obtained currency. (See "The Chaldean Account of Genesis," by GEORGE SMITH, revised ed. by JOYCE, 1880.) Sir Henry Rawlinson identifies it with the ruin now called Amrán, within the city of Babylon itself. But it is generally identified with Birs Nimrud in Borsippa, a suburb of Babylon. The ruin rises 154 feet above the level of the plain. Some persons have confounded the tower of Babel with the temple of Belus.

Bab-el-Man'deb (*i. e.* "gate of tears"), a strait which connects the Red Sea with the Gulf of Aden and the Indian Ocean. On the Arabian side of the strait is a cape called Bab-el-Mandeb. The strait is about 20 miles wide, and encloses the small rocky island of Perim, on which is a British fort. The name was given to the strait because the navigation of the sea to which it is the entrance, owing to numerous small rocky islets, was, before the introduction of steamers, extremely dangerous. The depth of its channel varies from 7 to 180 fathoms.

Bâ'ber, or **Babur** (Mohammed), written also **Babour,** surnamed Zaheer-ed-Deen ("protector of religion"), a celebrated emperor of India, and the first of the Great Moguls, was born Feb. 14, 1483. He was a descendant of Tamerlane (Timur-Leng). In 1494 he succeeded his father, who was king of Ferghâna. The first part of his reign was disturbed by wars with neighboring powers, and he experienced great vicissitudes of fortune. He performed remarkable exploits in war, and extended his dominions by the conquest of Kandahar, Cabul, etc. He made an incursion into the Punjâb in 1505, and a second time in 1519. Having again crossed the Indus in 1524, he defeated Ibrahim, king of Delhi, on the plain of Paniput in 1526, and became master of India. He was an able ruler, and had a genius for poetry and music. He died Dec. 26, 1530, and was succeeded by his son Humayoon. (See his autobiography, of which there is a review in Lord Jeffrey's "Essays;" R. M. Caldecott, "Life of Bâber, Emperor of Hindostan;" Ferishta, "Mohammedan Power in India," translated by J. Briggs, London, 4 vols., 1829; William Erskine's "History of India and the First Two Sovereigns of the House of Taimur," 2 vols., 1854; also Wheeler's "Short History of India," 1880.)

Babeuf (François Noel), a French conspirator and Socialist, who assumed the name of Caius Gracchus, was born at St.-Quentin in 1764. He founded in Paris, in 1794, "The Tribune of the People," a journal in which he advocated equality and community of property. His disciples were called Babouvistes, and his system Babouvisme. He formed a conspiracy against the Directory, was arrested and tried, and, the sentence of death being pronounced upon him, he stabbed himself with a dagger, May 23, 1797.

Babi, the Malay word for "hog," is the name of several islands in the Pacific and Indian oceans.

Babington (Churchill). See Appendix.

Bab'ingtonite, a silicate of iron and calcium.

Babirussa. See Babyroussa.

Bab'ists [in Arabic and Persian, *Bâbî*], a Mohammedan sect which originated in Persia in the second quarter of the present century. It is said to derive its name from a prophet named Bâb, who was killed by order of the king of Persia in 1850. Many of the early Babists took up arms to propagate or defend their religion, and no inconsiderable numbers were taken and put to death; but this does not appear to have checked the spread of the new doctrines. The adherents of Babism are said at present to amount to several millions. They profess to be reformers, assert the absolute unity of God, and claim that Bâb is as much superior to Mohammed as the latter is to Christ.

Bab'lah, the fruit of several species of acacia. It contains tannic acid and a red coloring-matter. It is used in dyeing and calico-printing for fawn colors.

Ba'boo, a Hindoo title equivalent to the English "Mr.," is usually given to gentlemen who are educated and wealthy. The Baboos are noted for generosity and public spirit, and are liberal in religion. Many of them are bankers and merchants.

Baboon' (*Cynoceph'alus*), a name given to species of monkeys (Cercopithecidæ), distinguished by long truncated muzzles and cheek-pouches. Its face resembles that of a dog, and the ridges over the eyes are very distinct. Baboons have large callosities on the buttocks, and a repulsive physiognomy, which indicates their ferocity. They walk or run easily on the ground, and climb trees with agility. They are exceedingly strong, cunning, and mischievous. Troops of these animals sometimes enter a plantation for plunder, and destroy much besides what they eat and carry away in their cheek-pouches. They are chiefly found on the continent of Africa. They mostly feed on fruits and vegetables. The genus is divisible into two groups—the baboons proper, which have long tails, and the mandrills, which have very short tails. As examples of baboons of the first group may be mentioned the chacma, or pig-faced baboon, also called the ursine baboon (*Cynocephalus porcarius*), a native of South Africa, and the dog-faced baboon (*Cynocephalus hamadryas*), which is a native of Arabia and Abyssinia. The latter species is often sculptured on the ancient monuments of Egypt, and it is supposed to have been the "Thoth" baboon to which divine honors were paid. It was frequently embalmed, and the mummies are still found. The chacma is one of the largest of the baboons, about the size of an English mastiff. The mandrill, or rib-nosed baboon (*Cynocephalus mor'mon*), a native of Guinea, is the largest, ugliest, and fiercest of the whole genus. Its muzzle is marked with blue and scarlet ribs. It is scarcely possible to imagine anything more hideous than its aspect. Numerous other species are known to the later naturalists.

Ba'brius, a writer of Greek fables who is assigned by Rutherford to the age of Alexander Severus. He made a collection of fables ascribed to Æsop, and turned them into verse. Minoides Menas discovered in a monastery of Mt. Athos a manuscript of 122 fables of Babrius, which were published in Paris in 1844. Best ed. by W. G. Rutherford, 1883.

Babuya'nes Islands, a group of small islands in the Pacific Ocean, between Formosa and Luzon or Lucon Islands. They are of volcanic formation, and very fertile. Among the largest of them are Calayan and Babuyan. Large quantities of sulphur are obtained on these islands. Pop. about 8000. Chief town, Batan.

Bab'ylas, Saint, bishop of Antioch from 237 to 250 A. D., when he suffered martyrdom. Miracles are reported in connection with his remains. Chrysostom wrote a book about him in 382, and in 387 delivered a discourse in commemoration of him.

Bab'ylon [Gr. Βαβυλών; Heb. *Babel*], an ancient and celebrated city of Chaldæa, was situated in the plain of Shinar, on both sides of the river Euphrates, about 60 miles S. of Bagdad; lat. 32° 28′ 30″ N., lon. 44° 9′ 45″ E. Its site is partly occupied by the modern town of Hillah. It is generally believed that it was built near Babel, which is mentioned in Genesis (chap. x.) as the beginning of Nimrod's kingdom. We have no subsequent notice of Babylon or Babel in the Hebrew sacred history until the reign of Hoshea, about 730 B. C., when the people of Samaria were carried away captive to Assyria. (2 Kings xvii. 24.) The statements of ancient historians in relation to the origin of this city are confused and discordant. According to Greek tradition, it was founded by Semiramis or Belus, but Berosus affirms that this story is a fiction of the Greeks. The earliest historian who gives a description of Babylon is Herodotus, whose testimony is that of an eye-witness. He visited it about 450 B. C., but he does not inform us who founded the city. He says Babylon, which after the fall of Ninus (Nineveh) became the capital of the Assyrian empire, had already been ruled by several kings and by two remarkable queens, Semiramis and Nitocris. He states that the form of the city was a square, each side of which was 120 stadia (about fourteen miles) in extent, that it was enclosed by brick walls, the height of which was 200 royal cubits (about 335 English feet), and the breadth or thickness was 50 cubits (about 85 feet). Pliny, however, gives 235 feet as the height of these walls, which were reckoned among the Seven Wonders of the World. It is supposed that a large part of the space enclosed by them was occupied by gardens, orchards, and open fields. The houses were built of bricks, and the streets, which were wide, crossed each other at right angles. "Babylon," says G. Rawlinson, "was probably the largest and most magnificent city of the ancient world." The prophet Isaiah, who lived about 300 years before Herodotus, describes it (chap. xiii. 19) as "the glory of kingdoms, the beauty of the Chaldees' excellency." There is reason to believe that Babylon attained its highest prosperity and splendor in the reign of Nebuchadnezzar, who, inflated with pride and success, once exultingly asked, "Is not this great Babylon, that I have built for the house of the kingdom, by the might of my power, and for the honor of my majesty?" (Daniel iv.) The most remarkable buildings of this city were two royal palaces, one on either side of the river, and the great temple of Belus. Connected with one of these palaces was the "hanging garden," which the Greeks regarded as one of the Seven Wonders of the World. This singular structure, which is ascribed to Nebuchadnezzar, was a square, each side of which measured 400 Greek feet. It was supported on several tiers of open arches, built one over the other like the walls of a classic theatre, and sustaining at each stage or story a solid platform from which the piers of the next tier of arches rose. The top of the building, which was about seventy-five feet high, was covered with a large mass of earth, on which grew not only flowers and shrubs, but trees of a large size. Herodotus gives a description of the temple of Belus, the chief feature of which was the *Ziggurat* or tower, a huge solid mass of brickwork, built with receding stages, square being emplaced on square, so as to form a rude pyramid, on the top of which the shrine was placed. The number of stages was eight, and the height of the tower, according to Strabo, was about 600 feet. "When we turn," says G. Rawlinson, "from this picture of the past to contemplate the present condition of the localities, we are at first struck with astonishment at the small traces which remain of so vast and wonderful a metropolis. The broad walls of Babylon are utterly broken down." God has "swept it with the besom of destruction."

(Isaiah xiv. 23.) On its site are visible no pillars, arches, or ruins in the common acceptation of the term, but the traveller finds here many heaps or mounds, some of which are of enormous size, scattered over the plain, so as to verify the prophecy of Jeremiah, "Babylon shall become heaps" (chap. li.). Between the "heaps" the soil is in many places filled with fragments of pottery and bricks, and impregnated with nitre, indicating that it was once covered with houses. Prominent among the remains of Babylon is the Babil mound, a pile of brickwork about 140 feet high, which is supposed to be the ruins of the temple of Belus. The palace of Nebuchadnezzar is identified with a mound which the native Arabs call *El-Kasr* ("the castle"), in which are found fragments of alabaster vessels, fine earthenware, and bricks of excellent quality stamped with the name of Nebuchadnezzar. According to M. Oppert, several slabs found in the Kasr mound bear the following inscription: "Grand palace of Nebuchadnezzar, king of Babylon, son of Nabopolassar, who walked in the worship of Nebo and Merodach his lords." About 6 miles S. W. of Hillah is a ruined building which the natives call Birs-i-Nimrood, which, says G. Rawlinson, "strikes moderns with more admiration than any other now existing in the country." It consisted of seven receding stages, representing the seven planetary spheres, and each stage painted with a different color. The first or basement stage was a square, each side of which measured 272 feet; the second stage was 230 feet square, and had a vertical height of 26 feet; the third stage was 188 feet square and 26 feet high; the fourth stage was 146 feet square; and the others diminished in a similar ratio. From the ruins of Babylon successive generations obtained materials with which Seleucia, Ctesiphon, and other great cities were built.

History.—About 1270 B. C. the Assyrian kings became masters of Chaldæa or Babylonia, of which Babylon was the capital. This country was afterwards ruled by an Assyrian dynasty of kings, who reigned at Babylon, and sometimes waged war against those who reigned in Assyria proper. At other times the kings of Babylon were tributary to those of Assyria. Several centuries elapsed in which the history of Babylon is almost a blank. In the time of Tiglath-pileser of Assyria, Nabonassar ascended the throne of Babylon in 747 B. C. He is celebrated for the chronological era which bears his name, and which began in 747 B. C. About 720, Merodach-baladan became king of Babylon, and sent ambassadors to Hezekiah, king of Judah (see 2 Kings xx. and Isaiah xxxix.). A few years later Sargon, king of Assyria, defeated and dethroned Merodach-baladan. Sennacherib completed the subjection of Babylon, which he annexed to the Assyrian empire about 690 B. C. The conquest of Nineveh and the subversion of the Assyrian empire, which was effected about 625 B. C. by Cyaxares the Mede and his ally Nabopolassar, the rebellious governor of Babylon, enabled the latter to found the Babylonian empire, which was the fourth of Rawlinson's "Five Great Monarchies," and included the valley of the Euphrates, Susiana, Syria, and Palestine. His reign lasted about twenty-one years, and was probably pacific, as the history of it is nearly a blank; but in 605 B. C. his army defeated Neco, king of Egypt, who had invaded Syria. He was succeeded by his more famous son, Nebuchadnezzar (604 B. C.), who was the greatest of the kings of Babylon. According to G. Rawlinson, "It is scarcely too much to say that but for Nebuchadnezzar the Babylonians would have had no place in history. At any rate, their actual place is owing almost entirely to this prince, who to the military talents of an able general added a grandeur of artistic conception and a skill in construction which place him on a par with the greatest builders of antiquity." Our records of his history are derived almost entirely from the Bible—*i. e.* the Second Book of Kings, Second Chronicles, Jeremiah, and Daniel. Zedekiah, king of Judah, having revolted, Nebuchadnezzar captured Jerusalem about 588 B. C., burned the great temple of Solomon, and carried away the Jews as captives to Babylon. (See BABYLONISH CAPTIVITY.) He also took Tyre and conquered Egypt, and became without doubt the most powerful monarch of his time. He promoted the Hebrew prophet Daniel to the second place in the kingdom. (For an account of his character, his marvellous experience, his loss of reason, and his restoration, the reader is referred to the Book of Daniel.) He died in 561 B. C., and was succeeded by his son, Evil-merodach, who reigned only two years. Nabonadius (or Labynetus), who became king in 555 B. C., formed an alliance with Crœsus against Cyrus the Great. He appears to have shared the royal power with his son Belshazzar, whose mother was a daughter of Nebuchadnezzar. Cyrus besieged Babylon, which he took by stratagem in 538 B. C., and with the death of Belshazzar, whom the Persians killed, the kingdom of Babylon ceased to exist. Alexander the Great died in Babylon, which he had selected as the capital of his empire. (See RICH, "Memoirs on the Ruins of Babylon," 1818; Sir R. K. PORTER, "Travels;" LAYARD, "Nineveh and Babylon;" RAWLINSON, "Herodotus," 1858; RAWLINSON, "Five Great Monarchies of the Ancient Eastern World," 4 vols., 1860–67; 2d ed. in 3 vols., 1871; MIGNAN, "Travels in Chaldæa," 1829.)

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Bab'ylon, Suffolk co., N. Y. (see map of New York, ref. 8–K, for location of county), situated on R. R. and South Bay, contains several manufactories. It is connected with Fire Island by steam ferry, and is famed for the salubrity of its climate, and much frequented as a summer resort. The township of Babylon was formed in 1872 from the S. part of Huntington township. Pop. of village in 1870, 1225; in 1880, 2142.

Babylo'nia, or **Chaldæ'a,** an ancient country of Asia, which the Scriptures call "the land of Shinar" and "the land of the Chaldees." It coincided nearly with the modern Irak-Arabee. Babylonia proper was a part of the great Mesopotamian plain, and was that alluvial tract which intervenes between the Arabian desert and the river Tigris, and was situated on both sides of the Euphrates. It extended from the Persian Gulf north-westward more than 300 miles, and had an area of about 23,000 square miles. The distance is *now* 430 miles, and the area about 30,000 square miles; but the Persian Gulf then ran up 120 miles farther than now. The great and almost sole physical features of this level region were the rivers Euphrates and Tigris, the former of which is navigable about 1200 miles from its mouth. It receives no tributaries from the right in the lower part of its course for a distance of 1000 miles or more, and few from the left, except the Tigris, so that its volume diminishes as it approaches the sea. The plain through which it passes is a dead level, and remarkable for its featureless character. The fertility of its soil in ancient times was proverbial. "Of all countries that we know," says Herodotus, "there is none that is so fruitful in grain, of which it yields commonly two hundred fold." The soil was irrigated by canals, and was well cultivated. The date-palm flourished here, and furnished several products of great value. Babylonia was favorably situated for commerce, and her people were among the most commercial nations of the ancient world. The Babylonians—the Chaldæans of the Hebrew prophets—were a mixed race, in which the dominant element was Semitic. They were distinguished for their intellectual ability, their high civilization, and martial spirit. Their "wisdom and learning" are attested by the prophets Isaiah and Jeremiah: "Thy *wisdom* and thy *knowledge*, it hath perverted thee" (Isaiah xlvii. 10). The luxury of the Babylonians is often censured by both sacred and profane writers. The Chaldæans excelled other ancient nations in astronomy, and were especially addicted to the study of astrology. They attained superior skill in architecture, although they had no better material than brick. Two of their structures, the walls of Babylon and the "hanging garden," were reckoned among the Seven Wonders of the World. Their grand temples and palaces were built of kiln-dried bricks of square form, and very hard and durable. The finest quality of brick was yellow. Brick or clay was also the material on which they wrote and made cuneiform inscriptions. Agriculture and commerce were the chief occupations of these people, who also excelled in the manufacture of textile fabrics and carpets. The Babylonian empire, which was the fourth of the five great Oriental monarchies, included, besides Babylonia proper, Susiana (Elam), Mesopotamia, Syria, Palestine, Idumea, and part of Arabia. (For an outline of its history see BABYLON.) The government was a loose organization of provinces under native princes, who paid tribute, but frequently revolted against the sovereign, who failed to win the affection of the subject nations. "Babylonian civilization," says G. Rawlinson, "differed in many respects from Assyrian, to which, however, it approached more nearly than to any other known type. Its advantages over the Assyrian were in its greater originality, its superior literary character, and its comparative width and flexibility. . . . Babylonia, so far as we know, drew her stores from no foreign country. To Babylonia, far more than to Egypt, we owe the art and learning of the Greeks. It was from the East, not from Egypt, that Greece derived her architecture, her sculpture, her science, her philosophy—in a word, her intellectual life."

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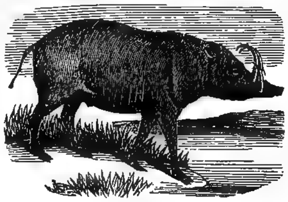
Babylo'nish Captiv'ity. In the Hebrew sacred history there occurs frequent mention of the fact that the Israelites were carried away captive to Babylon. It was a part of the policy of the kings of Assyria and Babylon to transport a large part of the population of conquered countries and plant them in a distant part of the empire. One political object of this deportation was the more easy government of a people separated from local traditions and associations. The captives were not enslaved or treated with severity, but they enjoyed probably the same privileges as the other subjects of the empire, and some of them were raised to the highest official positions. Sargon took Samaria in 721 B. C., and carried the ten tribes of Israel away to Assyria. The great Babylonish captivity of the Jews occurred in the reign of Nebuchadnezzar, who in 586 B. C. deposed Zedekiah, king of Judah, burned the temple at Jerusalem, and transported the Jews to Babylon. The tribes of Judah and Benjamin, by the permission of Cyrus the Great, returned to Palestine about 536 B. C., but the other ten tribes remained in exile, and disappeared from history. The seventy years are reckoned from 605, the date of Nebuchadnezzar's first invasion, when Daniel and his friends were carried captive.

Babyrous′sa (*Babyroussa alfurus*), an animal of the hog family, is a native of Borneo, Java, and the Molucca Islands. It is remarkable for the long tusks of the upper jaw, which are curved backward and resemble horns. Its legs are more slender than those of the hog.



Babyroussa.

Bacchana′lia (called by the Greeks *Dionysia*), the feasts and orgies of the votaries of Bacchus among the ancient Greeks and Romans. On account of the licentious practices and drunkenness which prevailed on these occasions, they were prohibited by the Roman senate in 186 B. C. In modern language the term is applied to wild revels and intemperate feasts. Theatrical representations originated in Greece from these feasts. (See DIONYSIA.)

Bacchan′tes [the plural of *bac′chans*, the present part. of the Latin verb *bacchor*, to "revel" or "riot"], the Latin term for those, whether male or female, who joined in the orgies of Bacchus among the ancient Greeks and Romans. Their conduct was very disorderly. They danced, swung about the thyrsus, and made a great noise. According to an ancient poetical legend, Orpheus was torn to pieces by some female Bacchantes.

Bac′chus [Gr. Βάκχος], the god of wine, was called DIONYSUS by the Greeks, and sometimes LIBER by the Romans. He was said to be the son of Jupiter and Semele, or, according to one tradition, of Ammon, king of Libya, and Amalthea. He taught men the culture of the vine, and first produced from grapes an intoxicating drink. His worship was spread over many countries of the world, and the myth of Bacchus was variously modified by different peoples. Bacchus is usually represented as an effeminate young man, crowned with vine or ivy leaves, with a *thyrsus* in his hand. His votaries carried sticks or staves called *thyrsi* (sing. *thyrsus*), which were bound with leaves of the ivy and vine. He is said to have performed a successful expedition to India. The Greek festivals in honor of Bacchus were called *Dionysia*. (See BACCHANALIA and BACCHANTES.)

Bach, the name of a celebrated German family which for upwards of two centuries was distinguished for musical talent and produced more than fifty distinguished artists.—VEIT BACH, the founder of the family, was a native of Presburg, in Hungary, and emigrated to Thuringia about 1600. Besides the great JOHANN SEBASTIAN (1685–1750), other eminent members of the family were JOHANN CHRISTIAN, called the "Milanese Bach" (1735–82); JOHANN CHRISTOPH (1643–1703), with his sons JOHANN CHRISTOPH and JOHANN NIKOLAUS; also KARL PHILIPP EMANUEL (1714–88) and WILHELM FRIEDMANN (1710–84).

Bach (JOHANN SEBASTIAN), youngest son of Johann Ambrosius, court-musician of Eisenach, born there Mar. 21, 1685, the most distinguished of the remarkable family of BACH, and one of the great musicians of the world. A North German and a Protestant, he was a patriarch and founder of German music, and has been not inaptly termed the Albert Dürer of his art. An extraordinary talent, united with enthusiasm and tireless industry, made his whole long life, from childhood on, a career of acquisition and greatness. Early throwing aside the traditions of the Italian school, he penetrated by severe study the secrets of musical science, sought the boldest masters, and pursued the most rigorous methods. Music in every style interested him—instruments of all kinds, but the organ was his great delight. He walked miles, as a boy, to hear a master's performance on that instrument. Such ability and enthusiasm were recognized from the first. Bach was spared the struggle with poverty, and rapidly, by his own efforts, rose to eminence. He had, till his voice became manly, sung treble in a choir at Lüneburg; at eighteen he was a violinist at the court of Weimar; at twenty he filled the place of organist at Arnstadt; at twenty-one he was at Mühlhausen; at twenty-two he was at Weimar again as court-organist; seven years later he resigned that most honorable position for that of concert-master to the duke, an office demanding high capacity, imposing varied responsibilities, and offering rich opportunity for study and practice in composition. His industry at this period was marvellous. Here, however, his stay was short. In 1723—in the mean time he had passed six years as chapel-master to the court at Köthen, capital of the duchy of Anhalt-Köthen—the city authorities of Leipsic chose him to the place of musical director of the St. Thomas School; he was thirty-eight years old. Here for the rest of his life, twenty-seven years, he lived, honored and happy, in the bosom of a large family, for he had ten sons, all musicians—beloved by numerous pupils, and occupied with the art he had done so much to create. Died at Leipsic July 28, 1750.

Bach's compositions were numerous, original, and in many styles. He wrote for voice and instrument—for orchestra, organ, pianoforte, instruments of wood and metal, himself being a performer on them all. He wrote for sacred occasions masses, oratorios, concerted pieces of every kind; his preludes, fugues, cantatas are famous; but his stately genius unbent at festive occasions, births, and weddings; and even comedy was not out of his range. In nearly every field of his art he was a discoverer—in some he was a prophet of future discoveries. The fame of Bach has been increasing since his death. For generations to come they who would study the difficult science of music will go to him, as students of literature or painting go to the grand masters. O. B. FROTHINGHAM.

Bache (ALEXANDER DALLAS), LL.D., a distinguished educator and scientist, born July 19, 1806, died Feb. 17, 1867, a native of Philadelphia, great-grandson of Benjamin Franklin, received his higher education at the U. S. Military Academy, where he graduated in 1825 at the head of his class. After serving there as assistant professor for one year, and on military engineering duty for two more, he was called to the chair of natural philosophy and chemistry in the University of Pennsylvania, which position he filled with great success for eight years, during which he was also constantly engaged upon scientific researches in physics and chemistry, and as member of the Franklin Institute conducted important experiments on steam-boiler explosions and kindred matters. In 1836 he was appointed president of Girard College, then about to be organized, and went to Europe to study the systems of education and methods of instruction and discipline adopted there. His report on education in Europe (1839), embodying the results of his studies, has done very much to improve the theory and art of education in America. The Girard College not being ready to go into operation, Bache undertook the organization of the school-system of Philadelphia; after accomplishing which he resumed his old chair at the university. He established at Girard College, and during five years directed, a magnetical and meteorological observatory, supported by the American Philosophical Society, of which he was a member. The results of these observations, which were made in correspondence with other observations in different countries, have largely added to our knowledge of terrestrial magnetism. In 1843 he was appointed superintendent of the U. S. coast survey, which important position he filled to the end of his life, displaying the highest administrative ability, combined with all the scientific knowledge requisite for the successful prosecution of that important work. By the confidence with which he inspired the government he was enabled largely to increase the scale of expenditure for the survey, resulting in a still greater ratio of progress. He omitted no opportunity of securing for science the collateral results that could be gathered during the prosecution of the work; he organized a systematic exploration of the Gulf Stream, an extended series of tidal observations, on the magnetism of the earth, on the direction of the winds, and instituted researches in regard to the bottom of the ocean within soundings, and the forms of animal life existing there. His annual reports to Congress are a monument, not only of his administration, but also of his personal investigations in regard to the subjects named, and many others connected with the improvement of methods of geodesy. In addition to the direction of the coast survey, Prof. Bache had, *ex officio*, charge of the construction of standard weights and measures for the U. S., and was a member of the lighthouse board. As a regent of the Smithsonian Institution from 1846 to the end of his life, he had a large share in shaping its operations. During the civil war he was active as a member of the Sanitary Commission, and in directing the resources of the coast survey to the assistance of the naval and military forces. When, in 1863, the National

Academy of Sciences was organized by Congress, Prof. Bache, as the acknowledged leader of science in the country, was elected its president; nor were his distinguished services to science less acknowledged abroad, as evinced by his election to membership of the most prominent scientific bodies of Europe. Prof. Bache married Miss Nancy Clarke Fowler of Newport, but had no issue. He left his property in trust to the National Academy of Sciences, the income to be devoted to researches in physical science. Died at Newport, R. I., after a lingering illness, on the 17th of Feb., 1867. J. E. Hilgard.

Bache (Benjamin Franklin), an American journalist, son of Richard Bache, noticed below, was born in Philadelphia Aug. 12, 1769. He went to Europe with Dr. Franklin, and while there learned printing and type-founding in the famous establishment of Didot Brothers. After his return he established a paper called the "General Advertiser," the influence of which was in opposition to the administrations of Washington and Adams. Died Sept. 10, 1798.

Bache (Franklin), M. D., a son of the preceding, was born in Philadelphia Oct. 25, 1792. He graduated at the University of Pennsylvania in 1810. He published a "System of Chemistry for the Use of Students of Medicine" (1819), became professor of chemistry in the Philadelphia College of Pharmacy in 1831, and obtained the same chair at the Jefferson Medical College in 1841. He was one of the authors of Wood and Bache's "Dispensatory of the United States," a work of much merit and an acknowledged standard of authority. Died Mar. 19, 1864.

Bache (George M.), U. S. N., born Nov. 12, 1840, in the District of Columbia, graduated at the Naval Academy in 1860, became a lieutenant in 1862, and a lieutenant-commander in 1866. He commanded the iron-clad Cincinnati during her various engagements on the Mississippi River, and until she was sunk by the Vicksburg batteries May 27, 1863. His conduct in this last affair elicited the admiration of Admiral Porter and General Sherman, and the secretary of the navy, Gideon Welles, in his "letter of thanks to Lieutenant-Commander Bache," says: "Amidst an incessant fire of shot and shell, even when the fate of the vessel had been sealed, and destruction both from the elements and the enemy was threatened, the officers and men appear to have stood bravely at their posts; and it is a proud record of the Cincinnati that when her last moments came she went down with the colors nailed to the mast. It is with no ordinary pleasure that I express to you, and to the surviving officers and crew of the Cincinnati, the department's appreciation of your brave conduct." He was in command of a little squadron of three vessels, the Tyler, the Naumkeag, and Fawn, in the very spirited action of June 24, 1864, at Clarendon, Ark., where in forty-five minutes he drove the enemy from their battery of seven guns, capturing guns, ammunition, and stores. He was in both attacks on Fort Fisher, and led the men of the Powhatan in the naval assault on the fort Jan. 15, 1865, where he was wounded in the right shoulder. Referring to this assault, Rear-Admiral Porter, in his despatch of Jan. 28, 1865, says: "Nowhere in the annals of war have officers and sailors undertaken so desperate a service. The names of some of these officers will be found on record on the files of the department, among which those of Lieutenant-Commander T. O. Selfridge and Lieutenant George M. Bache will be found most conspicuous." Became commander; retired Apr. 5, 1875. Foxhall A. Parker.

Bache (Hartman), an American officer, great-grandson of Dr. Franklin, born Sept. 3, 1798, at Philadelphia, Pa., graduated at West Point in 1818, colonel of engineers Mar. 3, 1863, served chiefly as topographical engineer on surveys for coast defence, naval dépôts, harbor and river improvements, roads, and canals, and for lighthouse sites 1818–47, in constructing Brandywine screw-pile lighthouse and ice harbor, Del., 1848–51, on engineer boards 1852–55, as lighthouse engineer 1852–70, in charge of military roads on Pacific coast 1855–58, in topographical bureau, Washington, D. C., 1861–62, in charge 1861, and member of lighthouse board 1862–70. Became brevet brigadier-general U. S. A. Mar. 13, 1865, for long, faithful, and meritorious services, and retired from active service May 7, 1867. Died Oct. 8, 1872, at Philadelphia, Pa., aged 74. George W. Cullum.

Bache (Richard), an Englishman, born Sept. 12, 1737, emigrated to the U. S., and in 1767 married Sarah, only daughter of Benjamin Franklin. He became postmaster-general of the U. S. in 1776. Died in July, 1811.

Bache (Sarah), wife of Richard Bache, noticed above, and only daughter of Dr. Benjamin Franklin, was born in Philadelphia Sept. 11, 1744. She was a very accomplished lady, and was distinguished for her efforts to relieve the sick and disabled soldiers of the Revolution. Died Oct. 5, 1808.

Bach'man (John), D. D., LL.D., an American naturalist, born in Duchess co., N. Y., Feb. 4, 1790. He was pastor of a German Lutheran church at Charleston, S. C. He contributed to Audubon's great work on ornithology, and wrote the principal part of the work on the quadrupeds of North America, which was illustrated by Audubon and his sons. Among his other works is "Characteristics of Genera and Species, as applicable to the Doctrine of the Unity of the Human Race" (1854). Died Feb. 25, 1874.

Bach'mut, a Russian town, in the province of Ekaterinoslav, 127 miles S. E. of Kharkov. In the vicinity are large coal-mines. It manufactures much tallow, and is a market for meat and grain. Pop. in 1882, 17,999.

Back (Sir George), F. R. S., D. C. L., an English navigator, born in Stockport Nov. 6, 1796. He accompanied Sir John Franklin on his Arctic voyage in 1819, and in 1833 commanded an expedition sent out in search of Capt. Ross. He wrote an account of it, entitled "A Narrative of the Expedition along the Shores of the Arctic Ocean in 1833–34." He became an admiral in 1867. D. June 23, 1878.

Back'er, van (Adrian), born in 1643, was a Dutch historical and portrait-painter, and worked at the city of Amsterdam. Died in 1686.

Back'gammon, a game of combined skill and chance, played upon a peculiar board or table with men and with dice. The men are of two colors, and the table is divided into two compartments, each with two sets of points, of which there are twenty-four in all. Upon these points the men are placed in playing, and their movements are determined by throws of the dice alternately made by each player; but the rules of the game are such that much skill may be exercised in executing the movements of the men as indicated by the dice. The object of the game is for the player to bring his own men into his own inner table, and to prevent his adversary from doing the same. There are several games of backgammon, for which the rules are given in "Hoyle's Games." Backgammon is a very ancient recreation, and is by many authorities said to have originated in England, or perhaps in ancient Britain.

Back'huysen, or **Bakhuysen** (Ludolf), a celebrated Dutch marine-painter, born at Emden Dec. 18, 1631. He was a close student of Nature, and often ventured out to sea during storms. His paintings are said to express the poetry of the sea. Among his works is a marine view which the magistrates of Amsterdam presented to Louis XIV. of France. Died in 1709. Several of his best works are in the gallery of the Louvre at Paris.

Back'us (Azel), D. D., a nephew of Charles Backus, noticed below, was born at Norwich, Conn., Oct. 13, 1765, graduated at Yale 1787, in 1791 succeeded Dr. Bellamy as pastor of the Congregational church in Bethlehem, Conn., in 1812 was chosen first president of Hamilton College, and died Dec. 9, 1817. He took great interest in political questions, was an eloquent preacher, and a successful teacher and disciplinarian. He published only a few sermons.

Backus (Charles), D. D., was born at Norwich, Conn., Nov. 5, 1749, graduated at Yale 1769, was settled over the Congregational church in Somers, Conn., in 1774, and died there Dec. 30, 1803. For many years he was accustomed to receive theological students into his family. Nearly fifty were trained by him, among whom were Dr. Woods of Andover, President Moore of Amherst College, President Davis of Hamilton College, and several other distinguished men. He published many sermons.

Backus (Rev. Isaac), born at Norwich, Conn., Jan. 9, 1724, ordained pastor of a Separatist church in Titicut (a parish of Bridgewater and Middleboro'), Mass., April 13, 1748, preached in Titicut till his death, which occurred Nov. 20, 1806. In 1751, Mr. Backus espoused Baptist principles, and soon became one of the most active and influential ministers of that denomination. He was for thirty-four years a trustee of Rhode Island College (now Brown University), was in 1774 agent of the Warren (R. I.) Association to advocate before Congress equal privileges for all religious denominations, and in 1788 delegate from Middleboro' to the Massachusetts convention which ratified the Federal Constitution. In 1777–84 Mr. Backus published "A History of New England, with especial reference to the Baptists," a work which is still of value to the general student of the history of New England, and especially so to one who is studying the progressive recognition of the principles of religious liberty in America. A new edition (carefully edited by Prof. David Weston of Madison University) was published by the Backus Historical Society, Newton Centre, Mass., in 1871, 2 vols. 8vo.

Backus (Jay S.), D. D., born Feb. 17, 1810, at Granville, Washington co., N. Y., educated at Granville Academy and Hamilton, N. Y., pastor of Baptist churches in Groton, Auburn, N. Y., and Syracuse, N. Y., and from 1862 till May, 1874, was an earnest and efficient secretary of the American Baptist Home Mission Society.

Baco'li, a village of Italy, near Naples. It is on the site of the ancient *Villa Bauli*, which was the seat of the country residences of the ancient Romans. Many ruins are found here.

Bacolor', a town on Luzon, one of the Philippine Islands, is the capital of the province of Pampanga. It is near the river Pampanga, and 38 miles N. W. of Manila. Pop. 11,337.

Bacon (Ezekiel), LL.D., born in Stockbridge, Mass., Sept. 1, 1776, graduated at Yale in 1794, was one of the chief-justices of the Massachusetts court of common pleas in 1813, first comptroller of the U. S. treasury (1813–15), and a member of Congress from Mass. (1807–13). He afterward removed to Utica, N. Y., and was a delegate to State constitutional convention of 1821. He published in 1843 "Recollections of Fifty Years Since." Died Oct. 18, 1870.

Bacon (Francis), [in Latin *Francis'cus Baco'nus*], Baron Ver'ulam, Viscount Saint Albans, one of the most illustrious of modern philosophers, was born in London Jan. 22, 1561. His father, Sir Nicholas Bacon, was lord keeper of the great seal under Elizabeth. His mother, a lady of fine talents, whose maiden name was Anne Cooke, was a sister of Mildred, the second wife of Lord Burleigh. Bacon, soon after he had completed his twelfth year, was sent to Cambridge, where he is said to have distinguished himself by his diligence and by his rapid progress in his studies. While at the university he conceived, it is said, a decided dislike to the philosophy of Aristotle as it was then taught in the schools. Soon after leaving Cambridge he visited France, in order to acquire the French language and to continue his studies on the Continent, but his father's death, in 1579, obliged him to return to England. In 1582 he was admitted to the bar, and became in 1589 member of Parliament, and in 1590 counsellor-extraordinary to the queen—a distinction almost without example for one so young. Ben Jonson speaks in the highest terms of his gifts as an orator; he tells us that Bacon "commanded when he spoke, and had his judges angry or pleased at his devotion. No man had their affections more in his power. The fear of every man that heard him was, that he should make an end." Lord Burleigh, though Bacon's uncle by marriage, appears rather to have retarded than aided the promotion of his nephew. The latter, left wholly to his own exertions, applied himself diligently to his profession, and at length acquired a lucrative practice. He became in 1594 a candidate for the office of solicitor-general, but was unsuccessful. The earl of Essex, who appears to have conceived a warm and sincere friendship for Bacon, in order to console him under his disappointment made him a present of an estate near Twickenham worth £1800 sterling, which in real value was, in all probability, nearly if not quite equal to five times that number of pounds at the present day.

It appears to have been Bacon's aim for many years to acquire a fortune by a wealthy marriage. He paid court to a rich widow by the name of Hatton, but, though aided by the intercession of Essex, who was then in great favor at court, he was not successful; which, according to Macaulay, was a very fortunate circumstance for Bacon. The lady afterwards married Bacon's rival and enemy, Sir Edward Coke, and "did her best to make him as miserable as he deserved to be." When Essex, seduced by a wild and reckless ambition, embarked on those schemes which afterwards led to his death on the block (see Essex), Bacon appears to have used whatever influence he had in order to mitigate the resentment of the queen against her misguided kinsman. Unhappily for his reputation, he was induced by the desire to advance his interest at court—for we can scarcely suppose he was influenced by a sense of duty—to abandon the office of intercessor, and to take an active and prominent part in the prosecution of his former friend. And worse still, after the death of Essex, in order to vindicate the conduct of the queen, he employed his talents and eloquence to blacken the character of his benefactor. After the accession of James I., Bacon appears to have enjoyed the highest favor at court. He was knighted before the king's coronation. His law practice had now become, if not very extensive, at least very lucrative. In 1606 he married Alice Barnham, the daughter of a rich London merchant. He had previously been appointed king's counsel, and in 1607 he was made solicitor-general. He became in 1613 attorney-general and a member of the privy council. He was selected by the king as his agent to conduct the prosecution against Peacham, in which affair Bacon is accused of having sought, against law and justice, to obtain the opinions of the judges before the case came up for trial. Bacon was appointed in 1617 keeper of the great seal, and in January of the ensuing year he was made lord high chancellor of England, the highest civil office to which any subject could then attain. In the following July he was created Baron Verulam, and admitted to a seat in the House of Peers. In 1619 he became Viscount Saint Albans, and in 1620 published his greatest work, the Novum Organum (which see). The cup of his prosperity and fame appeared to be full to overflowing, but a great reverse was near. It seemed as if Fate had raised him to the highest pinnacle of greatness that his fall might be the more tragic and more conspicuous. He was accused of accepting bribes by a man named Waynham, against whom Bacon had decided a suit in chancery. A committee of the House of Commons was appointed to inquire into the case, which was referred to the House of Lords as the only legitimate tribunal for trying it. At the beginning of the trial Bacon strongly asserted his innocence, but he subsequently abandoned his defence and confessed his guilt. He was sentenced (May 3, 1621) to pay a fine of forty thousand pounds, and to be imprisoned at the king's pleasure. James was disposed to show him every indulgence. As a mere form he was sent to the Tower, but two days afterwards he was set at liberty. His fine was also remitted, and he was allowed an income of £1200, a sum which may safely be pronounced fully equal to £6000 at the present day. He died April 9, 1626, and left no children. Bacon's celebrated "Novum Organum" and his "De Augmentis" are but parts of a more extensive work, entitled "Instauratio Magna," or "Great Restoration," so called because through its means he hoped to recall Philosophy from what he considered the vain and idle speculations of the Aristotelian school, and restore her to her true and legitimate office of interpreter of Nature. Among his other works should be mentioned his "Essays" (first published in 1597), doubtless the most popular and widely read of all his writings, and his "De Sapientia Veterum" ("On the Wisdom of the Ancients," 1609), of which a good translation by Sir A. Gorges was published in 1619. Although Bacon's celebrity as an author may be said to rest exclusively on his philosophical writings and his "Essays," he left some very able legal treatises; among others his "History of the Alienation Office." In person Bacon was well formed, but not robust, of a middling stature, with a high and broad forehead, his countenance conveying the impression both of intellectual power and benevolence of disposition. In society he is said to have been "a most delightful companion, adapting himself to company of every degree, calling, and humor, . . . bringing out with great effect his unexhausted stores of jests new and old." (See Montague, "Life of Bacon," added to Bacon's collected works; William Rawley, "Life of Lord Bacon" (1658); Spedding, "Life of Bacon," in his very complete edition of Bacon's works (4 vols., 1861–68).) J. Thomas.

Bacon (Joel S.), D. D., born in Cayuga co., N. Y., in 1801, graduated at Hamilton College, Clinton, N. Y., in 1826, studied theology at Newton, Mass., was successively president of Georgetown College, Ky., pastor of a Baptist church in Lynn, Mass., professor in the institution at Hamilton, N. Y. (1834–37), president of Columbian College, D. C. (1843–54), and subsequently was a teacher in Alabama and in Virginia. Died at Richmond, Va., Nov. 9, 1869.

Bacon (Leonard), D. D., LL.D., the son of a missionary to the Indians, was born at Detroit, Mich., Feb. 19, 1802, graduated at Yale 1820, and at Andover 1824. From 1825 to 1866 he was pastor of the Centre church (Congregational), New Haven, Conn.; from 1866 to 1871 he was acting professor of systematic theology, and since 1871 has been lecturer on church polity and American church history in the Divinity School of Yale College. He has contributed largely to the "Christian Spectator" and the "New Englander," and was for several years one of the editors of the "Independent." Besides numerous occasional sermons and addresses, he has published "Select Practical Writings of Richard Baxter," "Thirteen Discourses on the Two-Hundredth Anniversary of the First Church in New Haven" (1839), "Slavery Discussed" (1846), "Historical Discourse at the Old South Meeting-house, Worcester, Sept. 22, 1863." D. Dec. 24, 1881.—His sister, Delia Bacon (b. 1811, d. 1859), wrote, among other works, "The Philosophy of Shakspeare's Plays" (1857), in which she first threw out the startling hypothesis that these plays were really written by Francis Bacon, who simply used Shakspeare as a shield against the prejudices of the time.—One of his sons, Rev. Leonard Woolsey Bacon, D. D., b. Jan. 1, 1830, graduated at Yale in 1850; is an able preacher and author.—Another son, Rev. George Blagden Bacon, b. at New Haven May 23, 1836; was in 1861 ordained to the ministry at Orange Valley, N. J. D. Sept. 16, 1876.

Bacon (Nathaniel), an English lawyer and leader of Virginian insurgents, was born in Suffolk about 1640. He practised law in Virginia, became an eloquent speaker and a popular favorite. He was chosen as leader of the people who about 1676 took arms ostensibly to defend the province against the savages, but partly to resist the policy of Governor Berkeley. Bacon defeated both these enemies, but in the midst of the contest he died Oct. 1, 1676. (See Sparks's "American Biography," vol. iii. of new series.)

Bacon (Sir Nicholas), an English statesman, born at Chiselhurst, in Kent, in 1510, was the father of the great Bacon, Baron Verulam. He was educated at Cambridge, studied law, and was appointed solicitor to the court of augmentations in 1537. In 1546 he obtained the office of attorney to the court of wards, of which he was deprived by Queen Mary in 1553 because he was a Protestant. He was appointed lord keeper of the great seal by Elizabeth in 1558. He was distinguished for his moderation, sagacity, and discretion, and rendered important services to the Protestant cause. Among the English statesmen of that age he was ranked next to Lord Burleigh, who was his friend and brother-in-law. Having held the office of lord keeper about twenty years, he died Feb. 20, 1579. (See G. Whetstone, "Memoir of Sir N. Bacon;" Lord Campbell, "Lives of the Lord Chancellors.")

Bacon (Roger), an eminent English philosopher and monk, called the Admirable Doctor, was born near Ilchester, in Somersetshire, about 1214. He studied at Oxford and at Paris, where he took the degree of doctor of laws. Having entered the order of Franciscan monks, he settled at Oxford and devoted much time to experimental philosophy. He was far in advance of his age, and made discoveries in several sciences. He wrote in Latin a number of works on chemistry, optics, physics, etc. By denouncing the immorality and ignorance of the clergy and monks he made many enemies. His mechanical skill and his insight into the secrets of nature were such that he was suspected of dealing in magic. His writings having been condemned by a council of Franciscan monks, he was thrown into prison about 1278, and confined at least ten years. Indeed, it is not certain that he ever came out of prison. Nor is it certain in what year he died, whether 1292 or 1294. His capital work, which treats of several sciences, is entitled "Opus Majus," and was written about 1266. It was first printed in 1733. Several of his works, such as the "Opus Tertium," "Opus Minus," and "Compendium Philosophiæ," were published for the first time in 1859. It appears that he was acquainted with the composition and explosive power of gunpowder. "The mind of Roger Bacon," says Hallam, "was strangely compounded of almost prophetic gleams of the future course of science and the best principles of the inductive philosophy, with a more than usual credulity in the superstitions of his own time." Gieseler says of him that he "showed a wonderful keenness of vision on all points in every branch of human knowledge." And yet he believed both in alchemy and in astrology! (See Anthony Wood, "History and Antiquities of Oxford;" "Biographia Britannica.")

Ba'conthorp, or **Bacon** (John), an English Carmelite, surnamed the Res'olute Doctor, was born in Norfolk about the beginning of the fourteenth century. He advocated the philosophy of Averroës, and had great reputation for learning. Among his works is a commentary on the "Master of Sentences" (Peter Lombard). Died in 1346.

Bacs, a county of Hungary, is bounded on the N. by the county of Pesth, on the E. by Torontal, on the S. by Slavonia, and on the W. by Torontal. Area, 3940 square miles. The Danube flows along the western boundary, and the Theiss along the eastern, while the two are connected by the canal of Bacs, which is about 60 miles long. The county is entirely level, and, with the exception of the swamps along the rivers, is very fertile. Chief town, Zombor. Pop. in 1880, 638,450.

Bacte'ria (plu.), [Gr. *βακτήριον*, a "club," alluding to the form], in microscopy, a name for certain plant-cells which are cylindrical, spherical, or oblong, but sometimes distorted in shape. That they are of vegetable not animal character is shown by their power of taking up nitrogen from ammonia-compounds. They occur either single or compound, and multiply by transverse division. They are propagated in water, and are not (according to Cohn and Burdon-Sanderson) capable of transmission through the air, like fungus spores. Cohn divides them into four groups, and assigns them a place near the Algæ. (See Fermentation and Germ Theory.)

Bac'tria, or **Bactria'na,** an ancient country of Central Asia, bounded on the N. by the river Oxus (Amoo or Gihon), and on the S. by the Hindoo-Koosh Mountains (anc. *Paropamisus*). Its boundaries are not perfectly known, but it is considered to be identical with the modern province of Balkh. This is supposed by some to have been the native country of the Aryan race. Bactria was the centre of a powerful kingdom which flourished before the historical period. Its capital, Bactra or Zariaspa, which stood on the site of the modern Balkh, was the head-quarters of the Magi. In the time of Cyrus the Great, Bactria became a Persian province, and was conquered, with the rest of the Persian empire, by Alexander the Great. The history of Bactria has recently been elucidated by numerous Græco-Bactrian coins and other antiquities found in the *topes* or burial-places of Afghanistan. Some of these coins present Greek letters, and also letters of a dialect of Sanscrit. (See Wilson, "Ariana Antiqua," 1841; Lassen, "Indische Alterthumskunde," 1849.)

Bac'tris [from the Gr. *βάκτρον*, a "cane"], a genus of palms, comprising about fifty known species, all natives of America. They are generally small trees, with slender stems and pinnate leaves. Some of them are spiny, and form thickets which are almost impenetrable. The *Bactris Maraja*, or the maraja palm, bears clusters of fruit resembling small grapes, with a pulp of an agreeable flavor. The stems are used as walking-sticks.

Bactri'tes, a group of fossil Ammonitidæ, with a straight shell, and indented but not ramified septa. Several species of it have been found in the Devonian strata.

Baculi'tes [from the Lat. *bac'ulus*, a "stick"], a genus of fossil cephalopod mollusks of the family of Ammonitidæ, found in the upper chalk. The shell is chambered, perfectly straight, round (or compressed), and tapers to a point. Various species are found in Europe, North and South America, etc.

Bac'up, a flourishing town of England, in Lancashire, 22 miles by rail N. of Manchester. It is situated in a beautiful valley, and is a terminus of a branch of the Lancashire and Yorkshire Railway. It has many churches and chapels, a fine market-house, and a literary institute. Here are extensive cotton-factories and several brass and iron foundries and dye-works. Coal-mines are worked in the vicinity. Bacup is said to be increasing rapidly. Pop. 10,935.

Badag'ry, a seaport-town of Africa, on the Gold Coast of Upper Guinea, 50 miles E. N. E. of Whydah. The Portuguese once had several factories at this place, which was a market for slaves. Pop. about 10,000.

Badajos, a province of Spain, is bounded on the N. by Caceres, on the E. by Ciudad Real and Córdova, on the S. by Seville and Huelta, and on the W. by Portugal. Area, 8688 square miles. It is for the greater part a poor and uncultivated region, and is chiefly used as pasture-grounds for immense herds of sheep and swine. Chief town, Badajos. Pop. 432,809.

Badajos' [Sp. *Badajoz;* anc. *Pax Augus'ta*], a fortified town of Spain, capital of the above province, is situated on the left bank of the Guadiana, 175 miles by rail E. of Lisbon. The river is here crossed by a good granite bridge of twenty-eight arches. The town contains an old cathedral, an arsenal, and a cannon-foundry. It has manufactures of soap, coarse woollen stuffs, and leather, and a brisk contraband trade. Badajos was the native place of the painter Morales. It has been the scene of several important military events. It was besieged and taken by the French general Soult in Mar., 1811. Wellington attempted to retake it in April, but he failed. Having renewed the siege in Mar., 1812, he took it by storm on the 6th of April ensuing, after a desperate contest, in which the British lost 4824 men, killed and wounded. Pop. in 1877, 22,965.

Badakhshan', or **Budukshan,** a territory of Central Asia, dependent upon Afghanistan, bounded N. by the Amoo-Darya (Oxus), S. by the Hindoo Koosh. It includes several valleys of the head-streams of the Oxus (Amoo). The surface is mountainous, and a great mountain-range extends along the eastern border. Here are ruby-mines and massive cliffs or quarries of lapis-lazuli. Iron, salt, and sulphur are also obtained here. The inhabitants are Mohammedans. Cap. Fyzabad.

Bad Axe, on R. R., capital of Huron co., Mich. (see map of Michigan, ref. 6–K, for location of county). Pop. in 1880, 190.

Badeau (Adam), an American officer, born in New York. He received an excellent education, and devoted himself to literary pursuits. He was one of the first volunteers in defence of the Union, and became a captain in 1862. He served on Gen. Sherman's staff, and was wounded at Port Hudson. In 1864 he was appointed military secretary to General Grant, with the rank of colonel. This position he held until May, 1869. After the close of the war he received a brevet as brig.-gen. in recognition of "faithful and meritorious services." He published in 1868 a "Military History of General Grant," and became in 1869 secretary of legation, and afterward U. S. consul-general in London. In 1882 he became U. S. consul-general at Havana; resigned April, 1884. Author of "Conspiracy" (1885) and "Aristocracy in England" (1886).

Ba′den [Lat. *Ba′da*], **Grand Duchy of,** a state of Germany, bordering on Alsace and Switzerland, is bounded on the N. by Hesse-Darmstadt, on the E. by Würtemberg, and on the S. and W. by the Rhine. It has an area of 5851 square miles. Pop. in 1880, 1,570,254. The surface is mountainous. A long mountain-range called "The Black Forest" (Schwarzwald) extends along the eastern border. The highest point is the Feldberg, 4886 feet high. The western part of Baden is a long plain extending along the Rhine from Bâle to Mannheim. The chief rivers, besides the Rhine, are the Danube, which rises in Baden, and the Neckar. The valley of the Rhine has a mild climate and a very fertile soil, which is well cultivated. The grape and other fruits flourish here in abundance. Among the staple products are wheat, barley, maize, potatoes, and tobacco. Good pine timber abounds in the Black Forest. The average quantity of wine produced annually is about fourteen million gallons. Among the mineral resources are copper, coal, silver, iron, lead, and salt. Baden is rich in mineral springs, which are much frequented as watering places, as Baden-Baden, Badenweiler, etc. More than 9000 persons are engaged in the manufacture of cotton fabrics, ribbons, paper, toys and trinkets, wooden clocks, etc. The chief articles of export are wine and timber. The chief towns are Mannheim, Carlsruhe (the capital), Freiburg, Heidelberg, Pforzheim, and Constance.

Religion and Government.—A majority of the people are Roman Catholics, and about one-third Protestants. Baden has two universities (Heidelberg and Freiburg), an excellent system of public instruction, and the children are compelled to attend school. This state is governed by an hereditary grand duke, who in relation to foreign and military affairs is dependent upon the emperor of Germany. He governs according to a constitution which is among the most liberal in Germany. The parliament of Baden consists of a chamber of peers and a chamber of sixty-three deputies. Hermann II., who died in 1130, was the first to assume the title of margrave of Baden. The grand ducal family now reigning in Baden are lineal descendants of him. In 1746, Charles Frederick became margrave of Baden, which under his reign increased in extent and importance. He acquired the dignity of elector in 1803, and the title of grand duke in 1806. Having joined the Confederation of the Rhine, he gained a large accession of territory. His grandson, Charles Louis, granted in 1818 a charter which forms the basis of the present constitution. Under the impulse of the revolutionary movement which began in France in Feb., 1848, the popular party of Baden took arms to found a republic. The grand duke fled, and a constituent assembly was convened in May, 1849. By the aid of a Prussian army he was restored in July of that year. In Aug., 1866, Baden formed with Prussia a secret alliance, which was made public about April, 1867. Baden became, in 1870, a state of the new German empire, in the federal council of which she has three votes, the whole number of votes being 58.

A. J. Schem.

Baden (anc. *Ther′mæ Helvet′icæ*), a town and watering-place of Switzerland, in the canton of Aargau, on the Limmat, 14 miles by rail N. W. of Zurich. In Jan., 1834, the "conference of Baden" was held here, in which the representatives of Lucerne, Aargau, Thurgau, Soleure, Berne, Bâle-City, and St. Gall met to settle the relations of the Catholic Church to these cantons. The temperature of the baths is about 117° F. Pop. 3412.

Ba′den (Jakob), born at Vordenborg in 1735, was a Danish philologist. He was educated at Göttingen and Leipsic, and became in 1779 prof. of eloquence and Latin at Copenhagen. Edited "University Journal," 1793–1801. Died 1804.

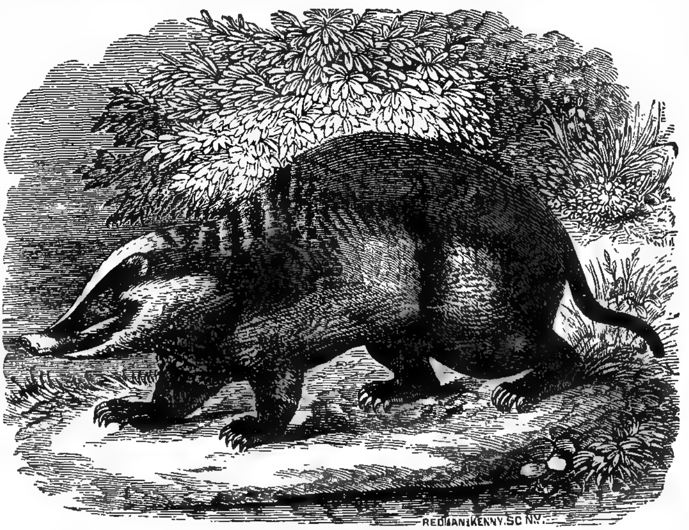
Baden-bei-Wien (anc. *Ther′mæ Ce′tiæ* or *Panno′niæ*), a town and bathing-place of Lower Austria, on the river Schwächat, 16 miles by rail S. S. W. of Vienna. Here are warm mineral springs, which are frequented by the citizens of Vienna. Many of the Austrian nobility have mansions here. Pop. in 1880, 9645.

Ba′den-Ba′den (anc. *Civ′itas Aure′lia Aquen′sis*), a town and a celebrated watering-place in the grand duchy of Baden, is beautifully situated in a pleasant valley at the foot of the Schwarzwald Mountains (Black Forest), 23 miles by rail S. S. W. of Carlsruhe and 6 miles from the Rhine. Here are warm saline springs, the temperature of which ranges from 117° to 154° F., which were much resorted to in the time of the Roman emperors. They are efficacious in cases of gout and chronic cutaneous diseases. Baden-Baden is frequented in summer by visitors from all parts of Europe, to the number of about 30,000 annually. In former years its gambling-hall was a great attraction, but upon the restoration of the German empire gambling here, as in the other watering-places, was suppressed. Pop. in 1880, 11,923.

Badenwei′ler, a village and watering-place of Baden, 2 miles E. of Mülheim, has alkaline thermal springs, the temperature of which is 82° F. Large ruins of Roman baths were found here in 1784, which are among the grandest known. Inscriptions on old coins let us suppose that the baths flourished until the middle of the third century.

Badge [perhaps a contraction of *bandage*], a mark, sign, or token by which a person is distinguished; an honorary decoration or special cognizance; as, for example, the stars and crosses worn by persons of rank and princes in Europe, the button on the cap of a Chinese mandarin, or a medal given to a soldier as a premium for bravery. Finger-rings are mentioned in the Bible as badges of authority; for instance, Pharaoh took off his ring and put it on Joseph's hand as a token of the power delegated to him (Genesis xli.). The ambassadors of ancient Rome wore gold rings during their mission as badges of authority. Several countries have distinctive badges. The badge of England is a rose, white and red, ensigned with the royal crown, the origin of which was the union of the white rose of the House of York with the red rose which was the badge of the rival House of Lancaster. The badge of Scotland is a thistle ensigned with a royal crown. Ireland has two badges, the golden harp and the trefoil, both of which are carried ensigned with the royal crown. The badge of France was formerly a *fleur-de-lis*, a "lily or iris," sometimes called in English "flower de luce."

Badger, a name applied to certain animals of the family Mustelidæ, assigned by naturalists to the genera *Meles*, *Arctonyx*, and *Taxidea*. They attain the size of a cat or medium-sized dog, are plantigrades, have a pointed skull, and feet adapted for burrowing. They have anal glands which secrete substances with a disagreeable odor. They live in deep burrows, going out at evening in search of roots, fruits, insects, frogs, etc. The common badger, brock or grey, of Europe (*Meles taxus*), found also in Asia, is about the size of the common fox. It was formerly, and is even now, kept for "badger-drawing." The animal is put into a barrel and assailed by numerous dogs, which are trained to pull the badger out. The animal resists obstinately until overpowered, when he is allowed a short rest, and is then ready for another struggle with his enemies. The animal is quite harmless if not abused. Allied species are found in Asia. The East Indian badger (*Arctonyx collaris*) is a more formidable animal, and is closely related, but generally distinct. Japan has still another badger.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The Indian Badger.

The American species of badger belongs to another genus (*Taxidea*). The fur of the American badger is fine, soft, and much used for muffs and rugs. It is more carnivorous than the European badger, and is remarkable for its short ears, long hair, and the rapidity with which it burrows in the earth.

Badger (George Edmund), LL.D., an American statesman, born at Newbern, N. C., April 13, 1795. He graduated at Yale in 1813, practised law at Raleigh with distinction, and in Mar., 1841, was appointed secretary of the navy by President Harrison. He resigned in September of that year, because Tyler vetoed the bill to recharter the U. S. Bank. He was a Senator of the U. S. for about seven years (1846–53). Died May 11, 1866.

Badger (Joseph), an American minister, born at Wilbraham, Mass., Feb. 28, 1757, graduated at Yale in 1785. He served four years in the Revolutionary army, after which he obtained an education, and was sent as a missionary to Ohio, where he labored more than thirty years. Died May 5, 1846.

Badger (Milton), D. D., an American clergyman, born May 6, 1800, at Coventry, Conn., graduated with honor from Yale College in 1823, and studied theology at Andover Seminary. In 1826 he was appointed a tutor in Yale College, and in 1828 was ordained pastor of the South Congregational church, Andover. Dr. Badger was elected associate secretary of the American Home Mission Society in 1835, with which society he was officially connected thirty-eight years. He died Mar. 1, 1873.

Badger (Oscar C.), U. S. N., born Aug. 12, 1823, in Windham, Conn., entered the navy as a midshipman Sept. 19, 1841, became a passed midshipman in 1847, a lieutenant in 1855, a lieutenant-commander in 1862, a commander in 1866, a captain in 1872. He served in the steamer Mississippi on the E. coast of Mexico during the Mexican war. In 1861–62 he commanded the steamer Anacostia of the Potomac flotilla, was engaged at various times with the batteries on the Potomac River, and the "precision" of the fire of his vessel is more than once referred to by the commanding officer of the flotilla, Lieutenant-commanding Wyman, in his reports to the navy department. He was in command of the iron-clads Patapsco and Montauk in their many engagements with the forts and batteries of Charleston harbor in the summer of 1863; as fleet-captain was with Rear-Admiral Dahlgren on board the iron-clad Weehawken in a night-attack upon Fort Sumter, Sept. 1, 1863, when he received a severe wound in the right leg, His services, character, etc., are thus mentioned by Rear-Admiral Dahlgren, in his report to the secretary of the navy of Sept. 2, 1863: "I shall feel greatly the loss of Commander Badger's services at this time. He has been with me for more than eight years, and his sterling qualities have rendered him one of the very best ordnance officers in the navy." He was commodore in 1883, and commandant at navy-yard, Boston. Foxhall A. Parker.

Badlam (Stephen), born at Canton, Mass., in 1751, entered the army in 1775; commanded the artillery in dept. of Canada; became a Revolutionary officer, and was made brig.-gen. of militia in 1779. Died Aug. 24, 1815.

Baena (bȧ-ā′nȧ), or **Vaena,** a town of Spain, in the province of Córdova, is situated on the Marbella, 32 miles S. E. of Córdova. It occupies the site of an ancient Roman town. Grain and oil are exported from this place. Pop. 13,336.

Baëpen′di, a town of Brazil, in the province of Minas Geraes, is situated on one of the head-streams of the Rio Verde, in the Serra Mantiqueira, about 180 miles N. W. of Rio de Janeiro. Pop. about 9000.

Baer, von (Karl Ernst), a Russian naturalist of German extraction, born in Esthonia in 1792. He became in 1819 professor of zoology at Königsberg. He wrote, besides other works in German, a "History of the Development of Animals" (2 vols., 1828–37). In 1834 he removed to St. Petersburg, and was appointed librarian of the Academy of Sciences. He made several discoveries in physiology and zoology. D. Nov. 29, 1876.

Ba′ez (Buenaventura), a mulatto politician, born in 1820, was elected president of Santo Domingo in 1849, and re-elected in 1856 and 1865. In 1874 he left the country and came to the U. S.

Bae′za, or **Baeça** (anc. *Biatia*), an old town of Spain, in the province of Jaen, 22 miles N. E. of the city of Jaen. It contains a cathedral and several monasteries in the Gothic style, which, with other buildings, present an imposing appearance. The university, established in 1533, has ceased to exist in recent times. Under the Moors it was the capital of the kingdom of Bajasat, and is said to have had 150,000 inhabitants. Cloth, leather, and soap are made here. Pop. 14,377.

Baf′fa (anc. *Pa′phos*), a seaport-town on the S. W. coast of the island of Cyprus. It was once an important place, but is now ruined or decayed and nearly deserted. In ancient times Paphos was a beautiful city, having several temples, and was a famous place for the worship of Venus. Lat. 34° 47′ N., lon. 32° 26′ E.

Baf′fin (William), an English navigator, born in 1584. He accompanied James Hall in an Arctic expedition in 1612, and discovered Baffin's Bay in 1616. He wrote two narratives of these voyages, and gave in the first a new method of ascertaining the longitude at sea by observation of the heavenly bodies. He was killed at the siege of Ormuz, May 23, 1622.

Baffin's Bay, or **Bylot's Bay,** a large gulf or inland sea of North America, communicates with the North Atlantic by Davis's Strait, and with the Arctic Ocean by Smith's Sound. It is about 950 miles long, and has an average width of about 300 miles. The greatest depth is about 1050 fathoms. The shores are generally high and rocky, backed by ranges of snow-covered mountains. It was first explored by William Baffin in 1616. Whales abound here.

Bagatelle [Fr. a "trifle"], the name of a game somewhat resembling billiards. A bagatelle-table is usually about seven feet long and twenty-one inches wide, and is lined with cloth. The other apparatus of the game consists of small ivory balls and a mace or cue.

Bag′by (Arthur Pendleton), a lawyer, born in Virginia in 1794, was governor of Alabama (1837–41), U. S. Senator (1843–49), and minister to Russia (1849–53). Died at Mobile Sept. 21, 1858.

Bag′dad, a pashalic forming the S. E. portion of Asiatic Turkey, bordering on Arabia and Persia. It extends from the Persian Gulf north-westward about 600 miles, and is intersected by the Euphrates and the Tigris. It includes the ancient Chaldæa, Susiana, and Mesopotamia. The part which lies between the Euphrates and Arabia is a barren, sandy plain. The soil of some other parts is fertile. The population is a mixture of Turks, Arabs, Kurds, Armenians, etc. Capital, Bagdad.

Bagdad, a celebrated city of Asiatic Turkey, formerly the capital of the empire of the califs, and now the capital of the pashalic of Bagdad, is situated on both banks of the Tigris, about 60 miles N. of Babylon; lat. 33° 20′ N., lon. 44° 22′ 38″ E. The river is here about 700 feet wide, and is crossed by a bridge of boats. The appearance of the city at a distance is rendered picturesque by groves of palm trees and numerous minarets, but the streets are narrow, crooked, and dirty. The dwelling-houses, having no windows on the side next to the street, present an unpleasing exterior, but the interior is often richly decorated. Bagdad contains about one hundred mosques, some of which have beautiful domes and lofty minarets. Here are large bazaars filled with the products of European and Turkish markets. It was formerly a very magnificent city, and was for many ages the great emporium of commerce of the surrounding countries, but its trade has declined. It has manufactures of silk and cotton stuffs and red and yellow leather. From a census taken in 1869 the population has been estimated by some at 80,000 and by others at 40,000. In 1831 an inundation destroyed a large part of the city. Bagdad was founded by the calif Almansur about 763 A. D., and built out of the ruins of Ctesiphon. In the ninth century it was enlarged by Haroun-al-Raschid, who built here a fine palace. In the tenth and eleventh centuries it is said to have had 2,000,000 inhabitants. It was sacked by Hulaku about 1258, and after several changes of masters was conquered by the Turks in 1638.

Bagdad, or **Boca del Rio,** a town on the Rio Grande, near its mouth, in the Mexican state of Tamaulipas, was during the late civil war in the U. S. a place of great importance to blockade-runners, who carried on from this point a heavy trade with Western Texas.

Bagehot (Walter), A. M. See Appendix.

Bagford (John), born at London, England, in 1675, became an antiquary. Died May 15, 1716.

Bag′gage [Lat. *impedimen′ta;* Fr. *bagage*], a term applied to the tents, clothing, utensils, and other necessaries of an army, which are carried on carts, pack-horses, or mules. In every army the amount of baggage is limited by strict rules. A private soldier is allowed to carry nothing except that which his knapsack and other accoutrements can hold. The baggage of officers is more extensive. In the U. S. the trunks and carpet-bags of travellers are called "baggage," in England they are "luggage."

Bag′gesen (Jens), a Danish poet, born at Korsör, in the island of Seeland, Feb. 15, 1764. He was highly gifted, but of a weak character; with a fine fancy, but of a restless spirit; excitable, but without passion; fantastic, but without imagination. Born between two periods, he could neither stay with the old nor march with the new. He was intimate with men of second rank, and enthusiastically received by the educated; but no man of first rank would acknowledge him, and the great public he never reached. Born a Dane, and married first to a German, then to a French lady, he fluttered from one country and language and literature to another—made a noise in all, and became great in none. Of his Danish writings, his "Komiske Fortællinger" and "Labyrinthen" are entertaining. Of his German writings, his "Haideblumen" are not without merit. His letters, of which he wrote thousands in different languages, are very interesting. Died in Hamburg Oct. 3, 1826.

Baghe′ria, a town of Sicily, in the province of Palermo, 8½ miles E. of Palermo. Here are numerous villas of the nobility of the island. Pop. 11,762.

Bagley (John J.). See Appendix.

Bagli′vi (Giorgio), F. R. S., an Italian medical writer, born at Ragusa in 1668. He became in 1692 the pupil of Malpighi at Rome, and subsequently professor of anatomy at the college Della Sapienza in that city. He gained distinction as the author of the system of "Solidism"—*i. e.* the theory that diseases originate in the solids. He published "Opera Omnia Medico-practica" (1704). Died Mar., 1707.

Bagnacaval′lo, an Italian painter, whose proper name was Bartolommeo Ramenghi, born near Bologna in 1484. He was a pupil of Raphael, and is regarded as the greatest painter of the Bolognese school. Among his works is "The Coronation of Charles V. at Bologna." Died in 1542. (See Vasari, "Lives of the Painters.")

Bagnères de Bigorre (anc. *Vi′cus Aquen′sis*), a town and fashionable watering-place in the S. of France, in the department of Hautes-Pyrénées, and on the river Adour, 14 miles by rail S. S. E. of Tarbes. It is situated in the romantic valley of Campan, and is among the most frequented watering-places in France. It has a college, a public library, a theatre, a museum, and good hotels. The springs, of which there are thirty-two, and whose temperature ranges from 72° to 124° F., are visited by about 16,000 persons annually. Barèges and woollen stuffs are made here. Pop. in 1881, 9498.

Bagnères de Luchon (anc. *A′quæ Convena′rum*), a town of France, in the department of Upper Garonne, and in the Pyrénées, 42 miles by rail from Bagnères de Bigorre. It has sulphurous thermal springs and is a place of summer resort. Pop. in 1881, 4256.

Bagnes, a French word signifying "galleys," is now the name of the convict prisons of France in which criminals were confined and employed at hard labor, since the galleys were abolished in 1748. Large numbers of convicts were thus confined at Brest and Toulon, and were employed in mechanical and other work. Various trades or mechanical arts were taught to the convicts. In the reign of Napoleon III. the bagnes were gradually abolished, and the penal colonies substituted in their place.

Bagnes-le-Chable, a parish and village of Switzerland, in Valais, on the Dranse, 12 miles E. S. E. of Martigny. Pop. of the parish, which is coextensive with the Val-de-Bagnes, 4256. This valley was inundated in 1818 by a *débâcle* which carried away 400 cottages.

Bagnoles, a village and summer resort of France, in the department of Orne, and in a valley 13 miles E. S. E. of Domfront. It has warm saline springs and cold ferruginous springs.

Bago′as, a Persian eunuch and soldier in the service of Artaxerxes Ochus. In 338 B. C. he poisoned that king and several of his sons. He raised to the throne of Persia Darius Codomannus, who put Bagoas to death about 336 B. C.

Bag′ot (Sir Charles), an English diplomatist, born Sept. 23, 1781. He was minister to France in 1814, ambassador to St. Petersburg in 1820, and to Holland in 1824. He in 1842 became governor-general of Canada, where he died May 18, 1843.

Bagot (Lewis), born Jan. 1, 1740, was educated at Westminster School and Christ Church, Oxford, England. In 1777 he became dean of Christ Church, and was made bishop of Bristol in 1782. He was transferred to Norwich in 1783, and to St. Asaph in 1790. Died June 4, 1802.

Bag′pipe, a wind instrument supposed to be of great antiquity, consists of a leathern bag which the player inflates by blowing with his mouth through a tube, or, in some cases, by a bellows worked by the elbow. The music proceeds from three or four pipes, whose mouthpieces are inserted into the bag, the wind being forced out by pressing the bag under the arm. One of the pipes, called the "chanter," is pierced with eight holes, while the others, or "drones," sound each only one continuous low note. Though generally fallen into disuse, the bagpipe is still a popular instrument in the Highlands of Scotland and the west of Ireland, and the Highland regiments are always accompanied by their pipers, dressed in proper costume. The bagpipe is still used in Southern Italy, as formerly in Spain.

Bag′radites, the name of a royal family of Georgia and Armenia. It was founded by Bagrad, who had the privilege of crowning the Armenian monarchs. In the eighth century a younger son of the Bagradites became king of Georgia, and from him the Georgian Bagradites claim descent.

Bagra′tion (Peter), Prince, a Russian general, born in 1765, was descended from the noble Georgian family of Bagradites. He served with distinction under Suwarrow in Italy in 1799. In Nov., 1805, he kept in check for six hours a superior force of French under Murat. He led the vanguard at Austerlitz, December, 1805, and rendered important services at Eylau and Friedland (1807). He was mortally wounded at Borodino, Sept. 7, and died Oct. 7, 1812.

Bag′shot Beds [named from Bagshot Heath, Surrey], the lowest strata in the middle eocene formation of Britain. The strata are arranged into four groups: 1. The Upper Bagshot, yellow and white sands with ferruginous stains, generally unfossiliferous, though at Whitecliff Bay, Isle of Wight, a bed contains a large number of shells. 2. The Barton beds, colored clays interstratified with sand and loam, rich in fossils, shells of Mollusca, etc. 3. The Bracklesham beds, composed of marly clays and white sands, capped by a bed of flint-pebble conglomerate. This is the most fossiliferous group in the series. 4. The Lower Bagshot, consisting of variously-colored sands, gray, chocolate-colored, or white pipe-clays. The white clays contain the only fossil found in this group—beautifully preserved leaves in the layers of the clay. The series rests on the London clay. Its maximum thickness is about 1200 feet. Some writers restrict the term to this last group.

Bahama (bạ-hā′mạ), **Grand,** the most north-western island of the Bahama group, is 69 miles E. of Florida. It is 74 miles long and 9 miles wide. Area, 428 square miles. The soil is moderately fertile. Pop. 1020.

Baha′ma Islands, or **Lucay′os,** a group of islands in the Atlantic Ocean, lie N. E. of Cuba, from which they are separated by the old Bahama Channel. They belong to Great Britain. They consist of twelve islands, 661 keys, and 2387 reefs and cliffs, together 3060 islands and islets. They extend like a chain from latitude 21° to 27° 31′ N., in a north-western direction for a distance of about 700 miles. They are generally long and narrow, and have little elevation above the sea. The climate in winter is very mild and salubrious. The soil is thin, but produces maize, cotton, oranges, pineapples, etc. The area is variously estimated from 3021 to 5794 square miles. Capital, Nassau, in New Providence. In 1880 the receipts amounted to £42,945, and the expenses to £43,643. The value of the imports was £180,815, and of the exports £121,429. The names of the larger islands are Grand Bahama, Abaco, Eleuthera, New Providence, Andros, San Salvador (or Cat Island), Exuma, Long Island, Crooked Island, Inagua, and Caicos. These are mostly covered with forests of the madeira tree, the mastic, lignumvitæ, etc. San Salvador (or perhaps Watling's Island) was the first land discovered by Columbus in 1492. The Bahamas were then inhabited by a gentle race of aborigines, who were soon exterminated by the Spaniards. The English obtained possession of them in 1629. Among the exports are canella, arrow-root, sponges, salt, conch-shells, eleuthera bark, fresh and canned pineapples, etc. Pop. in 1881, 43,521.

Bahi′a, a province of Brazil, is bounded on the N. by Pernambuco, on the E. by Sergipe and the Atlantic Ocean, on the S. by Minas Geraes and Espirito Santo, and on the W. by Goyaz. Area, 176,500 square miles. The large river São Francisco flows along or near the north-western border of the province, which is traversed by a high mountain-range about 200 miles from the sea-coast. The soil of the lowlands is fertile. The chief products are sugar, tobacco, cotton, rice, manioc, and coffee. Diamonds and gold are found in this province. Pop. 1,379,616.

Bahia, or **São Salvador,** an important maritime city of Brazil, capital of the above province, is situated about 740 miles N. N. E. of Rio Janeiro; lat. 13° 0′ S., lon. 38° 32′ W. The name is derived from Bahia de Todos-os-Santos (All Saints' Bay), at the entrance of which it is pleasantly situated. The upper part of the city is several hundred feet higher than the lower, and presents a very fine appearance from the sea. The upper town is the most populous, most beautiful, and contains the important public buildings, among which are the governor's palace, the cathedral, the theatre, the mint, and many fine churches and convents. It is the seat of the archbishop of San Salvador. A public library was founded here in 1811. The harbor of Bahia is one of the best in America, and admits vessels of the largest size. It is defended by several forts, and has a lighthouse at the entrance. The chief exports of Bahia are sugar, cotton, coffee, tobacco, rum, dyestuffs, hides, and horns. The commerce is almost entirely in the hands of Englishmen. Bahia is the oldest city of Brazil, having been founded in 1549, and was until 1763 the capital. It is, next to Rio de Janeiro, the largest commercial city of Brazil. The Bahia Steam Navigation Company, organized in 1861, has a large number of steamers in use here. Pop. 128,929.

Bähr, or **Baehr** (Johann Christian Felix), an eminent German philologist, born at Darmstadt, June 13, 1798, and educated at Heidelberg, where in 1826 he became prof. of classical literature. He published a "History of Roman Literature," 2 vols. 1828; 4th ed. 1868–70 (with supplement of Christian Latin literature, 3 parts, 1836–40), and edited several of Plutarch's "Lives." He also published Herodotus, with valuable notes, 2d ed., 4 vols., 1856–61. Died Nov. 28, 1872.

Bahrdt (Karl Friedrich), D. D., a German rationalist theologian, born at Bischofswerda, in Saxony, Aug. 25, 1741. He became professor of philosophy at Erfurt in 1762, but he professed such skeptical or deistical doctrines that he was ejected from that position in 1768. Among his works is "Aspirations of a Mute Patriot." Died April 24, 1792. (See his "Autobiography" ("Geschichte meines Lebens"), 4 vols., 1790.)

Bahrein′, or **Aval Island** (anc. *Ty′los* or *Ty′ros*), is in the Persian Gulf, near the Arabian coast, about 200 miles S. of Bushire. It is 27 miles long and 10 wide, and is surrounded by several small islands. Manama, the capital, on the northern extremity, has a good harbor. These islands derive their importance from their pearl-fisheries, the annual product of which is estimated at $1,000,000.

Bahr-el-A′biad (*i. e.* "white river"), the Arabic name of the White Nile, which is the main branch of the Nile. It rises in Lakes Victoria Nyanza and Albert Nyanza, under the equator, flows N. along the eastern boundary of Kordofân, and unites with the Blue Nile at Khartum. It is said to be navigable 1000 miles above Khartum.

Bahr-el Az′rek (*i. e.* "blue river"), one of the two great branches of the Nile. It unites with the other branch, the Bahr-el Abiad ("white river"), in lat. 15° 37′ N. Its sources are in lat. 10° 58′ N., lon. 36° 50′ E., but its spiral course, traced through all its windings, will probably exceed 800 miles. In this distance it descends with immense impetuosity from an elevation of 9000 feet to one of 1500 feet, collecting the waters of a basin having an extent of 1000 miles or more. The Blue River is navigable up to Fazogle, under the twelfth parallel, 1500 miles from Rosetta.

Bai′æ (mod. *Ba′ja*), an ancient town of Italy, beautifully situated on the bay of its own name, in Campania, 10 miles W. of Naples. It was the favorite watering-place of the ancient Romans, who were attracted by the beauty of its position and adjacent scenery, the amenity of the climate, and the virtues of its warm mineral springs. Julius Cæsar and Pompey had country-houses at Baiæ, which Horace preferred to all other places. The society of Baiæ was proverbially voluptuous and dissolute. Ruins of ancient temples and villas are visible in this vicinity.

Bai′ersbronn, a town in Würtemberg, 40 miles S. W. of Stuttgart, has manufactures of glass. Pop. in 1880, 5872.

Baie Verte Canal. See Ship-Canals.

Bai′kal [from the Mongolian *Bai-Kul*, *i. e.* "rich sea"], called also the **Holy Sea,** a large lake in the southern part of Siberia, in the government of Irkutsk, is an expansion of the river Angara. It is situated between lat. 51° 28′ and 55° 41′ N., and lon. 103° and 110° E. It is about 400 miles long, and has an average width of nearly 45 miles. Area, estimated at 12,118 square miles. It is said to be in some places 300 fathoms deep. It receives the Selenga and other rivers, and discharges its waters by the Angara, an affluent of the Yenisei. In summer steamboats navigate this lake, which is frozen from November to April. Here are valuable seal and sturgeon fisheries. The waters of this lake are said to have a curious ground swell called *zyb*, the nature of which has never been explained. The Christian kingdom of the Prester Johns, between the eleventh and the thirteenth centuries, was just S. of the Baikal Sea.

Baikal Mountains, in Siberia, extend eastward in three ranges, from the Egtag Altai, and enclose in their midst Lake Baikal. They appear to be mostly of volcanic origin, and possess considerable mineral resources.

Bail [Fr. *bailler*, to "deliver"]. The original signification of this word is to "deliver." It is used both as a noun and a verb, and refers to property, as well as to a person, in the custody of the law. It implies safe-keeping or delivery for a special purpose. It may signify the delivery of a person arrested, either on civil or criminal process, from the custody of the sheriff or some other officer of the law, into the safe-keeping of persons who bind themselves for his appearance in court or obedience to its processes. Again, it denotes the persons into whose keeping the party discharged from actual arrest is delivered, and sometimes the amount of security given or required for the defendant's appearance.

In all civil actions the defendant may give bail as a matter of right, and generally in criminal proceedings, unless he is charged with a capital offence. The amount of bail is in the discretion of the court, controlled by the somewhat vague constitutional provision that excessive bail shall not be required.

Bail *below*, or bail *to the sheriff*, is bail given to the sheriff to secure the appearance of the defendant in the action, or his putting in special bail on a required day. Bail *to the action*, or bail *above*, are bound either to satisfy the judgment if one should be recovered, or to deliver up the defendant to custody. In some of the States the defendant when arrested gives bail to render himself at all times amenable to the process of the court, which takes the place of bail below and bail above.

Common bail is the formal entry of fictitious security with the clerk of the court. It is given for the appearance of the defendant and his future obedience in cases where he has not actually been arrested. *Special* bail is responsible bail, given when the defendant has actually been arrested. Bail must in general possess certain prescribed qualifications. They must be *freeholders* or *householders*; must be within reach of the process of the court, and must not be privileged from arrest; must be competent to make a contract, and of sufficient means to pay the amount for which they become responsible. Bail can be compelled, on suitable application in the action, to justify; this means, to show by satisfactory evidence that they possess the qualifications required by law.

While the prisoner, when released on bail, is in fact generally allowed to go at large, he is regarded by the law as in custody of his bail. They can take possession of his person at any time or in any place, even though it is necessary to break into his house. By delivering him to the sheriff and complying with legal forms of surrender, they can discharge themselves from liability.

It should be remarked that when a prisoner is held under final process—that is, process to enforce a judgment of the court—he cannot be released on bail. However, by statute law he is sometimes allowed in civil cases, on giving security of the nature of bail, to be released from strict confinement in jail, at the same time being partially restrained of his liberty by the action of rules defining territorial limits beyond which he cannot lawfully go.

T. W. Dwight.

Bail′ey (Gamaliel), M. D., born at Mount Holly, N. J., Dec. 3, 1807. In conjunction with J. G. Birney he founded in 1836 the "Cincinnati Philanthropist," an anti-slavery journal. Although his press was destroyed by a mob, he continued the publication till 1847, when he issued the first number of the "National Era" at Washington. The celebrated novel of "Uncle Tom's Cabin" first appeared in this journal. Died June 5, 1859.

Bailey (Gilbert Stephens), D. D., born at Abington, Pa., Oct. 17, 1822, educated at Oberlin College, O., pastor of a Baptist church in Cornwall, N. Y., 1845–46, pastor in Illinois 1846–63, superintendent of missions for the Baptist General Association of Illinois 1863–67, and since 1867 secretary of the Baptist Theological Union at Chicago. He is the author of several works, mostly denominational. Dr. Bailey originated the system of "minister's institutes" now prevalent in the Baptist denomination, holding the first at Chicago in 1864.

Bailey (Guilford D.), an American officer, born in New York 1833, killed at the battle of Seven Pines May 31, 1862; graduated at West Point July 1, 1856, and promoted second lieutenant of artillery; served on frontier duty and in Kansas border disturbance 1856–59, served during the civil war in defence of Fort Pickens, Fla., to June 27, 1861, appointed colonel First New York Light Artillery volunteers Sept., 1861, and was engaged in the various actions of the Army of the Potomac during the Peninsular campaign of 1862 till his death.

G. C. Simmons.

Bailey (Jacob Whitman), an American officer and nat-

uralist, born April 29, 1811, at Ward (now Auburn), Mass., graduated at West Point 1832, served as lieutenant of artillery in Charleston harbor, 1832–33, during threatened nullification of S. C., at Bellona Arsenal, Va., 1834–35, as assistant professor at Military Academy 1834–35, and acting professor of chemistry, mineralogy, and geology 1835–38, becoming, upon resigning his lieutenancy, July 8, 1838, full professor, which position he held, to the great benefit of the Academy and advantage to cadets, till his death. He was the inventor of "Bailey's Indicator," and of many improvements in the microscope, in the use of which he achieved the highest distinction, particularly in the examination of infusoria, algæ, and the products of the deep-sea soundings of the coast survey, U. S. exploring expeditions, and the Atlantic telegraph plateau, of which he made valuable collections and numerous delineations, bequeathing them to the Boston Society of Natural History. He was president of the American Association for the Advancement of Science 1857, and member of various societies of savants at home and abroad, and author of over fifty able papers in various scientific journals. His health, always delicate, was completely shattered by exposure in the Hudson River while attempting to rescue his wife and daughter, lost in the burning of the steamer Henry Clay, he dying five years after, Feb. 26, 1857, at West Point, aged forty-five.
George W. Cullum.

Bailey (James Montgomery), editor of the "Danbury News," a well-known American humorist, born Sept. 25, 1841, in Albany, N. Y., commenced journalism on the Danbury "Times" (afterwards "News") in 1865, which paper soon acquired a celebrity throughout the U. S. from an incessant flow of rich, original, and healthy humor which the brilliant pen of its editor imparted to its columns. He has published "Life in Danbury" and "The Danbury News Man's Almanac."

Bailey (Joseph), an American officer who served on the Federal side in the late war, and distinguished himself by his successful attempt to save thirteen gun-boats, etc. of the Mississippi flotilla. The water of the Red River having fallen so low that Admiral Porter's squadron was unable to pass the rapids, Col. Bailey in the course of eleven days constructed dams which, by raising the water, enabled the boats to descend safely, for which he received the thanks of Congress and was made a brigadier-general. He removed to Mo., where he was shot by some ruffians Mar. 21, 1867.

Bailey, or **Bailay** (Nathan), an English lexicographer and classical scholar, who kept a school at Stepney, where he died June 27, 1742. Soon after 1720 he published his "Universal Etymological English Dictionary," the first English dictionary which aimed at completeness, and which was the basis of Dr. Johnson's more celebrated work (1755). He wrote also a "Domestic Dictionary," and other books on education.

Bailey (Philip James), an English poet, born at Nottingham April 22, 1816. He studied law, and was called to the bar in 1840. In 1839 he published "Festus" (8th ed. 1868), a poem which treats of the highest themes of philosophy and religion. It excited much admiration, and had a wide temporary success, to which its extravagance and defects contributed. "The faults of the poem are as great as the beauties; there is no congruity or proportion in it, and you lay it down with a sense of admiration qualified with disgust." He wrote other poems, entitled "The Angel World" (afterwards incorporated with "Festus"), 1850, "The Mystic" (1855), "The Age," a satire (1858), and "The Universal Hymn" (1867).

Bailey (Rufus William), D. D., was born at North Yarmouth, Me., April 13, 1793, and graduated at Dartmouth in 1813, was pastor of several Congregational churches in New England, was professor of languages at Austin College, Huntsville, Tex., and its president (1858–63). He published "The Issue" (1837) and several educational and other works. Died April 25, 1863.

Bailey (Silas), D. D. See Appendix.

Bailey (Theodorus), U. S. N., born April 12, 1805, in Plattsburg, N. Y., entered the navy as a midshipman Jan. 1, 1818, became a lieutenant in 1827, a commander in 1849, a captain in 1855, a commodore in 1862, a rear-admiral in 1866. He did good service on the W. coast of Mexico in the Mexican war, and during a part of 1861–62 commanded the frigate Colorado, western Gulf blockading squadron. On April 24, 1862, he commanded the right column of Farragut's fleet in the passage of Forts St. Philip and Jackson, and at the capture of the Chalmette batteries and the city of New Orleans, where he led the fleet, and was conspicuous for his great gallantry and self-possession. From 1862 to 1865 he was in command of the eastern Gulf blockading squadron. Died Feb. 10, 1877. Foxhall A. Parker.

Bailey (Theodorus), born in New York in 1752; member of Congress from New York 1793–97 and 1799–1803; U. S. Senator 1803–04, when he resigned, and was appointed postmaster of New York. Died Sept. 6, 1828.

Bailey (William Whitman), B. P. See Appendix.

Bai'lie, a Scottish term having several legal applications. The most common and popular signification is a superior officer or magistrate of a municipal corporation in Scotland, with judicial authority within the city or burgh. In royal burghs the office is in some respects analogous to that of alderman in England.

Bail'iff [probably a corruption of the Lat. *baj'ulus* or *bai'ulus*, a "porter;" Fr. *bailli*], a term applied in England to a deputy of a sheriff or of a local magistrate; also to magistrates of certain towns and keepers of castles. Bailiff may be defined as the keeper or superintendent of some duty or charge legally imposed on him. As officers of the law, bailiffs arrest culprits, summon juries, and collect fines. There is a class of men employed by the sheriff on account of their adroitness and dexterity who are called bound bailiffs, because, the sheriff being responsible for their official misdemeanors, they are annually bound in an obligation, with sureties, for the due performance of their service. The sheriff himself is the queen's bailiff.

Bailleul, a well-built town of France, in the department of Nord, near the Belgian frontier, about 19 miles by rail W. of Lille. It has manufactures of woollen and cotton stuffs, hats, lace, etc. Pop. in 1881, 12,712.

Bail'lie (Joanna), a British poetess, born in Lanarkshire in 1762. In early life she went to reside in London with her brother, Matthew Baillie, the celebrated physician. Her life was happy, but devoid of remarkable incidents. She published in 1798 the first volume of "Plays of the Passions," which had great success. Several other volumes of the same appeared in 1802, 1812, etc. Among the most popular of her other works are "De Montfort," a tragedy, and "Basil," a drama. She wrote several ballads and songs which are much admired. She was an intimate friend of Sir Walter Scott, and her house was the resort of many other British and foreign literary celebrities. She died Feb. 23, 1851, aged eighty-nine. Commenting on her "Plays of the Passions," the "Edinburgh Review" for April, 1836, says: "This great work is completed, and in a manner worthy of its commencement; a noble monument of the powerful mind and the pure and elevated imagination of its author."

Baillie (Matthew), M. D., a brother of the preceding, was born in Lanarkshire, Scotland, Oct. 27, 1761. His mother was a sister of the great anatomists, John and William Hunter. He studied anatomy under his uncle, and entered Oxford, where he graduated as M. D. In 1783 he succeeded Dr. Hunter as lecturer on anatomy in London. He acquired a high reputation as a teacher and expositor of that science. He published in 1793 an excellent work on "The Morbid Anatomy of some of the most Important Parts of the Human Body," which had a remarkable influence on the study of medicine. He practised medicine in London with great success, and was appointed physician to the king in 1810. Died Sept. 23, 1823.

Baillie (Robert), an eminent Scottish Presbyterian theologian, born at Glasgow April 30, 1602. He was distinguished for his learning and moderation. He was one of the commissioners sent to London in 1640 to prepare charges against Laud, became professor of divinity at Glasgow in 1642, and was principal of the University of Glasgow after the Restoration. He wrote various works and letters. Died in July, 1662.

Baillie of Jerviswood (Robert), a Scottish patriot of excellent abilities and character. He opposed the tyrannical measures of the duke of Lauderdale, and about 1676 was fined and imprisoned for four months. Having entered into a correspondence with Russell and Sidney, he was arrested and charged with complicity in the Rye-House Plot. He was condemned on insufficient evidence, and executed Dec. 24, 1684.

Bailly (Jean Sylvain), an eminent French astronomer, born in Paris Sept. 15, 1736. He was admitted into the Academy of Sciences in 1763, and published in 1771 a remarkable "Treatise on the Light of the Satellites of Jupiter." In 1775 he produced the first volume of his "History of Astronomy, Ancient and Modern" (4 vols., 1775–83), which by its eloquent diction and ingenious ideas obtained great popularity. He became a member of the French Academy in 1784, and of the Academy of Inscriptions in 1785. Fontenelle was the only Frenchman who before that time had had the honor to be a member of the three great academies of Paris. He was the first president of the States-General or National Assembly in 1789, and was elected mayor of Paris in July of that year. His influence was exerted to promote order and moderation. He offended the Jacobins by commanding the national guard to fire on a riotous crowd in July, 1791, and resigned his office soon after that date. During the Reign of Terror he was proscribed by the Jacobins, and after insulting treatment was guillotined Nov. 12, 1793. Among his works is "Memoirs of the Revolution by an Eye-witness" (3 vols., 1804). (See F. Arago, "Biographie de Bailly," 1852, and an English translation of the same, Boston, 1859; Lalande, "Éloge de Bailly," 1794; Lacretelle, "Éloge de Bailly," 1836; "Edinburgh Review" for April, 1805.)

Bailly (Joseph A.), a French sculptor, born in Paris in 1825, emigrated to Philadelphia in 1850. Among his best works are "Adam and Eve," a group of "Eve and her Two Children," and a marble monument of Washington (1869) placed in front of the State-house in Philadelphia.

Bail'ment [Fr. *bailler*, to "deliver"], a delivery of goods for some particular purpose, or on mere deposit, upon contract, express or implied, that after the purpose has been performed the identical goods shall be redelivered to the bailor, or otherwise dealt with according to his direction. If the contract permits the return of an equivalent instead of the goods bailed, there is no bailment, but the transaction constitutes a debt or some cognate engagement. Also, a delivery of a thing in trust for some special object, and upon contract, express or implied, to conform to the object of the trust.

Bailment includes the borrowing, lending, hiring, or keeping of chattels, and the carrying or working upon them for another. The party making the delivery, or *bailing* the property, is termed the *bailor;* the party to whom it is delivered, the *bailee.*

Bailments have been classified as follows: 1, *Depositum,* or deposit; a delivery of goods to be kept by the bailee, and returned on demand, without recompense. 2, *Mandatum,* or mandate; where the bailee agrees to do something with or about the thing bailed, without recompense. 3, *Commodatum,* or loan; where the thing bailed is lent for use, without recompense. 4, *Pignus,* or pledge; where the thing bailed is security for a debt or other engagement. 5, *Locatio,* or hiring; where the use of something is to be given, or labor performed about it, for a compensation. *Locatio* is subdivided as follows: *Locatio rei,* where the bailee by hire gains the temporary use of a thing; *Locatio operis faciendi,* where the bailee agrees to perform labor and services, or bestow care and attention upon the thing bailed, for a recompense; *Locatio operis mercium vehendarum,* where goods are delivered to a bailee to be transported to another place, for a recompense.

The question which most frequently arises and presents the greatest difficulty in the law of bailment relates to the responsibility which attaches to a bailee if the property is lost or injured, and the degree of care which he is bound to bestow upon it. With reference to this question, bailments have been divided into three groups: 1, Where the bailment is for the benefit of the bailor alone. This class includes deposits and mandates. Here, as the bailee receives nothing for his services, he is held only to the care which prudent men are supposed to give to their own affairs, and he is responsible only for such loss or injury as results from the absence of such care. The degree of care depends much upon the circumstances of each case; for example, upon the bulk of the article, its fragility, or its exposure to thieves from the dense population of a city as compared with the scanty population of a country district. In each case it is a question of fact whether the care which all the circumstances required was used. 2, Where the bailment is for the benefit of the bailee only. This class includes *commodatum.* Here the greatest care is required of the bailee, and he is responsible for the slightest negligence. It is also a rule that he must keep strictly within the privilege conferred on him with respect to the thing bailed, or he will be liable for any loss or injury to it, even though he is guilty of no negligence. 3, Where the bailment is for the benefit of both bailor and bailee. This is the case in *pignus* and *locatio.* Here the bailee is held to the exercise of the care and attention which prudent men under the circumstances would reasonably be expected to take.

There is a class of bailments of an exceptional nature, embraced under the head of *locatio,* where the policy of the law imposes upon the bailee responsibilities for loss or injury to the property delivered to his charge, entirely irrespective of the question of his care or negligence; this class includes innkeepers and common carriers, the liabilities of whom will be considered in another place. (See Carriers, Hiring, and Innkeepers.)

The relation of bailor and bailee is largely one of trust, and the law requires good faith of each party. As a rule, the bailee will not be allowed to dispute the title of his bailor. He has a right to the possession of the thing bailed during the bailment, and in some instances a special property in it. In other cases he has a bare custody. This would enable him to maintain an action against any one who should unlawfully interfere with the chattel or deprive him of its possession. In such an action he would hold the proceeds beyond what was sufficient to indemnify him for his special interest as a trustee for the bailor.

T. W. Dwight.

Bai'ly (Edward Hodges), an English sculptor, born at Bristol Mar. 10, 1788, was a pupil of Flaxman. He gained the gold and silver medals of the Royal Academy about 1809, and became a royal academician in 1821. Among his masterpieces are "Eve at the Fountain," which is exquisitely graceful; "Apollo Discharging his Arrows;" "The Graces Seated;" "Eve Listening to the Voice;" and a statue of Lord Nelson. Died May 22, 1867.

Baily (Francis), D. C. L., an English astronomer, born at Newbury, in Berkshire, Mar. 10, 1774, became a stockbroker of London. He was one of the founders of the Astronomical Society, and rendered important services to astronomy by the improvement of the "Nautical Almanac" and the production of the "Astronomical Society's Catalogue of Stars." He wrote several standard works on life annuities, and a "Life of Flamsteed" (1835). Died Aug. 30, 1844.

Bain (Alexander), LL.D., born at Aberdeen, in Scotland, in 1818, graduated as M. A. at Marischal College in 1840. In 1845 he was appointed professor of natural philosophy in the Andersonian University at Glasgow, in 1857 examiner in logic and moral philosophy in the London University, in 1860 professor of logic in the University of Aberdeen, of which he was elected lord rector in 1881. He has published "The Senses and the Intellect" (1855), "The Emotions and the Will" (1859), forming together a complete course of mental philosophy," "Study of Character, including an Estimate of Phrenology" (1861), "English Composition and Rhetoric" (1866), "Mental and Moral Science" (1868), "Logic, Deductive and Inductive" (2 vols., 1870), "Mind and Body: Theories of their Relation" (1873), "Education as a Science" (1879), "James Mill" and "John Stuart Mill" (1882), "Practical Essays" (1884).

Bain'bridge, R. R. junction, capital of Decatur co., Ga. (see map of Georgia, ref. 7–G, for location of county), on Flint River, 50 miles from its mouth and at the head of navigation, 236 miles W. S. W. of Savannah, has a cotton manufactory, three academies, and is a considerable shipping-point for cotton. Pop. in 1870, 1351; in 1880, 1436.

Bainbridge, on R. R., Chenango co., N. Y. (see map of New York, ref. 5–G, for location of county), 32 miles E. of Binghamton. It has a foundry and machine-shop, and a beautiful park. Pop. in 1870, 681; in 1880, 781.

Bainbridge, Ross co., O. (see map of Ohio, ref. 7–E, for location of county), on R. R. and Paint Creek, has a woollen factory, etc. Pop. in 1870, 647; in 1880, 825.

Bainbridge (Henry), born in New York in 1803; educated at West Point; distinguished himself in the Mexican war at Monterey, Contreras, and Churubusco; became governor of Jalapa, Mexico, in 1848; was engaged in the Seminole Indian war, 1849–51; became lieutenant-colonel First Infantry June 11, 1851. Died May 31, 1857.

Bainbridge (William), an American commodore, born at Princeton, N. J., May 7, 1774. He obtained the rank of captain in 1800, and commanded the frigate Philadelphia in the war against Tripoli. This vessel, having run aground, was captured by the enemy in Oct., 1803. He remained a prisoner until peace was concluded, June, 1805, and was afterwards raised to the rank of commodore. In Sept., 1812, he obtained command of a squadron consisting of the Constitution, of 44 guns, the Essex, and the Hornet. In Dec., 1812, he captured the British frigate Java, mounting 49 guns. Died July 28, 1833. (See Thomas Harris, "Life of Commodore Bainbridge," 1837.)

Baine (A. C.), born at Raleigh, N. C., Sept. 21, 1810; settled in Stockton, Cal., as a lawyer about 1849; was highly esteemed for learning and integrity. Wrote "Divine Faith and Natural Reason." He had nearly finished, at his death, "Relations of Human Liberty to Natural, Moral, and Divine Law." Died Dec. 21, 1863.

Bains (*i. e.* "baths"), the name of several watering-places in France. The most important of these is Bains-les-Bains, in the department of Vosges, 14 miles S. W. of Épinal, situated about 1000 feet above the sea. The place has thirteen springs. Among these "La Grosse Source" has a temperature of about 120° F.

Bai'ram, a feast of the Mohammedans, begins at the end of the fast of Ramadan. It is inaugurated with great public rejoicings and illuminations. Its observance is commanded by the Koran. "Little Bairam" occurs 70 days later.

Baird (Absalom), an American officer, born Aug. 20, 1824, at Washington, Pa., graduated at West Point 1849 in artillery, captain and assistant adjutant-general Aug. 3, 1861, major and inspector-general Nov. 12, 1861, lieut.-col. June 13, 1867; brigadier-general U. S. vols. 1862–66. He served at various posts 1849–61, in Florida hostilities 1851–53, as assistant professor at Military Academy 1856–59, assistant adjutant-general at Washington, D. C., 1861, in Manassas campaign 1861, engaged at Blackburn's Ford and Bull Run, in the adjutant-general's office 1861, in the Virginia Peninsula campaign 1862, engaged at Yorktown and Williamsburg, in command of a brigade in the army of the Ohio, 1862, engaged in the capture of Franklin in Rosecrans' Tennessee campaign, 1863, engaged at Tullahoma, Shelbyville, Dug Gap, Chickamauga (brevet lieutenant-colonel), and occupation of Chattanooga, in command of a division in the Fourteenth corps in the operations about Chattanooga (brevet colonel) 1863–64, engaged at Missionary Ridge and skirmished in pursuit of the enemy in the invasion of Georgia, 1864, engaged at Resaca, Pine Mountain, Kenesaw, Vining's Station, Peach Tree Creek, Atlanta (brevet brigadier-general), Jonesboro', pursuit of Hood's army, in the "march to the sea" and surrender of Savannah, in the invasion of the Carolinas 1865, engaged at Bentonville, Raleigh, and surrender of Johnston's army at Durham Station. He was brevetted major-general U. S. army Mar. 13, 1865, for gallant and meritorious services in the field, and major-general U. S. volunteers Sept. 1, 1864, for distinguished conduct in the Atlanta campaign and at Savannah. Became inspector-general of the army 1885. George W. Cullum.

Baird (Charles Washington), son of Rev. Robert Baird, D. D., was born at Princeton, N. J., Aug. 28, 1828, and graduated at the University of the City of New York in 1848, and at the Union Theological Seminary in 1851. He was American chaplain at Rome in Italy from 1851 to 1853, pastor of the Reformed (Dutch) church, Bergen Hill, Brooklyn, from 1859 to 1861, and then became pastor of the Presbyterian church at Rye, N. Y. He has published "A Book of Public Prayer, compiled from the Authorized Formularies of Worship of the Presbyterian Church as prepared by the Reformers Calvin, Knox, and others," 1859, and a "History of Rye, N. Y. (from 1660–1870)," 1871, etc.

Baird (Henry Martyn), Ph. D., son of the Rev. Robert Baird, D. D., was born in Philadelphia Jan. 17, 1832, graduated at the University of the City of New York 1850, attended lectures in the National University (then University of Otho), Athens, Greece, 1851–52, studied theology in the Union Theological Seminary, New York, 1853–55, and Princeton, N. J., 1855–56. He was tutor of Greek in the College of New Jersey 1855–59, and in 1859 became professor of the Greek language and literature in the University of the City of New York. In 1866 he was ordained as an evangelist. He has published "Modern Greece," 1856, "The Life of the Rev. Robert Baird, D. D.," 1866, "History of the Rise of the Huguenots of France" (1879), and many articles in the quarterlies.

Baird (Robert), D. D., an American theologian and writer, born in Fayette co., Pa., Oct. 6, 1798. He graduated at Jefferson College in 1818. He spent several years (1835 to 1843) in Europe, where he did much to promote Protestant Christianity and the temperance cause. Among his works is "History of the Waldenses, Albigenses, and Vaudois." Died. Mar. 15, 1863.

Baird (Spencer Fullerton), LL.D., a distinguished American naturalist, b. at Reading, Pa., Feb. 3, 1823; entered Dickinson College in 1836, and graduated in 1840. He got his first love for natural history from his father, who was fond of out-of-door studies of Nature, and he was greatly stimulated in this direction by an early acquaintance with Audubon, which he formed as soon as 1838. From 1846 to 1850 he was professor of natural history in Dickinson College, and just before resigning this position he began his first important literary work—that of translating and editing the *Iconographic Encyclopædia*. In 1850 he was appointed assistant secretary of the Smithsonian Institution, which position he held until the death of Prof. Henry, in May, 1878, when he succeeded to the position of secretary, which he now holds. His most elaborate original memoirs are the catalogue of North American serpents (1853), *Mammals of North America* (1858), the *Review of North American Birds* (1864–66), and a *History of North American Birds* in connection with Mr. Bremer and Mr. Ridgeway. From 1870 to 1878 he was scientific editor of the periodicals published by Harper & Brothers. In his writings Prof. Baird has covered nearly every branch of natural history. In 1871 he was placed at the head of the newly-created U. S. commission of fish and fisheries—an unsalaried office. Mainly through his exertions this commission has been raised to its present important position. Not only has he been honored by being made an honorary member of nearly every American scientific society, but he is also either a foreign or a corresponding member of most of the important scientific societies in England, France, Germany, Austria, and Spain, and is a member of the council of the American National Academy of Sciences. In 1879 he was awarded the gold medal of the Société d'Acclimatation of France, and in 1880 the "erster ehrenpreis" of the "Internationale fischerei ausstellung," at Berlin—the gift of the emperor of Germany. In 1875 he received from the king of Norway and Sweden the decoration of "knight of the royal Norwegian order of St. Olaf." Other honors and medals have been received by him. Ralph S. Tarr.

Baireuth, bī'rūth [Ger. pron. bī'roit], a city of Bavaria, capital of the circle of Upper Franconia, on the Red Main, 126 miles by rail N. of Munich. It is pleasantly situated and well built; its streets are wide and well paved, and the city has gardens and public fountains. The principal buildings are the new palace, the mint, opera-house, and town-hall. Here are manufactures of cotton, woollen, porcelain, and leather. Pop. in 1880, 22,072.

Bai'us, the Latinized name of De Bay (Michael), a Flemish theologian, born in Hainault in 1513. He became professor of divinity at Louvain in 1550, and in 1578 chancellor of that university. He adopted the doctrines of Saint Augustine, and wrote works on free-will and grace which were condemned by Pope Pius V. in 1567. Baius retracted or submitted, but his doctrines were afterwards maintained by the Jansenists. Died Dec. 16, 1589.

Ba'ja, an important market-town of Hungary, in the county of Bács, on the Danube, 115 miles S. of Pesth. Here is an important market or annual fair for swine. Large quantities of grain and wine are produced in the vicinity. Pop. in 1880, 19,211.

Baja'da de Parana', or simply **El Parana'**, a town of the Argentine Republic, is situated on the Rio Parana, 230 m. N. W. of Buenos Ayres. It was founded in 1730, was capital of the state 1819–62, and of the republic 1852–62. Pop. about 7000.

Bajazet. See Bayazid.

Baker (A. R.), D. D., born in Franklin, Mass., Aug. 30, 1805, graduated at Amherst in 1830, became a teacher in Medway, Dorchester, and Andover, Mass., ordained pastor of a Congregational church in Medford, Mass., and has subsequently been settled in Lynn, Wellesley, and Boston. He has published a "School History of the U. S.," "The Catechism Tested by the Bible," an "Exposition of the Sermon on the Mount," etc.—His wife, Harriette N. W. Baker, a daughter of Rev. Dr. Leonard Woods, was born in 1815. She has published over 160 vols., mostly for children, written under the pseudonym of "Madeline Leslie."

Baker (Charles M.), born in New York City about 1805, resided in Vermont, and after 1838 in Wisconsin, where he was a prominent lawyer. He was for some time a judge of the State circuit court. Died Feb. 5, 1872.

Baker (Daniel), D. D., born at Midway, Liberty co., Ga., in 1791, graduated at Princeton in 1815, was ordained to the Presbyterian ministry in 1818, was pastor at Washington, D. C., Savannah, Ga., Frankfort, Ky., Tuscaloosa, Ala., and Holly Springs, Miss., was for a time president of Austin College, Huntsville, Tenn., was a popular and successful preacher, and author of several practical and polemical religious works. Died in 1857.—His son, Rev. William Mumford Baker (born in 1825, graduated at Princeton in 1846), is the author of a "Life" of his father and of several other popular works, such as "Inside, a Chronicle of Secession," "The Virginians in Texas," etc. He has been a Presbyterian minister in Galveston and Austin, Tex. (1850–65), and at Zanesville, O.

Baker (David Jewett), born at East Haddam, Conn., Sept. 7, 1792, graduated at Hamilton College in 1816, became a prominent lawyer of Illinois, was a probate judge in Randolph co., U. S. Senator (1830–31), and U. S. attorney for Ill. (1833–35). He was one of the leading anti-slavery men of Ill. in the contest of 1830. Died Aug. 6, 1869.

Baker (Edward Dickinson), Colonel, a lawyer, born in London, Eng., Feb. 24, 1811, emigrated to the U. S. in his youth. He was chosen M. C. in 1848, removed to California in 1852, and became a popular orator of the Republican party. In 1860 he was elected U. S. Senator for Oregon. Having obtained command of a brigade of the Union army, he was killed at Ball's Bluff Oct. 21, 1861.

Baker (George A.), an American portrait-painter of great merit, born in New York City. His delineations of children are much admired. Died April 2, 1880.

Baker (John Gilbert). See Appendix.

Baker (Osmon Cleander), D. D., born in Marlow,

N. H., July 30, 1812, studied at Wesleyan University, Conn., became teacher in the Newbury Wesleyan Seminary (Vt.), 1834, and subsequently its principal. He was one of the founders of the Methodist theological schools, and for some time professor in the Biblical Institute at Concord, N. H. In 1852 he was elected bishop. Died Dec. 20, 1871. "Baker on Discipline" is a standard work.

Baker (Sir Samuel White), the English explorer, born in London June 8, 1821, organized an extensive agricultural colony at Newerra Ellia, in Ceylon, 1848, which afterward became a place of considerable importance. In 1861 he went to Africa, with the design of visiting the sources of the Nile. He fell in with Speke and Grant, and afterward explored the western arm of the Nile, and discovered the Albert Nyanza Lake. In 1869 he set out, under the direction of the khedive of Egypt, with 1000 picked men, with the design of suppressing the slave-trade and spreading the cultivation of cotton. In 1873 he returned from this expedition, reporting complete success. He has published "The Rifle and Hound in Ceylon" (1854, 1874), "The Albert Nyanza" (1866, 2 vols.), "Ismaila" (1874, 2 vols.), "Cyprus" (1879).

Ba'ker Cit'y, capital of Baker co., Or. (see map of Oregon, ref. 7–E, for location of county). It is situated on the east fork of Powder River. Pop. in 1870, 312; in 1880, 1258.

Baker's Creek, Miss. See Champion Hills.

Ba'ker's Falls, a cascade of the Hudson River, in Kingsbury township, Washington co., N. Y. The stream falls 56 feet in sixty rods, and the scene is one of remarkable beauty. The falls furnish a great water-power. Here are two machine-shops and some paper-mills.

Ba'kersfield, capital of Kern co., Cal. (see map of California, ref. 6–C, for location of county), is situated on Kern River, about 60 miles from Visalia. It is the centre of a considerable cotton-trade. Pop. in 1880, 801.

Ba'kersville, capital of Mitchell co., N. C. (see map of North Carolina, ref. 2–C, for location of county), 95 miles N. W. of Charlotte. Pop. in 1880, 476.

Bakewell, an old market-town of England, in Derbyshire, on the river Wye, near its confluence with the Derwent, is 25 miles by rail N. W. of Derby. It has an ancient Gothic church, and chalybeate springs with warm baths, which are visited by many persons. Quarries of black marble and mines of coal and lead are worked in the vicinity. Chatsworth House, the splendid mansion of the duke of Devonshire, is three miles from this town, which is surrounded by beautiful scenery. Pop. in 1881, 2502.

Bakewell (Robert), an English agriculturist, born in Leicestershire in 1726. He gained distinction by his improvement of domestic animals, especially sheep and horned cattle. He originated a breed of sheep formerly called by his name, but now known as the Leicester breed. Died Oct. 1, 1795.

Bakh'tchissaroi', or **Baktshi-Serai,** a Tartar town of Russia, in the government of Taurida (Crimea), 15 miles S. W. of Simferopol. It was formerly the capital of the Tartar khans, whose palace is a remarkable Oriental edifice and in good repair, with spacious galleries, brilliant paintings, and pavilions of light and airy form. Pop. in 1882, 10,528.

Bakhtegan', Lake, in Persia, is 50 miles E. of Shiraz. It is 60 miles long, with an average breadth of 8 miles, and receives at its western extremity the river Bundemir (anc. *Araxes*). The lake yields large quantities of salt.

Ba'king is the mode of cooking food in an oven usually nearly or quite airtight. The term is also employed in the manufacture of bricks, porcelain, etc. (The baking of bread will be treated under Bread.) In baking, strictly so called, the oven is so closed that the steam and aroma arising from the substances within are confined; but by opening ventilators a current of air may be produced, and then these ovens may be used for oven-roasting. The offensive taste that often characterizes baked dishes is thus avoided. Baking, although a convenient mode of cooking, is not so good a process for cooking meats as Roasting (which see).

Ba'kony-Wald ("forest of Bakony"), a densely-wooded mountain-range of Hungary, extends between the river Raab, the Danube, and Lake Balaton. It is 56 miles long and 23 miles wide. The average height is 2000 feet. Large herds of swine are annually driven hither to feed on mast (acorns). Quarries of good marble are worked in these mountains.

Bak'sheesh', or **Bakshish,** an Arabic and Persian word signifying a "present," a "gratuity," is much used by beggars and others in Egypt, Palestine, and other Eastern countries.

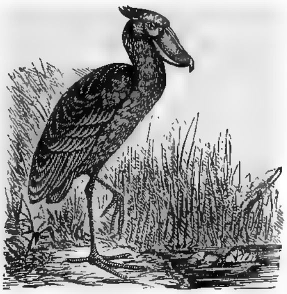
Ba'ku, a seaport town of Asiatic Russia, capital of Baku, on the W. shore of the Caspian Sea, and on the S. side of the peninsula of Apsheron (which see). It has several fine mosques and bazaars. Here are naphtha springs which ignite spontaneously, and caused Baku to be regarded as a holy city by the Parsees, who built several temples here; also oil-wells which produced 8,500,000 gallons in 1870, 29,045,000 in 1875, 140,000,000 in 1878, and 200,000,000 in 1882. Pop. in 1882, 15,604.

Bakunin (Michael), Russian agitator and earliest advocate of Nihilism, was born in Torschok, in the government of Tver, 1814, of a rich family of high rank. He graduated at the military school of St. Petersburg, and was appointed ensign in the artillery, but resigned and devoted himself to science with great success. In 1841 he left Russia and went to Berlin, where he occupied himself with philosophy, especially Hegelianism; to Dresden, where he studied with Arnold Ruge; and finally (1843) to Paris, where he lived with the Polish emigrants. In Switzerland he became acquainted with the communistic and socialistic societies, and often attended their meetings. In 1847, in a speech at Paris, he advocated a Russian republic and a Russo-Polish fraternity aiming to revolutionize Russia. On demand of Russia he was expelled from France, Jan., 1848. From this time he took part in all the revolutions of Europe, was put into prison in Saxony, sentenced to death in Austria, delivered up to Russia, and finally exiled to Siberia (1855). In 1860 he escaped to Japan, whence through the U. S. he returned to London. Here he took up again his revolutionary work, and advocated with fervor and boldness the overthrow of the contemporary government in Russia and the foundation of a great Slavonic federal republic. In a speech at Geneva in 1868 he announced himself the bearer of a new gospel. Its mission was to destroy the *Lie;* but the beginning of the Lie was God, the belief in whom we therefore were to get rid of. Having got rid of it, the next lie to be destroyed was *Right;* for Right was but a fiction invented by *Might*, simply in order to ensure and strengthen her reign, and Might formed the sole groundwork of society, making and unmaking laws. "Therefore our first work," he said, "must be destruction and annihilation—destruction of everything as it now exists, the good with the bad; for if but an atom of this old world remains, the new will never be created." Words like these form the very platform of the Russian conspiracy known as Nihilism. While Bakunin detested communism, he advocated the abolition of marriage and inheritance, and taught that conscience is a mere matter of education. Died at Geneva in 1876.

Balaam [Heb. *Bil'am*] was a soothsayer whom Balak sent for to pronounce a curse on the Israelites, but who, warned by his ass, blessed them. (See Num. xxii.–xxiv.)

Ba'la Beds, a local deposit of hard crystalline limestone, alternating with softer argillaceous bands, which occurs near Bala, in Wales, and forms a group of the Lower Silurian formation.

Balænicep'idæ [*Balæn'iceps*—*i. e.* "whale head;" so called from the likeness of the upper bill to the rostral portion of the skull of a balæna], a family of stork-like grallatorial birds with the hind toe incumbent, the three anterior long, without membrane, with stout claws (none pectinated), and with the bill very robust, much swollen at the sides, and arched, the upper hooked at the tip, the lower rounded. Only one species is known, the *Balæniceps rex* of Northern Africa, where it lives in the swamps, feeding on snakes and fishes. It has been called shoe-bird, from a fancied resemblance of its bill to a shoe.



The Balæniceps.

Bal'aghauts' (*i. e.* "above or beyond the Ghauts"), an extensive district of India, in the presidency of Madras, extends from the river Cavery to the river Krishna.

Balakla'va, or **Balaclava,** a small port and town of Russia, in the Crimea, and on the Black Sea, about 7 miles S. from Sevastopol, is separated from the harbor of Sevastopol by a rocky peninsula. It has a good landlocked harbor, supposed to be the port of the Læstrigonians at which Ulysses landed. The ruins of churches and mosques attest the ancient magnificence of this town. Pop. in 1882, 695. A few days after the battle of Alma, which occurred in Sept., 1854, Balaklava was occupied by the British army, and the harbor became the head-quarters of the fleet. The British army suffered here great privations in consequence of the inefficiency of the war office and the mismanagement of the commissariat. Soldiers perished with hunger and cold, while ample stores of food and clothing were in the holds of ships in the harbor. Here occurred the battle of Balaklava between the British and Russians, Oct. 25, 1854. The charge of the British cavalry in this action was a famous but unsuccessful exploit.

Bal'ance [supposed to be derived from *bilanx*, having two scales; from *bis*, "twice," and *lanx*, a "scale or plate"] is a lever of the first kind, the fulcrum being between the power and the weight; used to ascertain the weight of bodies in comparison with the standard units of weight. The ordinary balance consists essentially of a metallic bar or lever, called the beam, either delicately suspended, or supported on a stand by the intervention of a wedge-shaped prism, technically termed a knife-edge, exactly at its middle point. An index is fixed at right angles to the beam, and made to travel over a graduated arc, so as to show when the beam is horizontal. A scale-pan is suspended from each end of the lever. Since the arms of the balance are equal, it is plain that there cannot be equilibrium unless the weights placed in each scale are also equal. When this is the case, the beam is perfectly horizontal and the index vertical. The balance is then said to be true. When the beam is horizontal with unequal weights, the balance is false. Thus it is easy to test the truth of a balance by first placing in the scales weights which apparently are equal, and then transferring each into the other scale. If the weights are not really equal, one of them will appear heavier than the other after the transfer. There are, however, two methods of finding the exact weight of a body by means of a false balance. The body may be weighed with standard weights in each scale successively, and the true weight is the mean proportional between the two apparent weights. Or the body (placed in one scale) may be balanced by a sufficient quantity of any convenient substance—sand, for instance—so that the beam is horizontal, and then replaced by standard weights until the sand is balanced; the weight thus obtained is the true one. A good balance should have its beam in stable equilibrium, for which purpose the centre of gravity of the beam and its appendages should fall a little below the knife-edge. The points of suspension of the scale-pans and the fulcrum of the beam should be in the same straight line. Both when the scales are empty, and when equal weights are placed in them, the beam should be horizontal and the index vertical, the arms, of course, being exactly equal to one another. It is of great importance that the balance should be very sensitive and indicate very slight inequalities in the weights. The sensibility of a balance becomes greater, first, as the length of the arms is increased, which renders the movement about the fulcrum more obvious; and secondly, as the weight of the beam is diminished, for when the beam is displaced by the inequality of the weights, its own weight gives it a tendency to return to its first position. But this displacement is less for a given inequality in the weights as the weight of the beam is increased; so that the less the beam weighs the more sensitive it becomes. A form of balance, more convenient for counterpoising, but less exact than the common form, is that in which the scale-pans are placed above the beam.

The balance of a watch is a wheel nicely poised on its axis, the pivot-holes in which it turns being frequently formed in rubies or other jewels. The natural effect of an impulse given this wheel would be complete rotation, but this is arrested by the balance-spring, so that it recoils, and a vibratory motion results. The balance-spring is a coil of steel wire so fine and delicate that 4000 springs weigh only about one ounce. One of the extremities of the spring is fastened to a point independent of the balance, and the other end is attached near its axis. When the impulse is given to the balance, it moves round just so far as the impulse given is able to overcome the elastic resistance of the spring. When that resistance becomes equal to the impulse, the balance is driven back by the elastic recoil of the spring. In marine chronometers a cylindrical helical spring is used.
F. A. P. Barnard.

Balance of Power [Fr. *équilibre politique, i. e.* "political equilibrium" or "equilibrium of states"], a phrase used in modern European diplomacy to express a state of political equilibrium among neighboring powers, or a political system so arranged and counterpoised that no nation or monarch may be so powerful as to endanger the independence of other states. Such a balance was aimed at in the political combinations in behalf of Greece; in those of Italy just before the Reformation; in the policy of Europe under the lead of France against Austria and Spain; in the alliances against Louis XVI., against Napoleon I., and more recently against Russia in order to preserve the independence of Turkey. Its object is to prevent *political* aggrandizement only. There were in Europe, after the overthrow of Napoleon in 1815, five monarchies recognized as the great powers—namely, France, Austria, Great Britain, Russia, and Prussia, to which, in 1859, the kingdom of Italy was added. The victories of the Prussians in 1866 and 1870 have so prostrated the armies of Austria and France that there now remain in Europe only two first-rate powers, Russia and Prussia (or Germany), and the balance of power is supposed to be destroyed, for if these two should form an offensive alliance they would be a match for all the other powers on the Continent. (See International Law No. I., by Pres. T. D. Woolsey, S. T. D., LL.D.)

Balance of Trade [Fr. *balance du commerce*], in political economy, is the difference between the value of the exports and the imports of a country. If the exports exceed the imports in value, the balance of trade is in favor of that country which usually receives a quantity of gold equal to that excess. A nation may, however, derive profit from its foreign commerce even when its imports exceed its exports in value, for merchants who export commodities may find it more profitable for them to bring back some foreign produce than to bring the money which they receive for the articles exported. (See Trade, Balance of.)

Bal'anus, a genus of Cirripedia distinguished by the absence of a flexible stalk and the possession of a symmetrical shell. The name is derived from the Greek word for *acorn*, and was given to it because some species resemble an acorn. The base is usually formed of a thin calcareous plate, the sides of six valves; and four small valves form the operculum, exactly closing the aperture at the top. This genus comprises many species, known as sessile barnacles, which are found in nearly all seas, attached to stones, shells, and other objects. It is remarkable that in the early stage of their existence they are capable of active locomotion, and have large eyes, which disappear, along with the organs of locomotion, when they become stationary. Some of the large species were esteemed a delicacy by the ancient Romans. The Chinese collect and eat the *Balanus tintinnabulum*, which is said to resemble lobster in taste; and *Balanus psittacus*, a South American species, is also eaten. This species is sometimes four inches in diameter, its height considerably more. There are several species found in the U. S.

Bal'ashof, a town of Russia, in the government of Saratov, 138 miles W. of Saratov. Pop. in 1882, 6909.

Balasore, the chief town of the South Cuttack district, in Bengal, on the Boorabullung River, which has a bar at its mouth. It has an American mission, salt-works, and a coasting-trade. It is 145 miles S. W. of Calcutta. P. 11,000.

Bal'assa-Gyar'mat, a town of Hungary, in the county of Neograd, 40 miles N. of Pesth. Pop. in 1880, 6788.

Bal'aton, Lake [Ger. *Platten-see;* Hun. *Balatomy;* anc. *Pelso*], the largest lake in Hungary, 55 miles S. W. of Pesth, is 51 miles long and 7 miles wide. The area is estimated at 383 square miles. It receives numerous streams, the largest of which is the Szala, and discharges its water through the Sio and Sarvitz into the Danube. Fish of various kinds are found here. This lake is often celebrated in the old romantic ballads of the Magyars.

Bal'bi (Adriano), an eminent Italian geographer, born at Venice April 25, 1782. He became a resident of Paris, where he passed many years. He published in 1826 an "Ethnographical Atlas of the Globe," which is highly esteemed. His other chief work is a "Compendium of Geography" ("Abrégé de Géographie," 1 vol. 8vo), which is considered one of the best treatises on that science that has ever appeared. His works are mostly written in French. He removed from Paris to Italy in 1832. Died Mar. 14, 1848.

Bal'bo (Cesare), an Italian statesman and author, born at Turin Nov. 21, 1789. He was appointed commissioner of the Illyrian provinces by Napoleon in 1812. He advocated the independence of Italy in a work called "Speranze d'Italia ("Hopes of Italy," 1843), which widely extended his reputation. As a moderate and liberal patriot he took a prominent part in the revolutionary movements of 1848. Among his works is a "History of Italy from the Beginning to 1814" (1849), which is highly esteemed. Died June 3, 1853.

Balbo'a, de (Vasco Nuñez), a famous Spanish navigator and explorer, born in Estremadura in 1475. He emigrated to Hayti about 1500, and in 1510 accompanied Enciso in an expedition to Darien. Having quarrelled with Enciso, Balboa obtained the chief command of the party, and in Sept., 1513, discovered the Pacific Ocean from the top of a mountain. He descended to the shore and took possession of the ocean in the name of his sovereign. In 1514, Pedrarias Dávila was sent from Spain to supersede Balboa, who was punished by a fine for his insubordination. He served as a deputy under Pedrarias, who, actuated by cruelty and jealousy, accused Balboa of treasonable designs, and put him to death in 1517. (See IRVING, "Voyages and Discoveries of the Companions of Columbus;" M. J. QUINTANA, "Vidas de Españoles Celebres.")

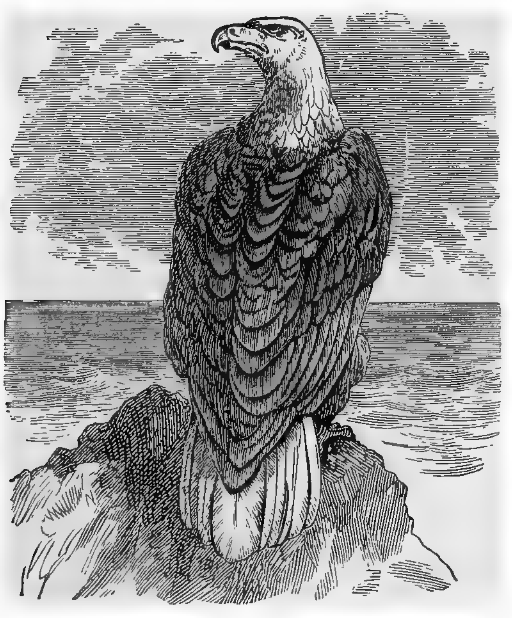
Balbue'na, de (BERNARDO), a Spanish poet, born at Val-de-Peñas in 1568. He became bishop of Porto Rico in 1620. Of his works, only three have been preserved: "La grandeza Mejicana" (Mexico, 1609; Madrid, 1829), "El Siglo de Oro" (1608), and "El Bernardo," an epic poem (1624 and 1808). Died at Porto Rico in 1627.

Bal'bus (L. CORNELIUS), surnamed MAJOR, a Roman officer, born at Gades (Cadiz), became an intimate friend of Cæsar, whom he accompanied to Spain in 61 B. C. In 40 B. C. he was chosen consul, being the first adopted citizen who received that honor. He wrote a diary of the events of his own and Cæsar's life.

Balch (GEORGE B.), U. S. N., born Jan. 3, 1821, in Tennessee, entered the navy as a midshipman in 1837, became a passed midshipman in 1843, a lieutenant in 1850, a commander in 1862, a captain in 1866, and a commodore in 1872. He served during the Mexican war on the east coast of Mexico, from 1862 to 1865 commanded first the steamer Pocahontas, and afterwards the steamer Pawnee, South Atlantic blockading squadron, during which period, in co-operation with our army, he was almost constantly engaged with the enemy's batteries and forts on the Stone and Black rivers, S. C. In one action the Pawnee was struck forty-six times, but finally succeeded in driving the Confederates from their guns "in the wildest confusion." Rear-Admiral Dahlgren spoke in the highest terms of Balch's bravery, conduct, and sound judgment. He was rear-admiral (retired Jan. 3, 1883) and superintendent of the Naval Academy in 1880–81. FOXHALL A. PARKER.

Bal'cony [Fr. *balcon;* It. *balco'ne*], a platform or gallery projecting in front of a window or several windows, is supported by consoles or brackets fixed in the wall or by pillars resting on the ground, and has a parapet or balustrade before it. The term *balcony* is also applied to several seats in a theatre which are nearest the stage.

Bal'dachin [It. *baldachi'no*], a canopy in the form of a crown or umbrella, made of costly materials, richly adorned, and raised over a throne, couch, pulpit, or altar. In the church of St. Peter in Rome there is a magnificent baldachin cast in bronze by Bernini, and supported by four twisted columns. The baldachin is used in processions of the Roman Catholic Church. The name *baldachin* is said to have been derived from *Baldach,* a corrupted form of a name of Bagdad, and was originally applied to the canopy which was carried over an Oriental prince.



Bald Eagle.

Bald (or **White-Headed**) **Eagle** (*Halia'ëtus leucoceph'alus*), so called on account of the snowy-white color of the head and neck, is a native of North America, where it is found along the sea-coasts and at the mouths of large rivers. The length of this bird is about forty inches, the stretch of wing from seven to eight feet. The nest of the bald eagle is generally made upon some lofty tree, and sometimes becomes of great size, as the bird is in the habit of using the same nest year after year, and making additions to it every season. The female bird generally lays her eggs in January, two or three in number and of a dull white color, and they are hatched by the middle of February. It is strongly attached to its young, and will not forsake them, even if the tree on which they rest be enveloped in flames. The bald eagle will eat almost anything, even carrion, but it is especially fond of fish, which it steals from the osprey when practicable, but also takes them from the water with much skill. Young lambs, pigs, also ducks, geese, and gulls, are seized by the eagle with avidity. For an interesting description of the manner in which it takes its prey the reader is referred to the account given by Audubon. The bald eagle has been adopted by the Americans as their national emblem.

Bal'der, or **Baldur** [from *ballr,* "good," "strong," "valiant"], often called BALDER THE GOOD, in the Norse mythology was the second son of Odin. He is supposed to typify the brightness of the summer sun, and to make all things bright and cheerful; hence he has been termed the "Apollo of the North." His abode was Breidablik ("widely shining"), where nothing impure could enter. The account of his death is as follows: He dreamed one night that his life was in the utmost danger; and when he related this dream, the gods were so distressed that his mother, Frigga, exacted an oath from all things, animate and inanimate, that they would not injure Balder. She did not, however, exact any oath from the mistletoe, because it seemed so harmless and insignificant. Now, the gods were accustomed to amuse themselves by shooting arrows and throwing stones at Balder, to all of which he proved invulnerable. When Loki, the god of evil, found that the mistletoe had not taken the oath, he obtained the plant and went to the assembly of gods, where he found Balder's brother Hoder, standing apart from the others. He asked him why he also did not throw something at Balder. "Because I am blind," answered Hoder, "and have nothing to throw." "Come," said Loki, "do like the rest; show honor to Balder by casting this trifle at him, and I will direct your hand." Hoder did as the tempter bade him, and Balder, pierced through by the mistletoe, fell dead. So great was the grief of the gods that Hermod visited the realms of death, and besought Hela to release her prey and allow Balder to return to the dwelling of the Æsir. Hela answered that if everything mourned him, then he should return, but if anything whatever failed to weep, then Balder must remain in the world of shades. All things animate and inanimate were requested by the Æsir to weep for Balder, and all did so except a giant hag named Thökk (afterwards found to be Loki himself, who had assumed this form in order to prevent Balder from returning to life). She answered their request by jeers, and Balder was accordingly forced to remain in the abode of the dead. (See THORPE'S "Northern Mythology," vol. i.; KEYSER'S "Religion of the Northmen.") J. THOMAS.

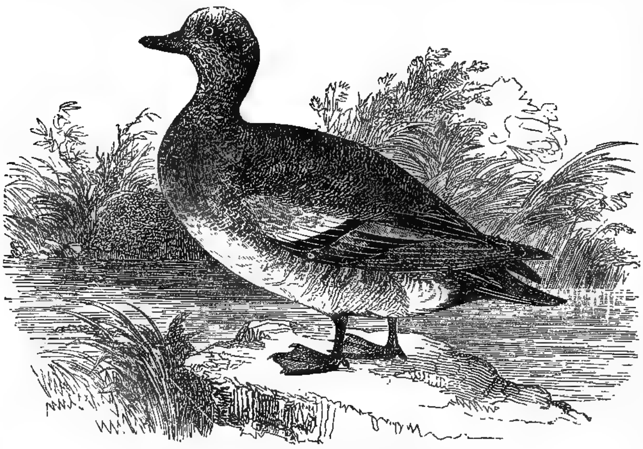
Balderic, or **Baudry,** a French chronicler, bishop of Dol, born about the middle of the eleventh century. He took part in all the Church councils of the time, and made active efforts to restore the rigor of monastic discipline. He visited England, and left an account of his travels. He wrote a chronicle of the first Crusade, entitled "Historiæ Hierosolomytanæ." We have also from him a life of Robert d'Arbrissel.

Baldi d'Urbino (BERNARDINO), a mathematician and man of letters, born at Urbino June 6, 1553, accomplished as a writer, and in science as well, under the tutelage of Commandino developed a remarkable zeal for the study of mathematics. He learned the Hebrew and Chaldean tongues in order to better understand the Bible, and every year he acquired some new language. His multitudinous writings deal with almost every branch of science. Chief among his works are "Cronica de' Matematici" ("Chronology of Mathematicians"), "Nautica," a didactic poem on navigation, an Arabic grammar and dictionary, and a translation of the Targum of Onkelos. He commenced a geographic dictionary, which he only brought to the letter C in four enormous volumes. Died Oct. 12, 1617.

Baldinuc'ci (FILLIPPO), born at Florence, Italy, about 1624, was a writer on art, and published a valuable work known as "Notices of the Professors of Design (Painters) from Cimabue, 1260–1670." He was patronized by the grand duke Cosimo III. Died in 1696.

Bald'ness (*Alopecia*), the loss or absence of the hair of the scalp. There are some few cases on record in which the hair has never been developed. This is termed congenital baldness. Accidental baldness is caused by an atrophy of the hair-follicles. Baldness in the comparatively young may occur from wearing waterproof caps or unventilated hats, which, by preventing evaporation from the head, occasion an unhealthy state of skin. It may be complete, or partial, occurring in patches. Senile baldness (*calvities*) is the consequence of age; it arises, like the preceding variety, from an atrophy of those parts on which the hairs depend for nutrition. It generally commences on the crown of the head. Women are not so frequently bald as men. The causes of baldness are defective supply of nutrition, a hereditary tendency, dissipation, but especially old age. The hair falls off after severe illnesses, or after other causes of general debility. Alopecia is sometimes the result of syphilis. The treatment consists in cleanliness, and in exciting the circulation of the scalp by using a hairbrush and the application of stimulants, as the Spanish-fly ointment, two drachms to an ounce of lard, mixed with the same quantity of pomatum, or some equivalent preparation. Any constitutional debility should be remedied. Shaving the head is sometimes resorted to, and is often useful. Favus (which see) permanently destroys the hair.

Bald′pate, called also **American Widgeon,** the *Mareca Americana*, a duck which breeds in Mexico and the South-western States, and also along the western coast; found also throughout the U. S., Canada, the northern part of South America, and occasionally in Europe. It is highly prized for the delicacy of its flesh. It takes its name from its white crown. It is variously marked with reddish-brown, gray, white, and chestnut. The male has a green band running from the eyes to the nape. The bird is nineteen and a half inches long.



The Baldpate, or American Widgeon.

Bal′dung (Hans), also called **Hans Grün,** a German painter and engraver, born at Gmünd, in Swabia, in 1470. He belonged to the Swabian School, and derived from Dürer and Schöngauer the fantastic element which marked his works. He excelled those masters in the handling of color and light and shade. His chief work is the altarpiece at Freiburg. His wood-cuts are wonderful in their Gothic strangeness and bizarre fancifulness. Died in 1552.

Bald′win I., king of Jerusalem, born in 1058, was a brother of Godfrey of Bouillon. He joined the first Crusade in 1096, and fought bravely against the infidels. He was chosen count of Edessa by the Christian inhabitants of that city. On the death of Godfrey, in 1100, he succeeded him as king of Jerusalem. He defeated the Saracens in several battles, and captured Acre, Cæsarea, and Sidon. He was more ambitious and worldly than his brother Godfrey. Died in 1118. (See Gibbon, "Decline and Fall of the Roman Empire.")

Baldwin II. (Baldwin du Bourg), king of Jerusalem, was a cousin of Baldwin I., whom he succeeded in 1118. He waged war against the Saracens. During his reign the military order of Templars was instituted for the defence of the Holy Land. He died Aug. 21, 1131, and left the throne to his son-in-law, Foulques of Anjou.

Baldwin III., the son of Foulques of Anjou, was born in 1129, and became king of Jerusalem in 1143. He defeated Noor-ed-Deen, the sultan of Aleppo, at Jerusalem, in 1152 and 1157. He acquired much renown and influence, and was respected even by the Saracens. His wife was Theodora, a daughter of the Greek emperor Manuel. He died Feb. 10, 1162, and was succeeded by his brother, Amalric or Amaury.

Baldwin IV., king of Jerusalem, surnamed The Leper, was born in 1160. He succeeded his father Amalric in 1174. He defeated the famous Saladin near Tiberias in 1182, but was afterwards defeated by that prince. He died in 1186, and was succeeded by his nephew, Baldwin V., who died in childhood.

Baldwin I., the first Latin emperor of Constantinople, was born at Valenciennes in 1171. He was Baldwin IX., count of Flanders, having inherited that title from his father, Baldwin VIII. He joined the fourth Crusade in 1200, and co-operated with the Venetians in an enterprise against Constantinople, the throne of which was occupied by Alexis, an usurper. The crusaders defeated Alexis, captured the city, and elected Baldwin emperor in 1204. He was defeated and taken prisoner by the Bulgarians in 1205, and died in 1206, leaving the throne to his brother Henry. (See A. Cahour, "Baudouin de Constantinople," 1850.)

Baldwin II., emperor of Constantinople, born in 1217, was a son of Peter de Courtenay, and a nephew of Baldwin I. He succeeded to the throne in 1228, and was placed under the guardianship of John de Brienne. He began to reign in 1237, and encountered much opposition from the Greeks and Bulgarians. In 1261 his capital was taken by Michael Palæologus, and Baldwin fled to Italy, where he died. (The English family of Courtenay claims to be descended from the stock of this emperor.)

Baldwin, on R. R., capital of Lake co., Mich. (see map of Michigan, ref. 5–H, for location of county). Pop. in 1880, 165.

Baldwin (Abraham), a distinguished statesman of Georgia, born in Guilford, Conn., in Nov., 1754, graduated at Yale in 1772, was five years a tutor there, and became in 1777 a chaplain in the army. In 1784 he became a lawyer of Savannah, Ga., was a member of Congress (1785–88 and 1789–99), of the convention which framed the U. S. Constitution (1787), and U. S. Senator from Georgia (1799–1807). He was the originator of the State University. Died Mar. 4, 1807.

Baldwin (Ashbel), born at Litchfield, Conn., Mar. 7, 1757, graduated at Yale College in 1776; was a quartermaster in the Revolutionary war; ordained by Bishop Seabury in 1785, the first Episcopal ordination in the U. S.; was clergyman at Stratford, Conn., 1792–1824, and afterward at Wallingford, Meriden, North Haven, and Oxford, continuing in the ministry until disabled by age in 1832. He was a delegate to the general convention and several times its secretary, and was secretary of the diocesan convention many years. Died at Rochester, N. Y., Feb. 8, 1846.

Baldwin (Augustus C.), born at Salina, N. Y., Dec. 24, 1817; emigrated to Oakland co., Mich., in 1837; admitted to the bar in 1842; was elected to Michigan legislature in 1844 and 1846; prosecuting attorney for Oakland co. 1853–54; delegate to the Charleston and Baltimore Conventions in 1860; elected member of Congress in 1862; delegate to Chicago Convention of 1864, and the "National Union Convention" at Philadelphia in 1866.

Baldwin (Charles H.), U. S. N., born Sept. 3, 1820, in the city of New York, entered the navy as a midshipman April 24, 1839, became passed midshipman in 1845, lieutenant in 1853, commander in 1862, and captain in 1869. He served on W. coast of Mexico during Mexican war, and was in several sharp engagements with the enemy on shore near Mazatlan. He commanded steamer Clifton of mortar flotilla at passage of Forts St. Philip and Jackson by Farragut's fleet, April 24, 1862, and at attack on Vicksburg, June 28, 1862. Became commodore Aug. 8, 1876, and rear-admiral Jan. 31, 1883. In command of Mediterranean squadron from Mar. 10, 1883, to date of his retirement, Sept. 3, 1884.

Foxhall A. Parker. Revised by S. B. Luce.

Baldwin (Elihu Whittlesey), S. T. D., born at Durham, N. Y., Dec. 25, 1789, graduated at Yale in 1812 and at Andover in 1817, was pastor of the Seventh Presbyterian church in New York City (1820–35), and president of Wabash College, Ind. (1835–40). Died Oct. 15, 1840.

Baldwin (George Colfax), D. D., born at Pompton, N. J., Oct. 21, 1817, educated at Madison University, for twenty-nine years pastor of the First Baptist church in Troy, N. Y. He is the author of "Representative Men," "Representative Women," "The Model Prayer," etc.

Baldwin (Henry), LL.D., an American jurist, born at New Haven, Conn., in 1779, became a citizen of Pennsylvania. He was elected to Congress several times, and was appointed a judge of the Supreme Court of the U. S. in 1830. Died April 21, 1844.

Baldwin (Henry P.) was born in Coventry, R. I., Feb. 22, 1814, emigrated to Detroit in his youth, was governor of Michigan (1869–71), and U. S. Senator for unexpired term of Senator Chandler, ending Mar. 4, 1881.

Baldwin (Jeduthan), born at Woburn, Mass., Jan. 13, 1732, was a captain in the expedition against Crown Point, N. Y., in 1755; became assistant engineer, ranking as captain, at Cambridge, Mass., Mar. 16, 1776, and was ordered to New York; was made lieutenant-colonel Apr. 26, 1776, and ordered to Canada Sept. 3, 1776; became colonel of engineers, and served at Ticonderoga; was at West Point with his regiment in 1780, and resigned Apr. 26, 1782. He was a distinguished member of the Massachusetts Provincial Congress 1774–75, and left a legacy of £100 to Leicester Academy, in Massachusetts. Died at Brookfield, Mass., June 4, 1788.

Baldwin (John Denison) was born at North Stonington, Conn., Sept. 28, 1810. After studying law and theology he became a journalist, and was long the editor and proprietor of the "Worcester (Mass.) Spy." He was a member of Congress from Massachusetts (1863–69), and has published "Raymond Hill and Other Poems" (1847), "Pre-historic Nations" (1869), "Ancient America" (1872). Died July 8, 1883.

Baldwin (Joseph G.), of Sumter, Ala., was a native of Virginia. He was an able lawyer and active politician, author of "Flush Times in Alabama and Mississippi" and of "Party Leaders," 1840. He was judge of the superior court of California 1857–63, and chief-justice of California in 1863. Died in San Francisco Sept. 30, 1864.—His son, Alexander W., was dist. judge for Nev. D. Nov. 15, 1869.

Baldwin (Loammi), born at Woburn, Mass., Jan. 21, 1745, studied at Harvard College, and became an engineer, was a major, lieutenant-colonel, and colonel in the Revolutionary army, and was afterwards a prominent engineer in Massachusetts. Died Oct. 20, 1807.—His son, Loammi Baldwin (born May 16, 1780, graduated at Harvard in 1800), was also an eminent engineer, and was employed in the U. S. government works at Charlestown navy-yard and at Newport. Died June 30, 1838.

Baldwin (Matthias W.), an American machinist, born at Elizabethtown, N. J., in 1796. He is said to have constructed the first locomotive on the American continent. He also made several improvements in locomotives. Died in Philadelphia Sept. 7, 1866.

Baldwin (Roger Sherman), LL.D., an American statesman, born in New Haven Jan. 4, 1793. He became governor of Connecticut in 1844 and U. S. Senator in 1847. In 1841, Governor Baldwin was associated with J. Q. Adams in the famous Amistad trial before the Supreme court of the U. S. Died Feb. 19, 1863.

Baldwin (Simeon), born at Norwich, Conn., Dec. 14, 1761; graduated at Yale College in 1781; tutor there 1783–86; admitted to the bar at New Haven; clerk of the district and circuit courts 1790–1803; member of Congress 1803–05; judge of Supreme Court of Connecticut 1806–17, and of the court of errors; mayor of New Haven in 1826. He was the father of Roger Sherman Baldwin, noticed above. Died at New Haven, May 26, 1851.

Baldwin (Theron), D. D., born at Goshen, Conn., July 21, 1801, graduated at Yale in 1827, was sent as a home missionary of the Congregationalists to the West in 1829, was one of the founders of Illinois College, organized the Monticello Female Seminary near Alton, Ill., of which he was principal (1838–43). He was for twenty-seven years secretary of the "Society for Promoting Collegiate and Theological Education." Died at Orange, N. J., April 10, 1870.

Baldwin City, on R. R., Douglas co., Kan. (see map of Kan., ref. 5–J, for location of co.), 15 m. S. of Lawrence, is the site of Baker University. P. in 1880, 325; in 1885, 933.

Bald'winsville, on R. R., Onondaga co., N. Y. (see map of New York, ref. 4–F, for location of county), and on Seneca River, 12 miles N. by W. from Syracuse. It has an academy and various manufactories. Pop. in 1870, 2130; in 1880, 2121.

Bâle, or **Basel** [Ger. *Basel;* Fr. *Bâle* or *Basle;* anc. *Basili'a* or *Basile'a*], an important city of Switzerland, beautifully situated on both sides of the Rhine, 65 miles by rail N. of Berne, and about 3 miles from the frontier of Alsace; lat. 47° 34′ N., lon. 7° 36′ E. The Rhine, here crossed by a bridge, divides it into two parts, named in German Gross Basel, "Great Basel," and Klein Basel, "Little Basel" (called in French *Grande Bâle* and *Petite Bâle*). Bâle is at or near the head of navigation on the Rhine, and is the most important commercial and manufacturing city of Switzerland. It was more populous in the Middle Ages than at present. Among its public buildings is a fine cathedral built by the emperor Henry II. between 1010 and 1019, with towers 218 feet high, which were not completed till 1500. The University of Bâle, founded in 1459, once had a high reputation. This city also contains a valuable museum of natural history, a botanic garden, and the university library of 120,000 volumes and 4000 MSS. The museum of art is noteworthy for its fine collection of the works of the younger Holbein. A large majority of the inhabitants are Protestants. Bâle has extensive manufactures of ribbons, printed cottons, paper, gloves, jewelry, etc. It was first mentioned in 372 A. D., was destroyed by the Huns and rebuilt by Henry I. in 917. Pop., 1880, 61,399.

Bâle, or **Basel,** a canton of Switzerland, bordering on Alsace and Baden, has an area of 176 square miles. The Rhine forms part of the northern boundary of the canton, which is bounded on the N. by Germany, on the E. by Aargau, on the S. by Soleure, and on the W. by Germany and Soleure. It is intersected by the river Birz. The surface is diversified with hills and valleys; the soil is fertile. Salt is made from salt-wells, and considerable quantities of good wine are made. It has extensive manufactures of ribbons, paper, woollen stuffs, etc. Bâle was first admitted as a Swiss canton in 1501. The town had previously been a free city of the German empire. In 1833, Bâle was divided into two independent portions or half-cantons—namely, Bâle city (Ger. *Basel Stadt*) and Bâle country (Ger. *Basel-landschaft;* Fr. *Bâle campagne*). Area of the former, 14 square miles; of the latter, 164 square miles. Pop. of the former in 1880, 65,101; of the latter, 59,271.

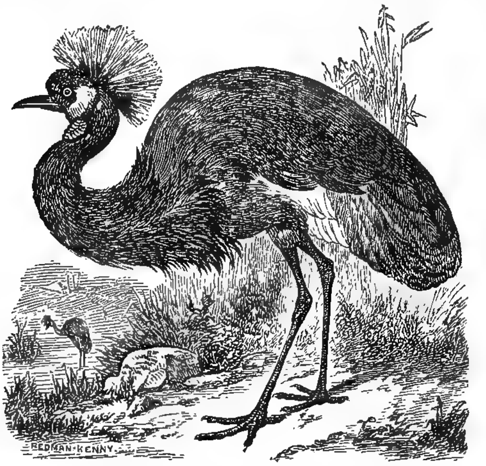
Bâle (or **Basel**), **Council of,** a memorable œcumenical council of the Church held in Bâle, was summoned by Pope Martin V., who died (Feb. 20, 1431) before the appointed time of its meeting. It was opened Dec. 14, 1431, under the pontificate of Eugenius IV. (elected Mar. 3, 1431). The pope tried repeatedly to dissolve the council, but in vain. A quarrel in regard to the manner and place of holding negotiations with the Greek Church led finally to a split. Many bishops, and all the cardinals but one, went off with Julianus Cesarini, the pope's legate, first to Ferrara (Jan., 1438), and thence to Florence (Feb., 1439). Those who remained chose a new president, and went on with their work. Excommunicated by Eugenius, they elected a new pope, Felix V., Nov. 17, 1439. Very few acknowledged him. This blunder broke the moral power of the council. Its forty-fifth and last formal session was held May 16, 1443, though the council was not technically "dissolved" till May 7, 1449, when it gave in its adhesion to Nicholas V., the successor of Eugenius IV. The Roman Catholic Church acknowledges only the first twenty-five sessions of the council, before the split. (See Wessenberg, "Die Allgemeinen Concilien des 15ten and 16ten Jahrhundertes," 2 vols., Constance, 1870.)

Bâle (or **Basel**), **Treaty of,** the name of an important treaty of peace signed at Bâle, April 5, 1795, between the French republic and Prussia. The latter then agreed to abandon the coalition against France, and to give up her possessions on the left bank of the Rhine. In July, 1795, another treaty was here concluded between France and Spain.

Bale (John), bishop of Ossory, was born at Cove, Suffolk, England, Nov. 21, 1495, became a Carmelite, and was educated at Cambridge, became a prior (1529), but becoming a Protestant, was obliged to leave the country; returning, he became a bishop in 1552. He was again exiled after Edward VI.'s death, but returned and became prebend of Canterbury in 1560. He wrote voluminously. His "Summarium" (1549), a catalogue of British authors, is his most celebrated work. Died Nov., 1563.

Balear'ic Isles (anc. *Balea'res* or *Balea'res In'sulæ*), a group of five islands in the Mediterranean, forming a Spanish province, the area of which is 1860 square miles. Pop. in 1877, 289,035. Capital, Palma. Their names are Majorca, Minorca, Iviça, Formentera, and Cabrera. The soil is mostly fertile, though badly cultivated. The climate is very fine. Vegetation has a tropical aspect. The chief exports are olive oil, figs, oranges, wool, mules, wine, hats, brooms, brandy, capers, saffron, cheese, salt, wooden ware, baskets, etc. The ancient natives of these islands were very expert slingers, and served in the Carthaginian army. The Baleares were made an independent kingdom in 1256, but soon became feudal to Aragon, to which kingdom they were annexed in 1344. The Moors were long masters here, but were expelled in 1285. The kings of Spain long retained the title of "king of the Balearic Islands" as one of their secondary honors. The language is made up of various dialects (Mallorquin, Minorquin, etc.) of the Catalan, mingled with Arabic (and perhaps Punic) elements. (See Majorca and Minorca.)

Balear'ic Crane (*Balearica pavonina*), a beautiful crane found in Northern and Western Africa, conspicuous for its crown of golden plumes and its scarlet cheeks. It is readily tamed, often indulging in fantastic dances, running about with great speed, and screaming with a harsh and ringing voice. It is of a bluish-slate color, and is four feet high. Its bill is shorter and thicker than that of other cranes. It is exceedingly gentle, and, unlike some other cranes, is quite harmless. It is doubtful whether this bird is the Balearic crane of the ancients.



Balearic Crane.

Balechou (Jean Joseph Nicolas), a very eminent French engraver, born at Arles in 1715. He was the first burinist of his time. His works are remarkably neat, and his style brilliant, vigorous, and bold; but his drawing is often defective, and he paid too little attention to detail. His "Women Bathing," "Storm" and "Calm" (after Vernet), "Saint Genevieve" (after Charles Vanloo), and his full-length portrait of Augustus, king of Poland, are his most famous works. The last mentioned is one of the great triumphs of the engraver's art. Died Aug. 18, 1765.

Baleen' [from the Lat. *balæna;* Gr. *φάλαινα,* a "whale"], a substance commercially known as whale-fin and whalebone, is procured from the mouth of the right whale, the Greenland whale, the Bahia fin-back, the Cape whale, the humpback, and various other species. It grows from the roof of the mouth of all the Balænidæ or true whales, though in some it is too small to be of much use. It is never found in the sperm whales or the dolphins. From single whales as much as two tons of baleen has been taken. It consists of horny plates of albuminous matter charged with phosphate of lime. Baleen takes the place of teeth, and serves as a strainer for separating from the water the little animals which serve as food for the whale. (See Whalebone.)

Balen, or **Ballen, van** (Hendrik), a Flemish painter, born in Antwerp in 1560, studied with Adam van Oort and in Italy, and was the first instructor of Vandyck. In spite of a certain coldness and mannerism, his harmonious coloring, correct taste, and skilful composition have given him a more than respectable rank among painters. Of his numerous works, the best known are scriptural and ecclesiastical pieces. His nude figures are well executed. Died in 1632.

Bales'tra (Antonio), an Italian painter, born at Verona in 1666. After his father's death he followed commercial pursuits until he came of age, when he went to Venice and became a pupil of Belucci (an able colorist), and afterwards studied at Rome with Carlo Maratti. His "Defeat of the Giants" gained the prize at the Academy of St. Luke in 1694. Among his other famous pictures are a "Saint Theresa" at Bergamo, a "Virgin" at Mantua, a "Life of Saints Cosmas and Damian" at Padua, and his own portrait at Florence. He was one of the last able artists of the Venetian school, though not a slavish follower of any school. He was a skilful designer, a good colorist, a laborious and faithful student of his art, and was possessed of a vigorous hand and spirit. The works of Giovanni Balestra, a skilful engraver, are often incorrectly assigned to the subject of this notice. Antonio Balestra died April 2, 1740.

Balfe (Michael William), a distinguished musician and composer, born in Dublin, Ireland, May 15, 1808, was a skilful violinist. He visited Italy in 1825, gained distinction as a singer, and composed in rapid succession many operas, which are not remarkable for originality. Among his most popular operas are "Falstaff" (1838), "The Bohemian Girl" (1844), "The Rose of Castile," and "The Talisman," the latter a posthumous work now (Sept., 1873) in preparation for representation in London. Died Oct. 20, 1870.

Balfour (John Hutton), M. D., F. R. S., a British botanist and physician, born in Edinburgh Sept. 15, 1808. In 1845 he became professor of botany at Edinburgh. He published a "Manual of Botany" (1849), and a "Class-book of Botany" (1852) which is highly esteemed. He contributed the article on Botany to the eighth edition of the "Encyclopædia Britannica." Died Feb. 12, 1884.

Balfour (Robert), a Scotchman, born about 1550, and for many years principal of the Guienne College at Bordeaux. He had great learning, and was called the "phœnix of the age." His principal works were commentaries on Aristotle, 1616, 1618, and 1620.

Balfour (Rev. Walter), born at St. Ninian's, Stirlingshire, Scotland, in 1777. He was brought up a Presbyterian of the national Kirk, but coming to the U. S. at the age of twenty, he became a Baptist ten years later. In 1823 he became a Universalist, and was long a preacher of that faith in Charlestown, Mass. He published, besides other works, "Inquiries concerning the Devil," "Scriptural Import of the Words translated Hell" (1824), "The State of the Dead" (1833), and controversial letters to Prof. Moses Stuart and others. Died Jan. 3, 1852.

Balfurosh', or **Balfrush,** originally **Barfurosh** ("the mart of burdens"), an important commercial town of Persia, in the province of Mazanderân, on the river Bahbul, 14 miles from its entrance into the Caspian Sea, and about 110 miles N. E. of Teherân. It has an extensive trade, and contains numerous colleges and caravanserais. The bazaars are large, and filled with a great variety of goods. A good road extends from this town to its port, Meshedi-Ser, on the Caspian. Pop. estimated at 120,000.

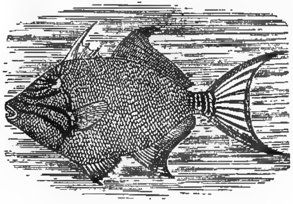
Ba'li, or **Bal'ly,** an island of the Malay Archipelago, is about 3 miles E. of Java. Area, 1999 square miles. It is nearly 70 miles long and 35 miles wide. The chief exports are rice, cotton, coffee, tobacco, hides, etc. The island is divided into several small states, of which Badong is the chief. The Balinese mostly profess Brahmanism. They are said to be superior to the Javanese in mind and other respects. Their language resembles that of Java. Pop. about 800,000.

Baliol, or **Bal'liol** (Edward), a son of King John Baliol, invaded Scotland in 1332. Having gained several victories over the Scottish army, he was crowned king at Scone in September of that year. About three months later he was surprised in his camp, and lost his crown. His subsequent career was unfortunate. Died in 1363.

Baliol, or **Balliol** (John), lord of Galloway and king of Scotland, was born about 1259. He became the rival of Robert Bruce, and claimed the crown as the grandson of David, who was a brother of King William the Lion. The dispute was referred to Edward I. of England as arbiter, who decided that Baliol was the rightful heir, and imposed the condition that he should do homage to the king of England. He was crowned in 1292, and swore fealty to Edward, but soon renounced his allegiance. Edward invaded Scotland, defeated Baliol's army, and compelled him to resign the crown in 1296. Baliol died in France in 1314.

Ba'liol College, Oxford, was founded about 1263 or 1268 by John de Baliol, whose son of the same name was king of Scotland. It was enriched by several benefactors separated by long intervals of time. Among the graduates of this college were John Evelyn and Bradley the astronomer.

Balis'tidæ (*Balis'tes*), a family of plectognath fishes of the sub-order Sclerodermi, with the pelvic bone well developed and movable, without ventral spines, and with the spinous dorsal represented by at most three spines. They are mostly found in tropical or sub-tropical seas, and are divisible into two sub-families. The Balistinæ have brilliant colors and a curious provision for fixing the first dorsal spine in an erect position or lowering it at will. For this reason they are sometimes called trigger-fishes. The Monacanthinæ are generally dull in color, and have one spine, often, however, supplemented by a second small



Unarmed Trigger-fish: *Balistes Vetulus* (found in the Nile).

one behind. One of the most remarkable species is the *Balistes vetulus*, or "unarmed trigger-fish."

Balize, or **Belize** [a Spanish name corrupted from *Wallis* or *Wallace*, an English pirate who infested that region], also called **British Honduras,** a British colony in Central America, on the Bay of Honduras, and in the south-eastern part of the peninsula of Yucatan. Area, estimated at 13,500 square miles. Mahogany, fustic, logwood, etc. are exported from this colony. Pop. in 1881, 27,452.

Balize, or **Belize,** a town of Central America, is in the district noticed above, and on the Bay of Honduras, at the mouth of the Balize River. It is a dépôt of British goods destined for Central America. It contains a court-house, a hospital, several chapels, and an iron market-house. Pop. estimated at 6000.

Balize, a name sometimes given to a village at the North-eastern Pass, at the mouth of the Mississippi River, derived from the French *balise*, a "beacon." It is inhabited by pilots and their families.

Balkan′ (the ancient *Hæ′mus*), an important mountain-chain of Europe, extends from Sophia eastward to Cape Emineh on the Black Sea, and forms the southern boundary of the basin of the Danube. Some peaks of this range are over 5000 feet high. The Balkan is connected with the mountains of Middle Europe by the ranges of Montenegro and Herzegovina. It is an important natural barrier, sloping abruptly to the S.

Balkash′ (in the Calmuck language "large lake," is called by the Khirgiz **Ak Tenghiz,** *i. e.* "white sea," or simply **Tenghiz Sea**), a large lake of Central Asia having no visible outlet, is on the borders of Chinese Turkistan and the Russian government of Tomsk, between lat. 44° and 47° N., and lon. 77° and 81° E. Its length from N. E. to S. W. is 390 miles, and its greatest breadth 50 miles.

Balkh (the ancient *Bac′tria*), a province of Afghanistan. It is bounded on the N. by the river Oxus or Amoo, on the E. by Badakshan, on the S. by the Hindoo-Koosh Mountains, and on the W. by the desert. A large part of the soil is sterile. The natives are Usbek Tartars. Capital, Balkh.

Balkh (anc. *Zarias′pa* and *Bac′tra*), the capital of the province of Balkh, is about 22 miles S. of the Amoo River, and 150 miles N. N. W. of Cabul. The ancient Bactra was an important city, the remains of which cover a space about twenty miles in circuit, and comprise eighteen aqueducts now in ruins. It was destroyed by Jengis Khan. The modern town is insignificant. Pop. about 2000.

Ball [from the Gr. βάλλω, "to throw"], a word used in various applications; a round body or globe; a dancing-party; a solid shot or bullet discharged from a cannon or other gun. Also the name of a game. (See BALL, GAME OF.)

Ball, in military affairs. See BULLET.

Ball, Game of. This was a favorite gymnastic exercise among the ancient Greeks and Romans, the latter of whom called it *pila*. At Rome it was played by persons of all ages and by men of high rank. The Greeks prized the game as a means of giving grace and elasticity to their figures and motions. In the sixteenth century this game was fashionable in the courts of French and Italian princes. The French *jeu de paume* and English *tennis* were modifications of the game of ball. The ball was struck with a mallet (Fr. *mail* or *maille;* Eng. *mall*), sometimes called pall-mall or pell-mell, from the Italian *palla*, a ball. A form of this game, called *cricket*, is much played by the English at the present time. The popular game of the U. S. is *base-ball*. (See BASE-BALL, in APPENDIX.)

Ball (EPHRAIM), an inventor, born in Stark co., O., in 1812. He had few educational privileges in his youth. He began the manufacture of ploughs in 1840, patented the "Ohio mower" in 1856, and the well-known "Buckeye" machine in 1858. He was long at the head of a large manufactory of farming tools at Canton, O.

Ball (GEORGE H.), A. M., D. D. See APPENDIX.

Ball (THOMAS), a distinguished American sculptor, born in Charlestown, Mass., June 3, 1819. His works of art are numerous and highly esteemed. Among them are busts of Webster and Choate, and statues of Webster, Everett, and Washington.

Ballad Poetry. The word *ballad* signifies in English a narrative song, a short tale in lyric verse, which sense it has come to have, probably through the English, in some other languages. It means, by derivation, a dance-song, but though dancing was formerly, and in some places still is, performed to song instead of instrumental music, the application of the word in English is quite accidental. The *popular* ballad, for which our language has no unequivocal name, is a distinct and very important species of poetry. Its historical and natural place is anterior to the appearance of the poetry of art, to which it has formed a step among every people that has produced an original literature, and by which it has been regularly displaced, and, in some cases, all but extinguished. Whenever a people in the course of its development reaches a certain intellectual and moral stage, it will feel an impulse to express itself in literature, and the form of expression to which it is first impelled is, as is well known, not prose but verse, and in fact narrative verse. The condition of society in which a truly national or popular poetry appears, explains the character of such poetry. It is a condition in which the people are not divided by political organization and book-culture into markedly distinct classes, in which consequently there is such community of ideas and feelings that the whole people form an individual. Such poetry, accordingly, while it is in its essence an expression of our common human nature, and so of universal and indestructible interest, will in each case be differenced by circumstances and idiosyncrasy. On the other hand, it will always be an expression of the mind and heart of the people as an individual, and never of the personality of individual men. The fundamental characteristic of popular ballads is therefore the absence of subjectivity and of self-consciousness. Though they do not "write themselves," as William Grimm has said, though a man and not a people has composed them, still the author counts for nothing, and it is not by mere accident, but with the best reason, that they have come down to us anonymous. Hence, too, they are extremely difficult to imitate by the highly-civilized modern man, and most of the attempts to reproduce this kind of poetry have been ridiculous failures.

The primitive ballad then is popular, not in the sense of something arising from and suited to the lower orders of a people. As yet, no sharp distinction of high and low exists, in respect to knowledge, desires, and tastes. An increased civilization, and especially the introduction of book-culture, gradually gives rise to such a division: the poetry of art appears; the popular poetry is no longer relished by a portion of the people, and is abandoned to an uncultivated or not over-cultivated class—a constantly diminishing number. But whatever may be the estimation in which it may be held by particular classes or at particular epochs, it cannot lose its value. Being founded on what is permanent and universal in the heart of man, and now by printing put beyond the danger of perishing, it will survive the fluctuations of taste, and may from time to time serve, as it notoriously did in England and Germany a hundred years ago, to recall a literature from false and artificial courses to nature and truth.

Of the Europeans nations, the Spaniards and those of Scandinavian-German stock have best preserved their early popular poetry. We have early notices of the poetry of the Germans. Their ballads, mythical or historical, are several times spoken of by Tacitus, who says that these were their only annals. The earth-born Tuisco and his son Mannus were celebrated in the one, and the hero Arminius in the other. The historian of the Goths, Jornandes, writing in the sixth century, says that these people were accustomed to sing the exploits of their fathers to the harp, and seems to have taken not a little of his history from such songs. The like is true of Paulus Diaconus, the Lombard historian, who wrote in the eighth century, and mentions songs about Alboin (who died in 563) as existing among all the nations of German speech. Charlemagne had the old traditional songs of his people collected and committed to writing, and even made them one of the subjects of school instruction. Side by side with heroic ballads, social, convivial, and funeral songs (which may, to be sure, have been pretty much the same thing) seem to have been in use from the earliest recorded times. To all this popular poetry, by reason of its heathen derivation and character, the Christian clergy opposed themselves with the most determined hostility. Not succeeding in extirpating it by the use of the spiritual and legal means at their command, the German churchmen of the ninth century conceived the idea of crowding it out by substituting poetry of a Christian subject and tone—an expedient which has been tried more than once since then. Though popular song lived on in obscure places, the foreground of history is filled for six hundred years with religious and courtly poetry and with the chivalrous and native epic. Nothing is left of the old heroic songs but a fragment of the Hildebrandslied, from the eighth century (best known in a modernized form of the fifteenth century); and of the Christianized song we have also but a single specimen, the Ludwigslied, of the year 881. The former is in the ancient alliterative metre, the latter in the then newly-introduced rhymed stanza. During the fifteenth and the early part of the sixteenth centuries a second growth of the genuine popular song appears, some of it springing, doubtless, out of shoots from the old stock which had lived through this long interval, some of it a fresh product of the age. These ballads were popular in the large and strict sense; that is, they were the creation and the manifestation of the whole people, great and humble, who were still one in all essentials, having the same belief, the same ignorance, and the same tastes, and living in much closer relations than now. The diffusion of knowledge and the stimulation of thought through the art of printing, the religious and intellectual consequences of the Reformation, the intrusion of cold reflection into a world of sense and fancy, broke up the national unity. The educated classes took a direction of their own, and left, what had been a common treasure, to the people in the lower sense, the ignorant or unschooled mass. German ballads have been collected in considerable numbers. The sources have been "flying leaves," manuscripts, printed song-books (mostly of the sixteenth century), and oral tradition. In interest they are decidedly inferior to the Scandinavian and English.

Christianity and foreign culture, which in different ways have been equally destructive in their effects upon ancient national poetry, were introduced into the Scandinavian countries much later than into Germany and England. In the Scandinavian countries, too, the peasantry long maintained a much higher position. They were not an oppressed and ignorant class, but free men, who shared fully in the indigenous culture, and so were well fitted to keep and transmit their poetical heritage. While, therefore, the heroic ballads of Germany and England have been lost—those of England utterly, those of Germany being preserved only in epic conglomerates like the Nibelungenlied—and while the mythical cycle in both countries is but feebly, if at all, represented, Scandinavia has kept a great deal of both. The story of Thor's Hammer forms the subject of a ballad still known in all the Scandinavian countries; a volume of ballads concerning Sigurd has been gathered from tradition in the Faroe Isles within this century, and several ballads of this cycle and of that of Dietrich of Bern are found in Danish manuscript ballad-books. Svend Grundtvig, the editor of the still unfinished but truly magnificent collection of the old Danish ballads, has arranged them in four classes: first, the Heroic; second, the Trylleviser, or ballads of giants, dwarfs, nixes, elves, mountain spirits, enchantment, spells, and ghosts; third, the Historic; and fourth, ballads of Chivalry. The historic ballads (intending their original, not their actual, form) mostly fall within the period from 1150 to 1300; the chivalrous are later, and the two other classes belong to a still earlier term, which may extend over the first half of the twelfth century, and into, or perhaps through, the eleventh; that is, to the epoch of the introduction of Christianity. Ballads are best preserved by oral tradition in Norway and the Faroe Isles, but not at all, there, in old manuscripts: Sweden has a few manuscripts, and Denmark a great number, written mostly by noble ladies living on their estates, and giving the ballads as they were sung three or four hundred years ago, as well in the lord's castle as in the peasant's hut. The Danish ballads were collected in a printed form earlier than any others except the Spanish. Vedel published a hundred in 1591; another collection, called Tragica, or old Danish historic love-ballads, appeared at Copenhagen in 1657; and in 1695 Syv republished Vedel's ballads, with the addition of another hundred.

The English have preserved but a moderate number of very early ballads, and the date of many of these it is impossible to fix. There are some narrative poems in Anglo-Saxon which, without stretch of language, might be called ballads. The Norman Conquest, and the predominance of the French language for more than two hundred years, had of course momentous literary consequences, but there is no reason why the production of the native ballad should have stopped. The story of the Saxon outlaw Hereward, which begins with the second year after the Conquest, and has been handed down to us in Latin prose of the twelfth century, is full of such adventures as form the themes of ballads, and very likely was made up from popular songs. Such ballads, if they existed, are lost, but ballads concerning outlaws are among the earliest and best ones of the English. In place of Hereward of the Conqueror's time, and Fulk Fitz-Warin of John's time (whose history was also extremely popular), we have Robin Hood of uncertain time. Songs of Robin Hood and of Randolph, earl of Chester (probably the third earl, who died in 1232), we know, from Piers Ploughman, were current among the lower orders at the middle of the fourteenth century, and one Robin Hood ballad exists in a manuscript which may be as old as the first quarter of the next century. Another occurs in a manuscript dated at about 1500, others in the Percy manuscript. The Little Gest of Robin Hood, which is a miniature epic made up of half a dozen ballads, was printed by Wynken de Worde, "probably," says Ritson, "in 1489." We may reasonably place the origin of the Robin Hood ballads as early as the thirteenth century. To the thirteenth century may belong Hugh of Lincoln, which is founded on an incident that occurred in 1255. An Anglo-Norman ballad on the same subject twice refers to a King Henry, and is therefore put within the reign of Henry III., which ended 1276. Sir Patrick Spens, if the occasion of the ballad has been rightly understood, dates from 1281. After this there are only one or two ballads with dates till we come to the Battle of Otterbourn, 1388, from which time we have a succession of ballads founded on ascertained events, down to the middle of the eighteenth century. Ballads like those of Grundtvig's second class exist in a small number; one of them in a manuscript of the middle of the fifteenth century. The little that we have of ballads of the Arthur cycle, and many of the best of all kinds, we owe to the Percy manuscript, written just before 1650. A few ballads besides those named have been gleaned from manuscripts and early prints, but a large part of our whole stock has been recovered within the last hundred years from the oral tradition of Scotland. The first impulse to the collecting of this poetry was given by the publication of Percy's "Reliques" in 1765. The "Reliques" inspired Bürger and Herder, through whom, and especially through Herder's "Volkslieder" (1778–79), that interest in the literature of the people was awakened in Germany which has spread over the whole of Europe, and has led to the collecting and study of the traditional songs and tales of all the European, and some of the Asiatic, African, and American races.

The Spanish alone of the Latin nations can boast a ballad poetry of great compass and antiquity. Following the law of analogy where documents are wanting, the origin of these ballads would be put between the years 1000 and 1200, the period when the Spanish nationality and language had been developed to that degree which invariably incites and leads to expression in epic song. Some sort of popular poetry about the Cid (whose time is 1040–99) is known to have been sung as early as 1147; the poem of the Cid itself is placed about 1200. During the century that follows we find occasional mention of ballad-singers, but no ballads. As in Germany, the popular poetry, after the first bloom of the national genius, was supplanted by art-poetry, among the higher classes, and it passed out of notice for two or three hundred years. A reaction set in in the sixteenth century. This was the glorious period of Spanish history, and the return to the national poetry was a natural consequence of the powerful stirring of the national mind. Omitting "flying leaves" or broadsides, and a few ballads in the "Cancionero General" of 1511, the earliest collection of Spanish ballads is an undated "Cancionero de Romances," printed at Antwerp about 1546; and this, it must be observed, is the first ballad-book printed in any language, and was gathered in part from the memory of the people. Other similar collections followed, from which was made in 1600 the great "Romancero General." Towards the end of the seventeenth century the national ballads declined in favor, with a decline of national spirit, but since the beginning of the present century they have been restored to a high estimation at home, and have gained the admiration of the world. The oldest ballads are those which relate to the history and traditions of Spain, and recount the exploits of Bernardo del Carpio, Fernan Gonzalez, the Seven Lords of Lara, and the Cid. Then comes a variety of romantic and chivalrous ballads, and then ballads of the Carlovingian cycle. These oldest and most characteristic of the Spanish ballads have been excellently edited by Wolf and Hofmann, and the entire body of this literature, amounting to more than 1900 pieces, is included in the "Romancero General," edited by Duran in 1849–51, a work which surpasses every other in the same line, except the Danish collection of Grundtvig. The collections of ballads in the other Latin languages will be found below. The most important are the Portuguese "Romanceiro," by Almeida-Garrett, 1863; the Piedmontese ballads, by Nigra, 1858–63, and the "Songs and Tales of the Italian People," by Comparetti and D'Ancona, begun in 1870, both first-rate works; Arbaud's, Puymaigre's, and Bujeaud's French collections.

The ballads of other European nations are scarcely less interesting than those which have been noticed, and those of races which possess little or no other literature are peculiarly instructive, by reason of the light which they throw on the history of national poetry; for instance, the songs of the Slavic races, and, most of all, of the Servians. The Slavic songs as a class are distinguished from the Teutonic by the absence of the sentiment of *romantic* love and of *chivalrous* heroism. In their form, too, they are much less dramatic, and even the division of epic from lyric songs is not easy. Many songs begin with a few narrative verses, and then become entirely lyric, and the narrative part is almost always descriptive. The Servians—especially those of Turkish Servia, Bosnia, and Montenegro, who have not been much affected by civilization—afford a capital example of a race that has not outlived the ballad era. Vuk has collected five or six hundred of their songs, one third of them epic, and every one of them from the mouths of the people. A few of these are, in their actual form, as old as the fifteenth century, some belong to a remoter time, and indeed many retain marks of an ante-Christian origin. So far, the Servians are like the German nations: the distinction is that the fountain of popular poetry still flows, and that heroic poems have been produced among the Servians in this century which are essentially similar to the older ones, and not at all inferior. We find the national poetry, there, in a condition closely resembling that in which it was among the races of Northern and Eastern Europe many hundred years ago. New songs appear with new occasions, but do not supersede the ancient ones. The heroic ballads are chanted at taverns, in the public squares, in the halls of chiefs, to the accompaniment of a simple instrument. Sometimes they are only recited, and in this way are taught by the old to the young. All classes know them: the peasant, the merchant, the hayduk (the klepht of the modern Greek, a sort of Robin Hood), as well as the professional bard. No class scorns to sing them—not even the clergy or the chiefs.

One or two general remarks are required to prevent misconceptions and to supply omissions. From what has been said, it may be seen or inferred that the popular ballad is not originally the product or the property of the lower orders of the people. Nothing, in fact, is more obvious than that many of the ballads of the now most refined nations had their origin in that class whose acts and fortunes they depict—the upper class—though the growth of civilization has driven them from the memory of the highly-polished and instructed, and has left them as an exclusive possession to the uneducated. The genuine popular ballad had its rise in a time when the distinctions since brought about by education and other circumstances had practically no existence. The vulgar ballads of our day, the “broadsides” which were printed in such huge numbers in England and elsewhere in the sixteenth century or later, belong to a different genus; they are products of a low kind of *art*, and most of them are, from a literary point of view, thoroughly despicable and worthless.

Next it must be observed that ballads which have been handed down by long-repeated tradition have always departed considerably from their original form. If the transmission has been purely through the mouths of unlearned people, there is less probability of wilful change, but once in the hands of professional singers, there is no amount of change which they may not undergo. Last of all comes the modern editor, whose so-called improvements are more to be feared than the mischances of a thousand years. A very old ballad will often be found to have resolved itself in the course of what may be called its propagation into several distinct shapes, and each of these again to have received distinct modifications. When the fashion of verse has altered, we shall find a change of form as great as that in the Hildebrandslied, from alliteration without stanza to stanza with rhyme. In all cases the language drifts insensibly from ancient forms, though not at the same rate with the language of every-day life. The professional ballad-singer or minstrel, whose sole object is to please the audience before him, will alter, omit, or add, without scruple, and nothing is more common than to find different ballads blended together.

There remains the very curious question of the origin of the resemblances which are found in the ballads of different nations, the recurrence of the same incidents or even of the same story, among races distinct in blood and history, and geographically far separated. The Scottish ballad of May Colvin, for instance—the German Ulinger—is also found in the Swedish, Dutch, Spanish, Portuguese, Italian, French, Servian, Bohemian, Wendish, Esthonian, Breton, and perhaps other languages. Some have thought that to explain this phenomenon we must go back almost to the cradle of mankind, to a primeval common ancestry of all or most of the nations among whom it appears. But so august an hypothesis is scarcely necessary. The incidents of many ballads are such as might occur anywhere and at any time; and with regard to agreements that cannot be explained in this way, we have only to remember that tales and songs were the chief social amusement of all classes of people in all the nations of Europe during the Middle Ages, and that new stories would be eagerly sought for by those whose business it was to furnish this amusement, and be rapidly spread among the fraternity. A great effect was undoubtedly produced by the Crusades, which both brought the chief European nations into closer intercourse and made them acquainted with the East, thus facilitating the interchange of stories and greatly enlarging the stock.

The most important collections of ballads are—

English.—“Reliques of Ancient English Poetry,” by Thomas Percy, fourth improved ed., London, 1794, and often since; “Ancient and Modern Scottish Songs,” by David Herd, second ed., 2 vols., Edinburgh, 1776; “Minstrelsy of the Scottish Border,” by Sir Walter Scott, 3 vols., Edinburgh, 1802–3, and often since; “Popular Ballads and Songs,” by Robert Jamieson, 2 vols., Edinburgh, 1806; “Ancient Scottish Ballads,” by George R. Kinloch, Edinburgh, 1827; “Minstrelsy, Ancient and Modern,” by William Motherwell, Glasgow, 1827; “English and Scottish Ballads,” by F. J. Child, 8 vols., Boston, 1860, which contains all but two or three of the ancient ballads, and a full list of collections; “Bishop Percy's Folio Manuscript,” by J. W. Hales and F. J. Furnivall, 3 vols., London, 1867–68.

Scandinavian.—“Danmarks Gamle Folkeviser” (“The Ancient Ballads of Denmark”), by Svend Grundtvig, 3 vols., and part of a fourth, Copenhagen, 1853–72—by far the greatest work in this class of literature; “Ancient Danish Ballads,” translated from the originals by R. C. Alex. Prior, 3 vols., London, 1860; “Norske Folkeviser” (“Norwegian Ballads”), by M. B. Landstad, Christiania, 1853; “Gamle Norske Folkeviser” (“Ancient Norwegian Ballads”), by Sophus Bugge, Christiania, 1858; “Svenska Folk-Visor” (“Swedish Ballads”), by Geijer and Afzelius, 3 vols., Stockholm, 1814–16; “Svenska Fornsånger,” by A. I. Arwidsson, 3 vols., Stockholm, 1834–42; Rosa Warren's “Dänische Volkslieder,” Hamburg, 1858, “Norwegische, etc. Volkslieder,” Hamburg, 1866, “Schwedische Volkslieder,” Hamburg, 1857; “Færöiske Kvæder” (“Ballads of the Faroe Isles”), by V. U. Hammershaimb, 2 parts, Copenhagen, 1851–55; “Islenzk Fornkvæði,” by Grundtvig and Sigurðsson, 3 parts, Copenhagen, 1854–59.

High German.—“Des Knaben Wunderhorn,” Arnim and Brentano, 3 vols., Heidelberg, 1806–08, 4 vols., Berlin, 1853–54; “Alte teutsche Volkslieder in der Mundart des Kuhländchens,” Vienna and Hamburg, 1817; “Oesterreichische Volkslieder,” Ziska and Schottky, Pesth, 1819; “Die Volkslieder der Deutschen,” F. K. von Erlach, 5 vols., Mannheim, 1834–36; “Schlesische Volkslieder,” Hoffmann von Fallersleben and Richter, Leipsic, 1842; “Alte hoch- und nieder-deutsche Volkslieder,” L. Uhland, 2 vols., Stuttgart, 1844–45; “Deutsche Volkslieder,” F. L. Mittler, Marburg and Leipsic, 1855; “Fränkische Volkslieder,” F. M. von Ditfurth, 2 parts, Leipsic, 1855; “Deutscher Liederhort,” L. Erk, Berlin, 1856; “Die historischen Volkslieder der Deutschen,” R. von Liliencron, 4 vols., Leipsic, 1865–69.

Low-German, Netherlandish.—“Letterkundig overzigt en proeven van de Nederlandsche Volkszangen,” J. C. W. le Jeune, Amsterdam, 1828; Uhland, as before; “Oude Vlaemsche Liederen,” J. F. Willems, Ghent, 1848; “Niederländsche Volkslieder,” Hoffmann von Fallersleben, second ed., Hannover, 1856; “Chants Populaires des Flamands de France,” E. de Coussemaker, Ghent, 1856.

Spanish and Portuguese.—“Tesoro de los Romanceros,” etc., Eug. de Ochoa, Paris, 1838, Barcelona, 1840; “Romancero Castellano,” G. B. Depping and A. A. Galiano, 2 vols., Leipsic, 1844; “Romancero General” (vols. x. and xvi. of “Biblioteca de autores Españoles”), Madrid, 1849–51; “Observaciones sobra la poesia popular,” etc., M. Milá y Fontanals, Barcelona, 1853; “Primavera y Flor de Romances,” F. J. Wolf and C. Hoffmann, 2 vols., Berlin, 1856; “Romanzen Asturiens,” u. s. w., José Amador de los Rios, in “Jahrbuch für romanische- u. englische Literatur,” iii. 268, 1861; “Cancionero Popular,” E. Lafuente y Alcantara, 2 vols., Madrid, 1866; “Cansons de la Terra, Cants populars Catalans,” F. Pelay Bríz y Candi Candi, 3 vols., Barcelona, 1866–71; “Romanceiro,” Almeida-Garrett, 3 vols., Lisbon, 1863; Th. Braga, “Cancioneiro Popular,” Coimbra, 1867; “Romanceiro Geral,” Coimbra, 1867; “Cantos Populares do Archipelago Açoriano,” Porto, 1869; “Ancient Spanish Ballads,” J. G. Lockhart, London, 1823; “Portugiesische Volkslieder u. Romanzen,” C. F. Bellermann, Leipsic, 1864; “Romanzero der Spanier u. Portugieser,” Stuttgart, 1866.

Italian.—“Canti popolari Toscani, Corsi, Illirici, Greci,” N. Tommaséo, 4 vols., Venice, 1841–42, second ed. of vol. i., 1848; “Canti pop. inediti Umbri, etc.,” O. Marcoaldi, Genoa, 1856; “Canzoni pop. del Piemonte,” C. Nigra in the “Rivista Contemporanea” of Turin, 1858–63; “Saggio di canti pop. Veronesi,” E. S. Righi, Verona, 1863; “Volkslieder aus Venetien, gesammelt von G. Widter,” 1864; “Canti pop. Siciliani,” G. Pitrè, vol. i., Palermo, 1870, vol. ii., 1871; “Canti e Racconti del Popolo Italiano,” D. Comparetti and A. d'Ancona, Turin and Florence, vol. i., 1870; vol. ii., 1871; vol. iii., 1872.

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Ballanche (Pierre Simon), a French social reformer, born at Lyons Aug. 4, 1776. He published "Antigone," an historical novel (1814), and "The Man Without a Name" (1820). He became a member of the French Academy in 1842, and was a friend of Chateaubriand and Madame Récamier. Among his works are an "Essay on Social Palingenesis" and "The Vision of Hebal." His philosophy is abstruse and mystical, but he is regarded as a profound thinker by some French critics. Died June 12, 1847. (See L. de Loménie, "M. Ballanche, par un homme de rien," 1841; J. J. Ampère, "Ballanche," 1849; Albert Aubert, "P. S. Ballanche," 1847.)

Bal'larat, an Australian city and gold-field in Victoria, 75 miles W. N. W. of Melbourne. The gold-mines of this place, which were opened in 1851, are among the richest in the colony of Victoria. Ballarat is unrivalled in the fineness of its gold, which averages twenty-three and a half carats, the pure metal being twenty-four carats. Pop. in 1881, including Ballarat East and Sebastopol, 39,758.

Bal'lard (Edward), D. D., born at Hopkinton, N. H., in 1805; became a school-teacher and secretary of the New Hampshire Historical Society; was rector of St. Paul's church, Brunswick, Me., was proficient in Indian languages and the early history of Me., and contributed to the Me. Historical Society collections. Died Nov. 14, 1870.

Bal'lard (Henry E.), born in Maryland in 1785, was son of Major Ballard of the army of the American Revolution; became midshipman in the U. S. navy Nov. 2, 1804, and captain Mar. 3, 1825. Died May 23, 1855.

Bal'last [probably derived from *beal*, "sand," and the Ger. *last*, a "load;" Fr. *lest*], stone, sand, or other heavy substance which is placed in the bottom of a ship when her cargo is too light to give her sufficient hold of the water and enable her to carry sail without danger of being upset. A vessel which does not carry enough ballast is said to be too crank. This condition renders her unsteady and topheavy. Iron, stone, and water are the principal substances used for ballast. Iron has the great advantage of taking up but little space. Water-ballast is sometimes contained in waterproof bags, or is confined beneath a false bottom in the vessel. A ship is said to be "in ballast" when she carries no cargo except the ballast, passengers, and the baggage and provisions of the passengers and crew. Balloons generally take up a quantity of sand as ballast, in order that the aëronaut may be able, by throwing it out, to increase the buoyancy of the balloon or arrest its too rapid descent. The term ballast is also applied to the broken stone or gravel which is laid as a packing between railway sleepers in order to give them solidity and prevent the rise of dust.

Ballet, bȧ′lā′, a French word signifying a dramatic or theatrical exhibition of dancing and pantomime, with music; a species of dance usually forming an interlude in theatrical performances, but confined principally to operas. The ballet has some resemblance to the pantomimic sacrificial dances of the ancient Greeks, among whom were dancers who expressed actions and passions by rhythm applied to gesture. The ballet was introduced into France under the auspices of Catharine de' Médici about 1580. Noverre about 1770 made improvements in it, to which he gave an independent dramatic form. The Vestris family were celebrated as performers in ballets. In recent times the public favor is almost exclusively bestowed on female dancers. The ballet has degenerated in many respects of late years.

Ballina′, a market-town and seaport of Ireland, partly in Mayo and partly in Sligo counties, and on the river Moy, 7 miles from its entrance into Killala Bay, and 18 miles N. N. E. of Castlebar. The part of the town on the E. bank of the Moy is called Ardnaree. Ballina has manufactures of coarse linens and snuff; also an active trade in fish, provisions, etc. Pop. 5551.

Balliol. See BALIOL.

Ballis′ta, or **Balis′ta** [from the Gr. βάλλω, to "throw"], a military engine used before the invention of gunpowder to propel large stones or other heavy missiles. It probably originated with the ancient Romans, who used it in the siege and defence of fortified places. The construction of the ballista is not well understood. It appears that the elastic force with which a twisted rope uncoils itself was commonly used as the propelling power, with which other forces were perhaps combined. (For a vivid picture of the *effects* of the ballista see LUCAN'S "Pharsalia," lib. iii., l. 465 *et seq.*)

Ballis′tic Pen′dulum, an instrument used to ascertain the velocity of projectiles and to prove the quality of gunpowder. In its simplest form it consists of a large block of wood suspended, so as to turn very easily, before the mouth of the cannon, and having some means of measuring the angle through which the beam oscillates. When the magnitude of this angle (produced by the shot lodging in the mass) is known, together with the centres of suspension and oscillation of the mass, the velocity of the shot can be determined by calculation. The gun itself is also made a ballistic pendulum, being suspended, and its recoil observed. But these contrivances are both long since superseded by the several forms of electro-ballistic pendulums.

Bal′lium, or **Bai′ley,** the central part of the old Norman castle, sometimes called the donjon, or the whole space enclosed within the external walls of a castle except that covered by the keep. The ballium was often very large, and contained barracks for soldiers, lodgings for workmen, magazines, chapels, and sometimes a monastery. The walls of the lower stories were of great thickness. The entrance to the ballium was generally by a drawbridge over the ditch.

Balloon. See AËRONAUTICS, by GEN. J. G. BARNARD.

Balloon-fish, a name applied to marine fishes of the families Tetrodontidæ, Diodontidæ, and Triodontidæ. They are named from the power which they possess of inflating themselves with air. Many species are known, of which several are American. Our *Diodons* are all small.

Bal′lot [Fr. *ballotte*], originally a little ball used in secret voting. In modern times it is applied to the ticket or printed paper which the voter uses at an election, and the practice of secret voting is called "voting by ballot." The tickets are deposited in a wooden box called the ballot-box. The system of voting by ballot prevails in France and the U. S. The other mode of voting is called *vivâ voce* ("by the living voice"). The ancient Greeks elected their magistrates or decided political questions by secret vote, for which purpose they used beans of different colors. The English elections were conducted *vivâ voce.* The adoption of the ballot has for many years been advocated by the British radicals and advanced liberals. In 1871 the House of Commons, after a long contest, decided in favor of the ballot, but the House of Lords rejected the bill. In 1872 the Ballot act was passed by both houses, and at present all members of Parliament are chosen by ballot. In the election of members of social clubs ballots or balls are commonly used. A person who is rejected on such occasions is said to be *black-balled,* black balls being used by those who vote in the negative.

Ballou′ (HOSEA), one of the fathers of the Universalist denomination in the U. S., was born at Richmond, N. H., April 30, 1771. His early education was acquired by his own efforts, though he had to contend with unusual obstacles. He began to preach when about twenty-one years of age, and labored in various places in New England. In 1807 he settled in Portsmouth, N. H., in 1815 in Salem, Mass., and in 1817 in Boston. In 1819 he became editor of the "Universalist Magazine," and in 1831–32 was connected with the "Expositor." Died June 7, 1852. Among his works are "Notes on the Parables" (1804), and an "Examination of the Doctrine of a Future Retribution" (1846). (See his "Life" by M. M. BALLOU, and another by T. WHITTEMORE, 1854.)

Ballou (HOSEA, second), D. D., was born in Halifax, Vt., Oct. 18, 1796. He was a nephew of the foregoing. He entered the Universalist ministry in his youth, and preached at Stafford, Conn., and Roxbury and Medford, Mass. In 1822 became an editor of the "Universalist Magazine," and was long connected with various journals of his denomination. He displayed much ability as editor of the "Universalist Quarterly." He was (1853–61) the first president of Tufts College. He published "Ancient History of Universalism" (1829) and a hymn-book (1837). Died May 27, 1861.

Ballou (MATURIN M.), a son of Rev. Hosea Ballou, born in Boston, Mass., in 1822, has edited "Ballou's Pictorial," "The Flag of our Union," "Ballou's Monthly," and other periodicals, and has published a "History of Cuba" (1854), "Biography of Hosea Ballou," "Life-work of Hosea Ballou," and a valuable compilation of quotations from a great number of writers. He became in 1872 one of the founders and the editor-in-chief of the "Boston Globe," a daily newspaper. Author of "Due South; or, Cuba, Past and Present" (1885).

Ballou (SULLIVAN), an American lawyer and officer of volunteers, born at Smithfield, R. I., Mar. 28, 1829, educated at Brown University, studied law at Ballston, and was admitted to the bar in 1853, clerk of the house of representatives of his native State 1854–56, and speaker 1857. He entered the army on the outbreak of the late war, and was engaged at the battle of Bull Run, July 21, 1861, where he was killed, thus ending a life marked by uncommon ability; and his military career, though brief, was distinguished by conspicuous gallantry and patriotism.

Ball's Bluff, Loudon co., Va., on the right bank of the Potomac, about 33 miles N. W. of Washington. The bank here rises about 150 feet above the level of the river. It was the scene of a disastrous defeat of the U. S. forces under Col. E. D. Baker, Oct. 21, 1861. The hostile forces of the North and South had for several months confronted each other on opposite banks of the Potomac. On the 19th and 20th of October reconnoissances were made in the direction of Dranesville and Leesburg by the Federal forces under Gen. McCall, without encountering any opposition. Gen. McClellan being anxious to ascertain the strength of the Confederates in these positions, on Oct. 20 (10½ P. M.), instructions were sent to Gen. Stone at Poolesville, Md., directing him to keep a good lookout on Leesburg, to note the effect of this movement, and adding that "perhaps a slight demonstration on your (Stone's) part might have the effect to move them." Accordingly, Gen. Stone ordered the Fifteenth Massachusetts, Col. Devens, to be moved to Harrison's Island in the Potomac, opposite the bluff, and about 100 yards distant from the Virginia shore; which was promptly effected in flatboats. At dark Devens sent a detachment of fifteen men under Capt. Philbrick to the Virginia shore, to ascertain the whereabouts of the Confederates. After ascending the bluff they had proceeded but a short distance when they discovered what was supposed to be a camp, apparently but poorly guarded, which situation Philbrick reported to Col. Devens on his return. Devens forwarded this report to Gen. Stone, who immediately issued an order directing Col. Devens to land with five companies of his regiment and proceed to surprise the discovered camp at daybreak, and, after having accomplished this, to pursue as far as he deemed prudent, destroy the camp, and return to his position on the island, unless he saw a favorable position on the Virginia side which he could hold until reinforced. At the same time Col. Lee (Twentieth Massachusetts) was ordered to occupy Harrison's Island with his regiment, and to throw one company across to the heights on the Virginia shore to cover Col. Devens's return. These orders were carried into effect, and at daylight Devens advanced only to find the reported camp to be, in fact, no camp, the detachment of the night before having been deceived in the moonlight, and mistaken the openings between the trees for tents. Col. Devens, however, advanced to within a mile of Leesburg, where he halted and, concealing his force in the woods, reported to Gen. Stone that he had met with no opposition, and asking for further orders. About 7 A. M. a body of Confederates appeared, but retired when approached, and cavalry were also seen on the Leesburg road; whereupon Col. Devens fell back to the bluff without interference, and reported to Gen. Stone, who directed him to remain, and that he would be reinforced. At this time his force of officers and men was about 650. The position he had taken up was surrounded on three sides by woods, and here about noon he was attacked, and fell back to a more secure position; being again attacked, he retired still farther, to the edge of the bluff, where he was reinforced by Col. Baker with his regiment of First California Volunteers, and who by seniority of rank took command. Col. Baker's instructions were discretionary whether to remain or withdraw, but on finding an attack already commenced he decided to remain. The force at his command amounted to about 1900 men; the Confederate force in the woods was reported at 1700, not including, however, a regiment of Mississippi volunteers so stationed as to prevent succor to Col. Baker from Edwards's Ferry. Col. Baker had no more than disposed his men in line when he received a vigorous attack on his right, extending soon to his left and centre. For two hours a desperate conflict was maintained, the Federals from their exposed position suffering by far the heaviest loss. Col. Baker, who displayed the greatest bravery, was killed about five o'clock, and the command devolved upon Col. Cogswell (New York Tammany Regiment). The severe fire to which the Federal troops had been subjected, and the fearful loss they had sustained, caused them to waver, and the only hope that appeared to be left was to endeavor to join Gen. Stone, who was known to have a strong force at Edwards's Ferry, about two miles away; but this movement was met by a body of fresh Mississippi infantry, and under their attack the disheartened and reduced troops were routed, and, flying in great disorder down the bluff, were subjected to a galling fire from all directions. The boats to which they fled were upset or sunk by the Confederates' fire, and the few that escaped either swam out into the stream or concealed themselves along the banks of the river, reaching the Federal lines under cover of the darkness. In the mean time, Gen. Stone had ordered an advance across Edwards's Ferry to their assistance, but as they did not arrive on the field, they furnished no aid. The Federal loss in killed, drowned and wounded exceeded, probably, 1000 men; Gen. Evans, in command of the Confederate forces, reported his loss at 155. Much blame was attached to Col. Baker for recklessness, and Gen. Stone was subsequently arrested and confined in Fort La Fayette in New York harbor, but was afterwards discharged, and at a later period again given a command.

Ballston Spa, sometimes called simply **Ballston,** on R. R., capital of Saratoga co., N. Y. (see map of New York, ref. 4–J, for location of county), 6 miles S. W. of Saratoga Springs. Here are mineral springs, which rise from the lower part of the Hudson River (Silurian) shales, and rank among the best acidulous chalybeate springs in the U. S. The village has several manufactories. Pop. in 1870, 2970; in 1880, 3011.

Bally. See Ball.

Bally, a Celtic word or prefix signifying "town" or "dwelling," enters into the composition of the names of a great number of places in Ireland and Scotland.

Ballyett (Emanuel), born at Marny in 1700, was a French antiquary. He became a member of the order of Barefooted Carmelites, was afterwards bishop of Babylon (Bagdad), and made a fine collection of medals. Died 1773.

Ballyme'na, a market-town of Ireland, in the county of Antrim, on the river Braid, 2 miles above its junction with the Maine and 33 miles by rail N. N. W. of Belfast. It has large public schools, a cotton-spinning mill, and extensive bleaching-grounds, and is one of the greatest linen and flax markets in Ireland. Pop. 6774.

Ballyshan'non, a seaport-town of Ireland, in the county of Donegal, on the river Erne at its entrance into Donegal Bay, 120 miles N. W. of Dublin. A bridge of fourteen arches here crosses the Erne. It has about six churches and chapels. Here is a valuable salmon-fishery in the Erne. Pop. 6739.

Balm (*Melis'sa officina'lis*), a perennial herbaceous plant of the natural order Labiatæ, a native of the south of Europe, is cultivated in American gardens, and prized for its lemon-scented leaves. The leaves, which are ovate and crenate, and the stem, are occasionally used in medicine as a gentle aromatic, stimulant, and tonic. Its properties depend on an essential oil called oil of balm. An infusion of balm is an excellent beverage in febrile diseases.

Balmacz-Ujvaros, a market-town of Hungary, in the county of Szabolcs, 14 miles N. W. of Debreczin. Pop. in 1880, 9861.

Bal'més (Jayme Lucio), a Spanish Catholic priest, born at Vich, in Catalonia, Aug. 28, 1810. He was a remarkably precocious scholar. He wrote in reply to Guizot an able work entitled "Protestantism Compared with Catholicism in its Relations to European Civilization" (3 vols., 1848), which was translated into English, French, Italian, and German. Among his other works is "Filosofia Fundamental," which was translated into English by H. F. Brownson, New York, 1857. Died July 9, 1848. (See Antonio Soler, "Biografia de D. J. Balmés," 1850; Garcia de los Santos, "Vida de Balmés," 1848; Blanche-Roffin, "J. Balmés, sa Vie et ses Ouvrages," 1849.)

Balm of Gilead. See Balsam; Gilead, Balm of.

Balmor'al Castle, the autumnal residence of Queen Victoria, is in a beautiful valley in Aberdeenshire, Scotland, on the river Dee, 48 miles W. S. W. of Aberdeen. It commands a magnificent prospect and comprises 40,000 acres of beautiful grounds. Prince Albert purchased this estate in 1852 for £32,000, and erected a granite castle in the Scottish baronial style. It consists of two blocks of buildings united by wings, and a massive tower thirty-five feet square, rising to the height of eighty feet, and surmounted by a turret twenty feet high.

Balna'ves, or **Balnavis** (Henry), **of Halhill,** an eminent Scottish Reformer and writer, born in Fifeshire in 1520. He studied law, and became secretary of state in 1543. In 1547 he, with other Protestants, took refuge in the castle of St. Andrew's, and was declared a traitor. The castle was captured by the French, who took him, with Knox, to Rouen as prisoner. While in prison he wrote a "Confession of Faith." He returned to Scotland in 1554. Died in 1570.

Bal'sam [Lat. *bal'samum;* Gr. βάλσαμον], a name including in popular language many resinous substances and oils to which great medicinal virtues are ascribed; also certain medicines compounded of resins and oils. The name was originally limited to a single substance, the balm of Gilead, Mecca balsam, or balsam of Judea. Balsams are natural mixtures of resins and essential oils, the resins originating from the oxidation of the oils. They are viscid, aromatic liquids, varying greatly in consistence. They are of two kinds: (1) the simple oleo-resins, as crude turpentine, Canada balsam, Copaiba balsam, Mecca balsam, etc.; (2) balsams containing, besides oil and resin, the fragrant cinnamic acid, as liquidamber, Peru and Tolu balsams, storax, etc. (For further details see each of the above.) Certain pharmaceutical preparations were once called balsams, as *balsamum opodeldoc*, an alcoholic soap solution containing ammonia; *balsamum arcæi,* a salve containing elemi gum; *balsamum sulphuris,* a solution of sulphur in linseed oil.

Balsam, Canada, the thick, terebinthine sap of *Abies balsamea,* which collects in blisters beneath the epidermis on the trunks of young trees. These blisters are punctured, and the balsam gathered as an article of commerce. It is used in medicine, for varnishes, for mounting microscopic objects, etc. *Abies grandis* of the W. coast furnishes a similar fluid.

Balsam'ina, a genus of herbaceous plants of the order Balsaminaceæ, includes numerous species which are natives of the East Indies, and are mostly annuals. The *Balsamina hortensis* (or *Impatiens balsamina*), commonly called balsam, is a favorite garden flower in the U. S., with unsymmetrical corollas finely variegated with white, pink, red, and purple. It has five stamens, and a capsule of five valves, remarkable for the elastic force with which it bursts. The term *balsam* is also applied to the *Impatiens noli-me-tangere,* a native of Europe, and two species of *Impatiens* which grow wild in the U. S.

Balsamina'ceæ, or **Balsamin'eæ** (so called from *Balsamina,* its principal genus), a natural order of succulent herbaceous plants, natives of the East Indies, Europe, China, and America. By Jussieu, Asa Gray, and others it is regarded as a sub-order of the Geraniaceæ (geranium family).

Bal'ta, a well-built town of Russian Poland, in Podolia, on the Kodema River, 132 miles E. S. E. of Kamieniec. It has over twenty factories of candles, soap, etc., and has an extensive trade in cattle, horses, hides, wool, and grain. Pop. in 1882, 18,842.

Balt'ia, the **Basili'a** of Pytheas, was, according to an ancient geographical tradition which has come down to us through Pliny, the name of a great island situated at a distance of three days' sail from the coast of Scythia. The name has some interest as showing the origin of the term *Baltic*. This latter term is not found either in the German or in any of the Scandinavian languages; the Baltic is there invariably called the East Sea. It is of Slavic or Lithuanian origin, and it is, for the understanding of ancient geography, of importance to know that both terms were in use from the very earliest days. It has not been possible, however, to identify the Baltia with any place of Northern Europe. To suppose it the name of the *Belt* between Sealand and Fünen is an untenable conjecture.

Bal'tic, or **Baltic Sea** [Ger. *Ostsee*; Lat. *Mare Balticum** and *Si'nus Coda'nus*], an inland sea or gulf of Northern Europe, is situated between Russia, Sweden, Germany, and Denmark, and connects with the German Ocean and the Cattegat by the Sound and the Great and Little Belts. It is 830 miles long. Its greatest width is 420 miles, and the area 154,570 square miles. On account of the small proportion of salt it contains (not over 2 per cent.), the Baltic freezes much more easily and early than the ocean. It is not affected by the tide. The numerous sand-banks and islands, and the violent storms with sudden changes of wind, render the navigation of the Baltic dangerous. It receives several large rivers—namely, the Oder, Vistula, Niemen, Düna, Narva, Neva, Torneå, Dal, etc. No sea has in proportion to its size so great an influx of fresh water. The largest islands in the Baltic are Seeland, Gothland, Rügen, Bornholm, and Oesel. The chief ports are St. Petersburg, Riga, Dantzig, Stralsund, Königsberg, Stockholm, and Copenhagen. A remarkable phenomenon connected with this sea is the slow and gradual rising of its shore in Sweden.

Bal'tic Ques'tion, the name given to the controversy between the Russian government and the Baltic provinces of Courland, Esthonia, and Livonia. These countries, which never stood in the relation of conquered provinces to Russia, were promised by Peter the Great the maintenance of their German administration and security for freedom of conscience. These rights and privileges were confirmed by Alexander II. in Feb., 1856, but the actions of the government appear to have contradicted these professions.

Baltimore, the chief city of Md., an important R.R., and commercial centre (see map of Maryland, ref. 2–F, for location), is in 39° 17′ N. lat. and 0° 26′ E. lon. (76° 37′ 30″ W. from Greenwich), at head of tide-water and navigation on Patapsco River, about 14 miles from Chesapeake Bay, and nearly 200 from the ocean by ship-channel. The Patapsco to this point is a broad estuary; above, a small and swift stream, furnishing water-power to many mills and manufactories. The harbor is spacious and secure, but with a depth of but little over 20 feet. Its depth is preserved and is being increased, and an improved ship-channel provided, by extensive dredging, prosecuted at the expense of the U. S., the State, and the city governments. The city covers about 10,000 acres of land, and the surface of its site was originally very hilly.

The first steps for "erecting a town" on the Patapsco, to be called Baltimore Town, were taken by a legislative act in 1729, and it was laid out in half-acre lots in 1730. In 1752 it contained 25 houses and 200 persons; in 1765 the number had increased to 50 houses. After this the growth was more rapid, and in 1775 there were 564 houses and 5934 persons. In Dec., 1776, the Continental Congress transferred its sittings from Philadelphia to Baltimore, and met here for about two months. In 1797 it was incorporated as a city. The population in 1790 was 13,503; in 1800, 26,514; in 1810, 35,583; in 1820, 62,738; in 1830, 80,625; in 1840, 102,313; in 1850, 169,054; in 1860, 212,418; in 1870, 267,354; and in 1880, 332,313.

The city is laid out, for the most part, at right angles, the streets having generally a width of about sixty feet, and the buildings are mostly built of red brick, many of them with white marble bases; granite and iron are, however, largely used in the construction of stores and warehouses, some of which are very fine. The bricks used for building are made from immense clay-beds adjacent to the city, and are of unsurpassed quality. The white marble, of excellent quality, is procured from inexhaustible quarries about 10 miles N. of the city: the granite, from quarries about 15 miles W. Shipbuilding has always been one of the leading industries of the city, and the repairs of ships are greatly facilitated by an excellent dry-dock recently constructed, capable of receiving the largest ships that can enter the harbor.

Manufactures.—By the census of 1880, Baltimore had 3683 manufactories, with $38,586,773 capital, employing 56,338 hands; wages for the year, $15,117,489; value of products, $78,417,304. There are several furnaces and foundries, producing iron in various forms from ores mined in the vicinity, one very extensive rolling-mill, several manufactories of agricultural implements, and very large machine-shops, employing many hundred hands. There are also extensive manufactories of clothing, leather, shoes, tobacco, etc., and about 100 establishments for packing oysters and fruits. This is a very important industry, and gives employment to several thousand hands, consumes from 7,000,000 to 8,000,000 bushels of oysters, gathered from the Chesapeake Bay, in a year, and during the season —Sept. 1 to Apr. 1—often sends inland, packed raw, or cooked and hermetically sealed, from 40 to 60 rail car-loads a day. These industries find their outlet both by land and water communication. There are lines of steamships to Liverpool, Bremen, Boston, Providence, Wilmington (N. C.), Charleston, Savannah, Havana, New Orleans, etc., and steamboat lines to Norfolk, Richmond, Fredericksburg, Washington, and all points on the Chesapeake Bay and its many estuaries. It has several excellent railroads, and they are rapidly mutiplying. The Baltimore and Potomac road (to Washington) passes by a tunnel 7400 feet in length under the N. W. part of the city; and the Northern Central road (to Harrisburg) reaches tide-water by a similar tunnel 3500 feet long, under the N. E. section. Besides floating elevators for the transfer of grain, reaching the market by water, the R. Rs. have at their termini six substantial elevators, with a storage capacity of 5,000,000 bushels, and others are projected.

Its sobriquet "Monumental City" was derived from the Washington Monument and Battle Monument, erected by the gratitude and patriotism of its citizens. The former, located at Mount Vernon Place, North Charles street, is a Doric shaft of white marble 180 feet high, surmounted by a statue of Washington sixteen feet high, built 1816–30. Access to the top is had by 220 winding stairs within the column. Battle Monument, in Monument Square, North Calvert street, is also of white marble, 52½ feet high. Wildey Monument on Broadway, of white marble, 52 feet high, was erected to Thomas Wildey, a citizen of Baltimore, who died in 1861, and was the founder of Odd Fellowship in America. There is also in Greenmount Cemetery a monument and statue to John McDonogh, who bequeathed to the city a large sum (amounting now to about $1,000,000) to establish the McDonogh Institute "for the education of poor children." A monument in Harlem Park to James L. Ridgely, sec. of the Sovereign Grand Lodge of Odd Fellows, was unveiled Sept. 22, 1885. Greenmount and Loudon Park are its two beautiful cemeteries, and there are several others creditable. The city has about 160 churches and 6 Jewish synagogues. The first church founded in the city was St. Paul's (Episcopal) in 1731. The first Presbyterian church was erected in 1756; the first Roman Catholic, in 1770; the first Wesleyan Methodist, in 1773; the first Baptist, in 1780; the first Friends' meeting-house, in 1781. Several of the churches are imposing and beautiful structures. Among the most noticeable are the cathedral, St. Alphonsus', and St. Martin's (Roman Catholic); Grace, St. Peter's, and Christ (Episcopal); Mount Vernon (Methodist); Westminster, Brown Memorial, and First (Presbyterian), and the Unitarian.

The water-supply of the city until 1881 was taken from Jones's Falls, about seven miles above the city, and was of good quality and ordinarily abundant. In that year a further supply was brought, at an expense of $4,000,000, from the Gunpowder River by natural flow through a tunnel of 12 feet interior diameter, 7 miles in length, with capacity for daily delivery of 170,000,000 gallons. The reservoirs upon the two supplies have a storage capacity of 2,241,000,000 gallons, the average daily flow of the streams that supply them 165,000,000 gallons, and the aqueducts leading from the storage reservoirs have a capacity for delivering in the city 200,000,000 gallons a day. This is distributed everywhere in abundance, and there are about 1000 fire-plugs for use in case of fire. The fire department is well organized, directed by a police and fire-alarm telegraph, and notably efficient. It has eight steam fire-engines and three hook-and-ladder companies.

Numerous public squares add to the beauty and healthfulness of the city. The largest of these, Patterson Park, in the N. E. section of the city, contains 54 acres. Druid Hill Park, just outside the N. W. limits of the city, contains 704 acres of ground, with fine forests, lakes, and lawns, about twenty miles of good carriage-drives, and has no superior as a pleasure-ground.

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* The name *Baltic* is supposed to be derived from the Latin *balteus*, a "belt," on account of the famous belts of this sea.

Public Buildings.—First among the public buildings should be named the new city-hall, built of white marble, occupying an entire square, and costing $3,000,000; the Maryland Institute, of brick, 355 feet long; the custom-house, 240 feet long, with a dome 115 feet high; the court-house, and Odd Fellows' Hall, all of brick; the Masonic Temple, of white marble; the U. S. court-house and the jail, both of granite, are remarkable structures. Outside of the city limits, but a part of its institutions, should be noted Bay View Asylum (city almshouse), 714 feet in length; the house of refuge, retaining about 500 juvenile delinquents; Spring Grove Asylum, a State institution for the insane, of granite, with capacity for 300 patients; the Maryland Institution for the Blind, a beautiful white marble building, where about fifty of these unfortunates are instructed; and the Sheppard Asylum (for the insane), endowed by the will of Moses Sheppard with about $1,000,000. A superb post-office building is now in process of erection by the U. S. government. The Peabody Institute of Baltimore was the recipient of over $1,000,000 from the late George Peabody. It has, in its fine white marble building by the side of the Washington Monument, a free library of 60,000 books and pamphlets, an art-gallery, musical conservatoire, rooms for lectures, concerts, etc., and is one of the most thriving of the institutions endowed by that great philanthropist which will "keep his memory green." The Hopkins Hospital has no superior in its appointments in this country—probably none anywhere. It originated in Mar., 1873, when Johns Hopkins, a merchant of the city, placed in the hands of trustees selected by him 13 acres of land in the eastern part of the city, with directions to establish thereon a free hospital for the "indigent sick of the city and its environs, without regard to sex, age, or color," guaranteeing it $100,000 a year during his life, and endowing it with $2,000,000 for its support thereafter.

Education, etc.—Johns Hopkins established by most liberal endowment the Hopkins University, which already is taking high rank among schools for advanced instruction. The general education of the city is provided for in about 125 graded public schools, in which about 40,000 pupils are taught by about 550 teachers. Loyola College, a Catholic institution under the general supervision of the Jesuits, and the seminary of St. Sulpice (St. Mary's Collage), a Catholic theological institution, are both in a flourishing condition, while the medical department of the University of Maryland takes very high rank, and the law department a respectable position among professional schools. The city has 14 national banks, 6 daily, 7 weekly, 8 monthly, and 1 semi-monthly newspaper.

In 1873, Enoch Pratt, a successful merchant of the city, established a free circulating library for the use of the citizens, which the city accepted and named the "Enoch Pratt Free Library." It has a central building on Mulberry street and four branches in the different quarters of the city. The endowment consisted of these buildings and a sum of money so invested with the city as to yield perpetually an annual income of $50,000. The other principal libraries of the city are—Peabody Institute, 81,000 books and pamphlets; Mercantile Library Association, 33,278; Maryland Institute, 15,600; Baltimore Bar Association, 7500; Young Men's Christian Association, 2500; Odd Fellows', 19,356; Maryland Historical Society, 13,366; Loyola College, 22,000. HENRY STOCKBRIDGE.

Baltimore, Lord, a title (of the Calvert family) in the Irish peerage, created in 1624 by James I., who marked his confidence in Sir George Calvert by making him, though a Roman Catholic, baron of Baltimore (in Ireland). Calvert was born at Kipling, Yorkshire, England, in 1582. He graduated at Oxford, held several important public trusts, was knighted in 1617, became principal secretary of state in 1619, member of Parliament 1620–21, and first Lord Baltimore 1624. By grant of James I. he became proprietary of Avalon in Newfoundland, endeavored to plant a colony there, and went thither himself in 1625. Owing chiefly to the unfavorable soil and climate, the colony was a failure. He then (1628) visited Virginia, met an ungracious reception, and returned to England. He seems then to have petitioned the king (Charles I.) for a charter for founding a new colony, and to have met with favor; but before the charter was issued he died, April 15, 1632. The charter which his address had secured was issued in June, 1632, to his son Cecil, who became the second Lord Baltimore, and real founder of the colony of Maryland. The territory granted by the charter included the whole of the present State of Maryland. Cecil never visited it, but sent out an expedition in Nov., 1633, under the charge of his brother, Leonard Calvert, as governor. The Calverts have been much praised for their liberal and tolerant spirit, and their wise and equitable legislation in the colony. The successive Lords Baltimore were John (the third), Charles (fourth), Benedict (fifth), Charles (sixth), and Frederick (seventh). Frederick died in 1771, leaving no legitimate children, and with him the title Lord Baltimore became extinct. (See FULLER'S "Worthies of England;" BANCROFT'S and HILDRETH'S "Histories of the United States;" J. P. KENNEDY, "Character of George Calvert;" Proceedings of Maryland Historical Society; SPARKS'S American Biography," vol. ix. S. S.) HENRY STOCKBRIDGE.

Baltimore Oriole (*Icterus Baltimore*, Daudin), also called **Fiery Hangbird** and **Golden Robin,** a well-known and conspicuously beautiful bird of the New-World family of Icteridæ. This family, closely allied in structure and habits with the weaving-birds (Ploceidæ) of Africa and Asia, display an equally wonderful skill in the construction of pensile and intricately-woven nests. Both are also distinguished by the brilliant contrast in the colors of their plumage. Black and yellow, the two colors of the coat-of-arms of Lord Baltimore, predominate in all the members of the genus *Icterus*, and suggested the name of this typical species. In the summer months the Baltimore is found from Florida to New Brunswick on the coast, westward, as far as the Great Plains, from the valley of the Saskatchewan on the N. to Louisiana and Texas. It is a winter resident of the West Indies and Central America as far S. as Panama. It is not found W. of our central region, where it is replaced by another closely-allied species, and is not at all common beyond the Mississippi, being found less numerous as we proceed W. As a vocalist it is a bird of rare power, combining pathos, beauty, and variety in its notes. It arrives in New England, with great regularity, about the 10th of May, but remains in song only about two months, rarely singing after the young are hatched. The richness, beauty, and variety of its melody must be heard to be appreciated, for no description can do it justice. Like all the true weavers, the Baltimore displays great skill and ingenuity in the construction of its nest. This is a pendulous, cylindrical pouch, and is suspended from the extremity of a hanging branch. It is made by the interweaving into a homogeneous fabric, of great strength and admirably adapted to its purpose, of the filaments of various flax-like plants. Audubon figures one made entirely of Spanish moss (*Tillandsia usneoides*), so conspicuous in Southern cypress-swamps. In the article NESTS OF BIRDS (Fig. 12) the typical nest is well represented. These birds are devoted and courageous parents, and resolutely defend their young when in danger, fearlessly exposing themselves to death rather than forsake them. The mother-bird has been known to enter her nest when the branch to which it was attached was being severed from the tree, and to persist in remaining there until the nest had been taken into a house. It will follow its young when taken, and will feed them when in captivity. Reared from the nest, it may be completely domesticated, be allowed full liberty of the house, making no attempt to escape, and, like a spoiled child, delighting in occasional acts of mischief, such as putting its pointed bill through the meshes of lace curtains, and, opening wide its beak, seeming to enjoy the noise made by the breaking of the threads. It feeds chiefly on insects, many of them highly injurious to vegetation, and is thus of immense service to the farmer, destroying the worst pests of the orchard. The parents feed their young chiefly with caterpillars, which they swallow and disgorge for this purpose. Besides the Baltimore, there are four other orioles common in the U. S.—the Bullock oriole of the Pacific coast, the orchard oriole of the Eastern States, and the hooded and Scott's orioles of Texas and Arizona. THOMAS M. BREWER.

Baluze (ÉTIENNE), a French historian, born at Tulle Dec. 24, 1630, became in 1670 professor of canon law in Paris, and in 1707 director of the Royal College under Louis XIV. Among his works are "Lives of the Popes of Avignon," 1693, and "History of the House of Auvergne," in which he endeavored to show that the House of Bouillon was descended from the ancient dukes of Guienne, and therefore owed no allegiance to the king of France. The king suppressed this work, exiled the author, and confiscated his estates. He published forty-five works, among which were "Regum Francorum Capitularia" (1677), "Lives of the Avignon Popes" (1693), etc. Died in Paris July 28, 1718.

Balzac, de (HONORÉ), a popular French novelist, born at Tours May 16, 1799. After he had written several unsuccessful tales, he published in 1829 an historical romance called "The Last Chouans," which was received with favor. His reputation was increased by "The Physiology of Marriage" (1831), "Le Peau de Chagrin" (1831), "Scenes of Provincial Life" (1832), "Scenes of Parisian Life" (1832), "Le Père Goriot," and "Eugénie Grandet." He excelled in the analysis of emotions and in the delineation of individuality of character. He married the countess of Hanska, a Polish lady, in 1848. His works have been translated into many languages. Died in Paris Aug. 19, 1850. (See

G. Desnoiresterres, "Vie de Honoré de Balzac;" George Sand, "Notice biographique sur H. de Balzac," 1853; A. Baschet, "H. de Balzac," 1852.)

Balzac, de (Jean Louis Guez), Seigneur, a French writer, born in 1594. He was patronized by Cardinal Richelieu, and was admitted into the French Academy in 1634. He was considered the best French prose-writer of his time, and acquired a durable reputation by his successful efforts to improve and refine his native language. Among his works are "The Christian Socrates" (1652) and "Familiar Letters" (new ed., 1806). Died Feb. 15, 1654.

Bambar'ra, a state of Western Africa, in Soodan, lies on both sides of the river Niger or Joliba, which flows in a N. E. direction through the middle of this state. It is bounded on the S. by the Kong Mountains. The soil is well watered and fertile. The rainy season lasts from June to November. Two crops of maize, cotton, and yams are raised annually. The baobab, butter tree, and date-palm are found here. The wild animals are lions, elephants, leopards, panthers, etc. The population is composed mostly of Mandingoes. Area, about 21,300 square miles. Capital, Sego.

Bam'berg, a city of Bavaria, in Upper Franconia, is beautifully situated on the river Regnitz, 30 miles N. of Nuremberg and 3 miles from the river Main. It is connected by railway with Nuremberg and other towns. It is well built, and has spacious, well-lighted streets, which are lined with handsome houses. Among the remarkable public buildings are the magnificent cathedral (Domkirche) in the Byzantine style, founded in 1004 by the emperor Henry II.; the old palace of the bishops of Bamberg; and the Jesuit church of St. Martin's. Bamberg contains a theatre, a lyceum, a museum of natural history, and a royal library of 135,000 volumes. Here are manufactures of porcelain, jewelry, musical instruments, gloves, etc.; also numerous breweries, which produce beer of superior quality. It has numerous literary and charitable institutions. Pop. in 1880, 29,587.

Bambi'no [the Italian for "infant"], a term applied to the swaddled figure of the infant Saviour which, carved or painted, forms the subject of many altar-pieces in Roman Catholic churches. The most celebrated of these is the Santissimo Bambino of the church Ara Cœli at Rome. This is a kind of wooden doll profusely adorned with jewels, said to have been carved from a tree which grew on the Mount of Olives. It is often carried in procession to the bedside of the sick. The festival of the Bambino occurs at Epiphany, Jan. 6.

Bamboccia'de [from the It. *bamboc'cio*, a "simpleton"], in painting, is a grotesque scene from common or low life, such as country fairs, rural sports and festivals, and boorish frolics. The name was derived from Bamboccio, the surname of Peter van Laer, who painted such subjects. He was born in 1613, and died in 1674.

Bam'boo' (*Bambu'sa*), [Fr. *bambou*], a genus of arborescent grasses which are natives of the tropical and warm parts of Asia and America, and grow to a large size. Some of the species are eighty feet high or more. The bamboo is a plant of great utility and importance. It has a jointed and hollow stem, which is very hard and light, and is externally coated with silex. It has been called the national plant of China, the natives of which make of it a great variety of articles, furniture, weapons, etc. It is sometimes used for building houses and bridges and for water-pipes. The smaller stems are converted into walking-sticks, and are employed in wickerwork and the seats of chairs. Some species of *Bambusa* secrete a silicious, phosphorescent substance called tabasheer, to which remarkable properties have been attributed. (See Tabasheer.)

Bam'borough (or **Bambrough**) **Castle,** one of the oldest castles in Great Britain, is on the coast of Northumberland, 16 miles S. E. of Berwick. It stands on a basaltic rock 150 feet high, and accessible only on the S. E. side. It was founded in 1070. Connected with this castle is an extensive public library, a dispensary, life-boats to save the crews of shipwrecked vessels, and other charitable institutions. Near the castle is a village of the same name.

Bambuk', a country of Western Africa, included between lat. 12° 30′ and 14° 30′ N., and between lon. 10° 30′ and 12° 15′ W., is bounded on the N. E. by the Senegal River, and on the S. W. by the Faleme. The surface is hilly, and the soil of the valleys fertile. It is inhabited by Mandingoes, who are said to be very ferocious. The baobab and other trees here attain an enormous size. Bambuk has long been celebrated for its rich gold-mines. Pop. about 800,000.

Ba'mian', a valley and pass of Afghanistan, on the route from Cabul to Turkistan, and between the central and western ranges of the Hindu-Kush Mountains, is at an elevation of 8496 feet, and is important as the only known pass over the Hindu-Kush Mountains that is practicable for artillery. The valley is covered with ruins of the city of Gulgula, which was destroyed by Jengis Khan about 1220. Bamian was one of the chief centres of the Booddhist worship, and presents numerous caves with gigantic idols cut out of the rock. One of these is 160 feet high.

Ba'mo, B'ha'mo, or **B'han-Mo,** the most important commercial town in the empire of Burmah, in Farther India, is situated on the Irrawaddy at the entrance of the Tamping. Large caravans laden with silk and other goods arrive here from October to May, during which time a large business is carried on. Large quantities of raw cotton are also exported from this place. The annual imports and exports amount to about $1,500,000 each. Pop. about 12,000.

Bamp'ton Lec'tures, so called after the name of their founder, the Rev. John Bampton (1689–1751), canon of Salisbury, who in 1751 left his "lands and estates" to the University of Oxford for "the endowment of eight divinity lecture sermons," to be preached annually at "St. Mary's in Oxford." The subjects specified were: (1) "To confirm and establish the Christian faith, and to confute all heretics and schismatics; (2) upon the divine authority of the Holy Scriptures; (3) upon the authority of the writings of the primitive Fathers as to the faith and practice of the primitive Church; (4) upon the divinity of our Lord and Saviour Jesus Christ; (5) upon the divinity of the Holy Ghost; (6) upon the articles of the Christian faith as comprehended in the Apostles' and Nicene Creeds." When the lectures commenced, in 1780, the income of the estate was £120 a year. Ever since then (except in the years 1834, 1835, and 1841) these lectures have been delivered. Some of the more noted of the earlier lecturers were Dr. White, in 1784, on "Christianity and Mohammedanism;" Dr. Nott, in 1802, on "Religious Enthusiasm;" Bishop Heber, in 1815, and Archbishop Whately, in 1822. Mansel, in 1858, on "The Limits of Religious Thought," opened a new era in the history of the lectures. Since then we have had, among others, George Rawlinson in 1859, Farrar in 1863, Bernard in 1864, Mozely in 1865, Liddon in 1866, Irons in 1870, Jackson in 1875, Row in 1877, Wace in 1879, Hatch in 1880, Temple in 1884. (For a complete list, down to 1880, see Hunt's "Bibliotheca Sacra.")

Ban, a word which occurs in many modern languages, signifying an edict; a public order or prohibition; an interdiction; a notice of marriage; a curse or excommunication. In the former German empire to put a prince under the ban of the empire was to divest him of his dignities and pronounce on him a sentence of outlawry.

Ban, and **Arrière Ban,** military terms used in France under the feudal system. When the feudal barons were summoned to the service of the king in time of war, they were called the *ban*. Their tenants or inferior vassals formed the second levy, or *arrière ban*. The ban and arrière ban constituted the entire military force of France in feudal times.

Ban,[*] or **Ba'nus,** the title formerly given to military governors of certain districts, called *banats*, in the eastern part of Hungary. The ban was appointed by the king with the consent of the Diet, and had formerly very extensive powers. In political, judicial, and military affairs his authority was supreme. In time of war he commanded the troops of his banat. The most important banats were those of Dalmatia, Croatia, Slavonia, Bosnia, and Makovia (or Machow), but their boundaries often changed, and they were at length united into the double banat of Dalmatia and Croatia.

Bana'na (*Mu'sa sapien'tum*), an herbaceous plant of the natural order Musaceæ, is extensively cultivated in all tropical regions of both hemispheres. It is regarded by many botanists as a mere variety of the plantain (*Musa paradisiaca*). It grows to the height of from fifteen to twenty feet, and the stem terminates in a tuft of leaves which are from six to ten feet long, and about one foot wide. The fruit, which is generally five or six inches long, has a soft, luscious pulp, and is a nutritious and very important article of food. It is commonly eaten raw. It is stated that no other plant produces so great an amount of nutriment on the same space of ground. It is successfully cultivated in South Florida.

Bananal', an island of Brazil, also called **Nueva Beira,** is in the river Araguay, and in the province of Matto Grosso. Its length from N. to S. is 290 miles, and its width about 35 miles. The soil is fertile, and covered with a dense forest. There is a large lake near the middle of the island.

Banat-Komlas, a town of Hungary, in the county of Torontal, has beer-breweries and sheep-markets. Pop. in 1880, 5073.

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[*] Ban in some of the Slavonic dialects is said to signify "master."

Ban'ca, an island on the Malay Archipelago, belonging to Holland, about 10 miles E. of Sumatra, from which it is separated by the Strait of Banca. It is about 100 miles long, and has an area of 4977 square miles. The surface is hilly, the soil mostly dry and stony, and the island to a great extent covered with forests. It is celebrated for its tin mines, which are very productive, about 4700 tons having been produced in a single year. Copper, iron, and lead are also found here. Pop. in 1880, 69,312.

Ban'co, the standard money in which a bank keeps its accounts, as distinguished from current money. The term is chiefly applied to the money in which the Hamburg bank keeps its accounts, which is not coined money. The Hamburg mark banco (= 1*s.* 5¾*d.* sterling) is to the current mark (= 1*s.* 2½*d.* sterling) as 20 to 17.

Ban'croft (AARON), D. D., a Unitarian minister, was born at Reading, Mass., Nov. 10, 1755. He graduated at Harvard in 1778, and became in 1785 pastor at Worcester, where he remained upwards of fifty years. Among his works, besides a great number of sermons, is a life of George Washington, which was very popular. He was the father of George Bancroft, noticed below. Died Aug. 19, 1839.

Bancroft (EDWARD), M. D., F. R. S., born at Westfield, Mass., Jan. 9, 1744, ran away from his native country in his youth, practised medicine in Guiana, and resided long in England. He was a friend of Dr. Franklin, and professed to labor in behalf of America, but is believed to have been a spy of the British government. He published several political works, a "Natural History of Guiana" (1769), and "Researches concerning the Philosophy of Permanent Colors" (2 vols., 1794–1813). Died Sept. 8, 1820.

Bancroft (GEORGE), PH.D., LL.D., D. C. L., an eminent American historian, a son of Aaron, noticed above, was born at Worcester, Mass., Oct. 3, 1800. He graduated at Harvard College in 1817, and entered in 1818 the University of Göttingen, where he studied history and philology under Heeren, Bunsen, and others. In 1820 he took the degree of doctor of philosophy at Göttingen. Having returned home in 1822, he published a volume of poems (1823) and a translation of Heeren's "Reflections on the Politics of Ancient Greece" (1824). In 1834 he produced the first volume of his "History of the U. S." He was appointed secretary of the navy by President Polk in Mar., 1845, in which year he founded the U. S. Naval Academy, resigned that office in 1846, and was sent as minister plenipotentiary to England in the same year. He returned home in 1849, retired from the public service, and has for several years resided in Washington, D. C. His capital work is a "History of the U. S." The tenth volume, to the end of the Revolutionary War, appeared in 1874. The eleventh and twelfth volumes, giving the history of the American Constitution, appeared in 1882. In the same year he began to issue his final revised edition of the whole work. In a review of the third volume of this work, William H. Prescott observes: "The reader will find the pages of the present volume filled with matter not less interesting and important than the preceding. He will meet with the same brilliant and daring style, the same picturesque sketches of character and incident, the same acute reasoning and compass of erudition." Mr. Bancroft was appointed minister to the court of Berlin in 1867, and negotiated a treaty by which Germans emigrating to the U. S. are released from their allegiance to the government of their native country. In 1871–74 he was minister plenipotentiary to the German empire, and rendered important services in settling the San Juan boundary question. The revised ed. (last vol. published in 1885) is completed in 6 vols. 8vo.

Band, in architecture, is the name given to any kind of ornament which is continued horizontally along a wall, or an ornament by which a building is encircled. Bands often consist of foliage, quatrefoils, or of simple bricks. A band of a shaft is the moulding or suits of mouldings around the pillars and shafts in Gothic architecture.

Ban'dages [from the Anglo-Saxon *bin'dan*, to "bind;" literally, anything used for binding], applied to the bands or wrappers used by surgeons to keep in their places the dressings of wounds, to compress bleeding vessels, to rectify the deformity produced by fractures or other injuries, and to unite parts in which there is a solution of continuity. They are commonly composed of soft muslin, linen, or flannel. Sometimes they are made to become immovable after application by being first soaked in starch or glue. The great art in bandaging consists in applying pressure with exactly the required firmness, and *evenly*. Especially is it important to avoid interrupting too much the circulation of the blood. Unskilful bandaging has sometimes caused fatal mortification of a limb. For this reason the arm should never be tightly bandaged (unless temporarily, to arrest hæmorrhage) without the hand being subjected to an equal amount of pressure; and the same rule applies with regard to the leg and foot. To make a continuous bandage fit well upon a limb or other part, the roller should be drawn smoothly as far as it can be, and then, if needful, *reversed* by a turn of the hand from time to time; producing a spiral, by the overlapping of the successive turns, each time, about one-third of its width. A bandage for the arm may be from two to two and a quarter inches wide; for the lower extremity, two and a half inches; for the chest, three inches. The *figure-of-eight* bandage is often required for the elbow or knee-joint. The T bandage is available for the lower part of the trunk. A *many-tailed* bandage is used especially in fractures of the thigh. It is composed of about eighteen transverse strips, with or without a longitudinal band, to which they may be fastened by stitching. These being laid under the limb, the lowest is folded over, and then the next, and so on until the whole thigh is secured. This bandage has the advantage that it can be undone without disturbing the position of the limb. For a more particular account of bandages we must refer to works on minor surgery. Handkerchiefs are sometimes employed instead. In the treatment of wounds, however, and of stumps of amputated limbs, bandages are less resorted to now than formerly, many surgeons preferring lighter and cooler dressings, with adhesive strips, etc. One of the most useful of bandages for emergencies is the "Spanish windlass," to check serious bleeding from any part of either extremity. It is merely a strip of muslin or a pocket handkerchief passed around the upper part of the limb, tied in a knot, and then twisted firmly by a stick or bayonet passed under it, so as to press with sufficient force to arrest the arterial circulation. It must not be left on many hours, but its temporary application has often saved life. In like manner, free bleeding from a wound of the scalp may be controlled by a compress and bandage tightly applied around the head.

REVISED BY WILLARD PARKER.

Ban'da, a town in British India, province of Allahâbâd, is on the Crane River, 80 miles W. of Allahâbâd. It has increased rapidly of late years, and acquired considerable note for its cotton.

Ban'da Isles, a group of islands, forming part of the Molucca Archipelago, belonging to the Dutch. They are lofty and volcanic. One of them, named Goonong Apee, rises 7880 feet above the sea, and is an active volcano. The larger of these islands are exclusively appropriated to the cultivation of nutmegs and mace, and produce annually about 450,000 pounds of nutmegs. These islands were discovered by a Portuguese, Antonio Abreus, in 1512. The Portuguese took possession of the islands in 1524, and in 1599 they passed under the dominion of the Dutch. Area, 8748 square miles. Pop. 272,000.

Banda'na, or **Bandan'na,** a silk or cotton handkerchief of East Indian origin, though now extensively manufactured in Great Britain. The cloth is dyed Turkey red, and then the pattern is made by discharging the color with bleaching-liquor in a hydraulic press. The patterns of the real bandana are spots and diamond prints.

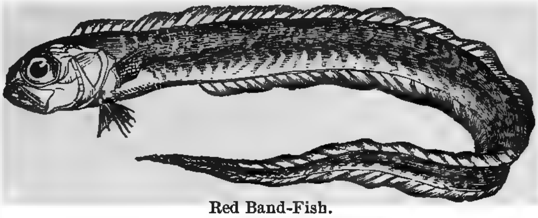
Banda Oriental. See URUGUAY.

Band'el, von (JOSEPH ERNST), born at Anspach May 17, 1800; received his artistic education at the academy of Munich; studied for several years in Rome, and settled in 1827 at Munich. In 1834 he moved to Hanover. His principal work is the Hermann monument in the Teutoburger-Wald, near Detmold. It was begun in 1838, but not finished until nearly forty years later, and consists of a figure representing Hermann, 90 feet high, of copper, and raised on a foundation of granite 93½ feet high. In 1846 the foundation was ready to receive the statue, but the reaction which in 1850 set in and swept through the whole of Germany made it impossible to carry out a plan like that of the Hermann monument. In 1862 an association was formed in Hanover for the purpose, but only an insignificant sum was raised; in 1869 the king of Prussia gave 2000 thalers; but after the Franco-German war the Hermann monument became a national affair, and was soon completed.

Bandel'lo (MATTEO), an Italian novelist and Dominican monk, was born in Piedmont in 1480. He emigrated to France in the reign of Francis I., and was appointed bishop of Agen in 1550. Shakspeare borrowed from him the plots of several plays.

Bandera, capital of Bandera co., Tex. (see map of Texas, ref. 5–G, for location of county), is on the Medina River, 30 miles N. W. of San Antonio. Pop. not in census of 1880.

Band-Fish, a name applied to *Cep'ola rubes'cens* and allied fishes, which have the body much elongated and compressed. It has also been extended sometimes to other elongated and much compressed fishes. The red band-fish (*Cepola rubescens*) is about fifteen inches long, and is found in the Mediterranean.


Red Band-Fish.

Ban'dicoot, a name given to the species of *Peramelitæ*, a family of marsupial quadrupeds, natives of Australia and Tasmania, having a long head and pointed muzzle. They have ten cutting teeth in the upper jaw, and only six in the lower. They devour grain in granaries and potatoes in the field. The *Perameles nasuta* is about eighteen inches long. The name is popularly extended to several kindred genera of marsupials.

Long-nosed Bandicoot.

Bandie'ra (Atilio and Emilio), two brothers and Italian patriots, born respectively in 1817 and 1819, were sons of a vice-admiral in the Austrian service. In 1842 they opened a correspondence with Mazzini, and formed a design to liberate Italy by a conspiracy. They failed, and escaped to Corfu about Mar., 1844, but hearing a false or exaggerated rumor of a revolt in Naples, they returned with a few friends and landed in Calabria in June. They were executed July 25, 1844, their letters to Mazzini having been opened by the British postmaster-general, and the contents communicated to the Austrian government.

Bandinel'li (Baccio), an Italian sculptor, was born at Florence in 1497; patronized by Cosimo de Medici, the emperor Charles V., and Pope Clement VII. As a sculptor he was considered second only to Michael Angelo, of whom he was a jealous rival. He adorned the choir of the Duomo of Florence with bas-reliefs. Among his best works are a group of Adam and Eve, a statue of Orpheus, "The Descent from the Cross," and "Hercules and Cacus." Died in 1559, aged 62.

Bandit'ti [It. *banditi*], bands of robbers in the mountainous parts of Italy and Greece, who fall upon travellers and hold them captive for a ransom. In former times there existed in the larger towns of Italy organized associations of bandits, whose stilettoes were ready for hire to accomplish any deadly scheme. They were called euphemistically *bravi* ("brave men"), and were not exterminated until the modern improvements in police organization. Hired assassination (*homicidium conductum, assassinatus*) was a worse crime than ordinary murder, and punished by the wheel.

Ban'don, Earls of, and Viscounts Bernard (1800), Viscounts Bandon (1795), Barons Bandon (1793, in the Irish peerage), a noble family of Great Britain.—Francis Bernard, the third earl, was born Jan. 3, 1810, and succeeded his father in 1856. D. Feb. 17, 1877.

Ban'don, or **Ban'donbridge,** a town of Ireland, on the beautiful river Bandon, 20 miles S. W. of Cork. It is situated on both sides of the river, which enters the harbor of Kinsale. Bandon was formerly a prosperous manufacturing town, but its prosperity has considerably declined. Pop. 6074.

Bands, Military, consist of a body of musicians attached to each army regiment or battalion. In the British service these bands generally comprise a band-master and about fifteen musicians, who are chiefly maintained at the cost of the officers of the regiment to which they belong. The number is often much larger in the choice corps. In the U. S. service the present law provides for a band at the Military Academy at West Point, and for each artillery, cavalry, and infantry regiment a chief musician, who shall be instructor of music, and for each artillery and infantry regiment two principal musicians; each cavalry regiment to have one chief trumpeter.

Banér, written also **Bannier** or **Bannér** (Johan), a famous Swedish general, born near Stockholm June 23, 1595. He commanded the right wing under Gustavus Adolphus at the battle of Leipsic in Sept., 1631. His conduct in this action was highly applauded. On the death of Gustavus Adolphus (Nov., 1632) he became the commander-in-chief of the Swedish army. He gained a brilliant victory near Wittstock in Sept., 1636, and again defeated the imperial army near Chemnitz in 1639, after which he overran a large part of Germany. Died May 10, 1641. Schiller represents him as great in adversity, and formidable even after defeat. (See Schiller, "History of the Thirty Years' War;" Carl Manderfeldt, "Éloge de J. Banér," 1787.)

Banff, sometimes written and always pronounced **Bamf,** a seaport-town of Scotland, capital of Banffshire, at the mouth of the river Doveran, and on Moray Frith, about 40 miles N. N. W. of Aberdeen. A bridge over the river connects it with Macduff. Here is Duff House, the seat of the earl of Fife, with a park fourteen miles in circumference. Banff has manufactures of leather, soap, iron castings, linen, sails, and cordage, and has important fisheries of salmon, cod, and herring, which, with agricultural products, are exported from this town by sea. Banff has a lighthouse in lat. 57° 40′ N., lon. 2° 31′ W. The harbor is shallow and poor. The town has numerous and excellent schools and charitable institutions. The river is liable to floods, which have sometimes been destructive. Pop. 7439.

Banff'shire, a county of Scotland, bounded on the N. by Moray Frith, on the E. and S. by Aberdeenshire, and on the W. by Elgin and Invernessshire, and partly by the river Spey, a very rapid stream. Area, 684 square miles. The surface is greatly diversified by mountains and valleys. Among its highest peaks is Cairngorm, 4090 feet high. Granite, slate, old red sandstone, limestone, and serpentine occur here. The soil of the valleys is fertile. The breeding of cattle is the chief occupation of the farmers. Capital, Banff. Pop. in 1881, 62,736.

Ban'galore', a strongly fortified town of India, the capital of Mysore, is on a high table-land 71 miles N. E. of Seringapatam; lat. 12° 58′ N., lon. 77° 38′ E. It is the chief British military station in Mysore, and is much frequented by Europeans, attracted by the salubrity of the air. The temperature seldom exceeds 90° F. Here are important manufactures of cotton and silk. It was taken by storm by Lord Cornwallis in 1791. Pop. 142,513.

Bang'kok', or **Bankok,** a large commercial city, the capital of Siam, is situated on the river Meinam, about 20 miles from its entrance into the Gulf of Siam; lat. 13° 38′ N., lon. 100° 34′ E. It is mostly built of wood, but has some brick and stone houses. Many of the houses are built on movable bamboo rafts on the river. The Chinese constitute a majority of the population, which is estimated at 600,000. Bangkok contains a large royal palace and numerous Booddhist temples, which are decorated in a gorgeous style. The stationary dwelling-houses are raised on piles six or eight feet from the ground, in order to protect them from inundations. The river is navigable for vessels of 250 tons from its mouth to Bangkok, which has an extensive trade. The chief articles of export are sugar, pepper, rice, ivory, cardamoms, hides, tin, etc. Iron-mines and forests of teak occur in the vicinity. It is the seat of Roman Catholic and of American Baptist and Presbyterian missions. It has some native Christians of Portuguese descent. (See Sir John Bowring's "Siam.")

Ban'gor, an episcopal city and seaport of North Wales, in the county of Caernarvon, on the S. E. shore of Menai Strait, 2½ miles from the Britannia Bridge, and 9 miles N. E. of Caernarvon. It is on the railway which connects Chester and Holyhead, and is situated in a narrow, romantic valley. The grandeur and beauty of the scenery render it a favorite place of summer resort. Six miles from Bangor are slate-quarries which employ about 2000 men. This city is very ancient. The famous monastery of Bangor was founded by Comgall. The cathedral, originally founded in 525, has been twice destroyed (in 1071 and in 1402). Bangor has eight annual fairs, four of which are for cattle. They are visited by great throngs of buyers and sellers. The trade by sea is not important, the harbor not being accessible to large vessels. Pop. in 1881, 8240.

Bangor, a city, port of entry, and important R. R. and commercial centre, capital of Penobscot co., Me. (see map of Maine, ref. 6–E, for location of county), is on the right bank of the Penobscot River, about 60 miles from its mouth. It is 138 miles N. E. of Portland, and 67 E. N. E. from Augusta, the present State capital, and is in lat. 44° 47′ 50″ N., lon. 68° 47′ W. from Greenwich, at the head of navigation on the Penobscot River. The Kenduskeag River, navigable to the centre of the city, runs directly through it, dividing the city into two nearly or quite equal parts. Both rivers, above the city, are broken by waterfalls for about 12 miles, thus furnishing water-power unequalled in New England. Brewer, a beautiful suburb of Bangor, lying on the easterly side of the Penobscot, and commonly known as the "Eighth Ward," is the city's shipyard, being connected with it by a ferry and a covered bridge, and is rapidly filling up with manufactories of different sorts. Bangor is one of the greatest lumber-dépôts in the U. S., nearly 3000 vessels being employed in exporting lumber, mostly pine, spruce, hemlock, and cedar, to every quarter of the globe. It is also largely engaged in other foreign commerce. Steamboats ply regularly, by different lines, between Bangor and the several ports along the Penobscot, between Bangor and Portland, between Bangor and Bar Harbor, and between Bangor and Boston. Besides the city schools, which are excellent, it has a theological seminary, with five or six professors, and a library of about 15,000 volumes, a city library of about 12,000 volumes, a mechanics' library of about 9000 volumes, now merged into one, a law library of about 1000 volumes; a conservatory of music, a Young Men's Christian Association, a board of trade, and other similar organizations. Of banks, it has one State, two savings, and seven national, besides several brokers who lend money and receive deposits. Bangor has fourteen churches and two daily and five weekly papers. Four large iron-foundries, with two of which are connected shops for manufacturing machinery, several planing-mills, three or four furniture-factories, three extensive carriage and sleigh factories, one large trunk-factory, besides many similar establishments, together with a burnettizing works, do a very heavy manufacturing business. It has also several boot and shoe factories, this branch of business becoming a large and growing interest. The city is surrounded by an excellent agricultural country, which sends to Bangor large quantities of farming produce for export. It is also doing a heavy business in insurance. With its natural suburb, before mentioned, Bangor has a valuation of about $13,000,000. Water is carried from the river by the Holly system to every portion of the city, supplying all the best residences and furnishing small water-powers to many operations. There is a stone dam across the Penobscot, which, it is believed, will soon make Bangor the leading manufacturing city of New England.

The city is divided into seven wards, each of which elects annually one alderman and three common councilmen, the aldermen constituting the upper and the councilmen the lower branch of the city government. The government is presided over by a mayor, elected annually. Bangor has a fine granite custom-house, with a U. S. collector and two deputies. Besides the superior, probate, and commissioners' courts for Penobscot county, and the regular nisi prius term of the supreme judicial court of the State, it has an annual law term of the latter court, and an annual sitting of the U. S. district court.

History.—The French erected here a fort before 1656, and named it Norombega. There prevailed in the seventeenth century a belief in Europe that a great and flourishing Indian city called Norombega stood near this point. The name, variously spelled, occurs in Milton's "Paradise Lost," in Burton's "Anatomy of Melancholy," and other works of that time. It was settled in 1769, and was then called Kenduskeag. Its name was changed to Bangor by Rev. Seth Noble, in honor of a well-known psalm-tune of that name. In 1791 it was incorporated as a town, and in 1834 as a city. Its rapid growth since that time has been the result of its position, which combines the advantages of a noble and navigable tidal river with a large and constant water-power. It has also in the upper waters of the Penobscot the means of very cheap transportation of logs from the boundless forests of Northern Maine. These advantages made it for a long time the greatest lumber-market in the world, and even now but few places excel it in the amount and value of lumber sawed and shipped.

Bangor had by the census of 1800, 277 inhabitants; in 1810, 850; in 1820, 1221; in 1830, 2868; in 1840, 8634; in 1850, 14,432; in 1860, 16,408; in 1870, 18,289; in 1880, 16,856. B. F. Tefft.

Bangor, on R. R., Van Buren co., Mich. (see map of Michigan, ref. 8–H, for location of county), 27 miles N. E. of St. Joseph, in a good farming and fruit region, has an iron-smelting furnace, a union school, etc. Pop. in 1880, 1102; in 1884, 947.

Bango′rian Con′troversy, a controversy which rose between the adherents and opponents of ecclesiastical authority in Great Britain. It was brought about by a sermon preached before George I. by Dr. Benjamin Hoadley, bishop of Bangor. (See Hoadley.)

Bangs (Heman), a Methodist preacher, born in Fairfield, Conn., in 1790, joined the New York Annual Conference in 1815. He labored effectively in the pulpits of his denomination in New York and Connecticut. He was one of the principal founders of the Wesleyan University at Middletown, Conn., and one of the most powerful preachers of Methodism. Died Nov. 2, 1869.

Bangs (Nathan), D. D., a Methodist minister, born in Stratford, Conn., May 2, 1778. He became editor of the "Christian Advocate and Journal," and president of the Wesleyan University at Middletown, Conn. He wrote, among other works, a "History of the Methodist Episcopal Church." Died May 3, 1862.

Bangs (William M'Kendree), son of Nathan Bangs, was born in New York City in 1810, graduated in the University of Ohio in 1829, and served one year in a professorship in Augusta College, Ky. He resigned his chair there to enter the itinerant ministry of the Methodist Episcopal Church. From 1831 to his death, in 1852, he was a member of the New York Conference. He was some time principal of the Wesleyan Academy at Wilbraham, Mass. He was distinguished by his culture and by the force of his controversial writings.

Ban′ialu′ka, or **Banjaluka,** a fortified town of European Turkey, in Bosnia, on the river Verbas, 94 miles N.W. of Bosna-Serai. It has numerous mosques, many bazaars, a manufactory of gunpowder, hot springs, and Roman antiquities. Pop. in 1879, 9560.

Baniya (pronounced in India, bŭn′e-yå), less correctly, **Baniyan** or **Banian,** a word used in Hindostan to denote a shopkeeper, especially a dealer in grain, but also applied to the wholesale dealers and importers of Bombay, Surat, and Cambay, carrying on a trade with the interior of Asia by caravans and with Africa by ships. They usually belong to the caste called Vaisyas, and strictly abstain from animal food.

Ba′nim (John), an Irish novelist, born at Kilkenny April 3, 1798, excelled in the delineation of the life and character of the Irish peasantry. He published in 1825 "Tales of the O'Hara Family," which was very popular. Among his other works are "The Battle of the Boyne" (1828), "The Denounced" (1830), "The Smuggler" (1831), and "The Mayor of Wind-gap." Died Aug. 1, 1842. (See P. J. Murray, "Life of John Banim," with extracts from his correspondence, 1857.)

Banister (village). See Halifax Court-house.

Ban′ister (John), born in England, came from the West Indies to Virginia, and settled in the neighborhood of Jamestown, devoting himself to botanical investigations. He contributed in 1680 a catalogue of Virginia plants to Ray's "History of Plants." He published, among other works, "Observations on the Natural Productions of Jamaica," "The Insects of Virginia," and "Curiosities in Virginia." The genus *Banisteria* was named in his honor. He was killed about 1689, in one of his botanical excursions, by a fall.

Banister (John), born in Virginia, was educated in England and studied law there. He was colonel in the Virginia line; was prominent in the patriotic conventions of the Revolution; member of the Virginia Assembly; delegate from Virginia to the Continental Congress in 1778–79, and signed the Articles of Confederation. He was lieutenant-colonel of cavalry in 1781. Died 1787.

Baniwas, a tribe of South American Indians living on the Amazon and the Rio Negro. A vocabulary of their language is given by Alfred Wallace in "A Narrative of Travels on the Amazon and the Rio Negro" (1853, pp. 521–541).

Banjermas′sin, or **Benjar-Massen** (*i. e.* "the river of plenty"), the name of a river, state, and town on the S. coast of Borneo. Owing to the inundations of the river, the town is completely built on floating logs, held by ropes. It has a considerable trade in gold-dust, precious stones, birds' nests, wax, resin, rubber, rattans, pepper, and steel of native manufacture and excellent quality. Many of the inhabitants are Chinese, and most of the trade is with China. The Dutch government is the dominant power here. Trade is obstructed by a bad bar at the mouth of the river. Pop. estimated at 30,000.

Bank [from It. *banco*, a "bench" or "table," on which the Venetian money-changers displayed their money]. In general, banks are credit institutions or dealers in credits. The exchanges of the modern world are barter, effected by the indirect agency of the credit system, and banks and bankers are its machinery. Metallic money and its representative, the circulating note, are together only the small change of trade, employed in the settlement of balances and in the smaller purchases and payments. The operations of the New York Clearing-house are a good illustration of the small amount of money required in the transaction of business; its exchanges during the last twenty-three years having been more than 435,000 millions, while the balances paid in money were but 18,000 millions, or about 4 per cent. only of the amount of the settlements.

The earliest banking institution in Europe was the Bank of Venice, founded A. D. 1171. It was based upon a forced loan of the republic. Funds deposited in it could not be withdrawn, but were transferable on the books at the pleasure of the owner—in this respect not unlike the perpetual annuities of the British debt. These inscriptions of credit were usually at a premium over current coins, which were worn and clipped and were of various countries and values. Except in so far as the transfers of credit on the books were concerned, the bank was only a fiscal agent of the government. It continued in operation until 1797, when it was overthrown by the Revolutionary army of France.

The Bank of Barcelona, founded in 1401, is said to have been the first bank that negotiated foreign bills of exchange. Jewish money-dealers, however, are entitled to the credit of the invention at a much earlier period.

The Bank of Genoa went into operation in 1407. For centuries it was one of the principal banks in Europe. It was the first to issue circulating notes, which were negotiated or passed only by endorsement, not made payable to bearer. It is not known whether or not they were issued in small denominations. They were probably made for considerable amounts, and employed only, or chiefly, in large transactions. This was a long step in advance of the earlier system of deposit transfers, which was also employed by this bank. In 1800, when its circulating notes were at a large premium, it was pillaged by the French army, and thenceforth ceased to perform the functions of a bank.

The Bank of Amsterdam, established in the year 1607, was the earliest considerable institution of the kind which looked to the promotion of commerce. Its predecessors of Venice and Genoa were chiefly devoted to the management of state finances. It was plundered by the French army in 1794, when it was found that, with the reputation of 50 millions of dollars in its vaults, it had nothing, its capital having been loaned to the States General, the East India Company, and to the city of Amsterdam. In this condition of its affairs it had done an immense business during the preceding fifty years.

The Bank of Hamburg, established in 1619, was a bank of deposit and circulation based upon fine silver bars. The deposits were confined to silver. This institution, like nearly all those of the time, had, as a principal object, the protection of the people from worn, sweated, clipped, and plugged coins, and from coins of the German empire secretly reduced in standard value. The remedy was that previously adopted by the Bank of Amsterdam—to lock up the debased and depreciated coins, and circulate the credit granted for them. The Bank of Rotterdam was established in 1635, and that of Stockholm in 1688, but there was nothing of principle in them, or in other banks in Europe organized previous to the establishment of the Bank of England, which differed materially from those here briefly sketched. The Banks of Venice and Genoa, the earliest in Europe, were simply fiscal agencies of their respective governments.

The Bank of England is a fiscal agent, but is also devoted to the service of domestic and foreign commerce. It was established in the year 1694, and there is no banking institution elsewhere in the world equal to it in the management of national finances. Its whole capital, which was then £1,200,000, and is now £14,553,000, was and is permanently loaned to the government. A notable event in its history was its suspension of specie payment in 1797, which continued for twenty-five years. Its charter has been frequently renewed, and, although considered as perpetual, is subject to amendment.

Previous to the passage of the bank-charter act of 1844, any bank or private person could issue bank-notes, subject to the condition that they must be paid in coin on demand. By that act the Bank of England was divided into two departments—the bank and the issue department. The bank department is as private as any bank corporation; the issue department is an office of the state. The bank receives from the state office 15 millions of pounds in currency, which amount is loaned or issued to the government, on which the bank receives 3 per cent. interest. The bank, however, pays to the government about £200,000 annually for this privilege, and the profit to the bank from this source, after deducting the expense of management, is estimated at only about £100,000 annually. The notes are a legal tender everywhere except in payments by the bank. Bank-notes in excess of 15 million pounds are furnished by the issue department upon the gold coin and bullion held by it; which amount is not included in the reserves and is not under the control of the bank. In 1847, 1857, and 1866 the act was suspended, and the bank issued notes without holding gold; but the amount issued has only once exceeded the amount required by the bank charter, and then the excess was but £800,000.

The bank rate of interest since 1865 has varied from 10 to 2 per cent. The average rate for 1866 was 7 per cent.; for 1875, 3½ per cent.; for 1880, 2.76 per cent. The rate was reduced in Sept., 1883, from 4 to 3½ per cent. Its usual dividends are 10 per cent. per annum. The total issues of the United Kingdom on Aug. 25, 1883, were—Bank of England, £26,188,284; 148 private and joint-stock banks, £3,143,874; Scotland, £5,654,730; Ireland, £6,364,429; total for the United Kingdom, £41,351,317.

There is a large number of joint-stock banks which are not banks of issue. The usual dividends of the London and Westminster, London and Joint-Stock, London and County, and the Union, which are leading joint-stock banks, are 20 per cent. per annum, and their average deposits are about twelve times the amount of their capital.

The *Economist* of July 1, 1876, stated that three joint-stock banks in England, with a capital of £4,462,000, had 392 branches.

The number of banks in the provinces of Ontario and Quebec, in the Dominion of Canada, on Nov. 30, 1883, was 25; capital, 55 millions of dollars; loans, 149 millions; specie, 6 millions; circulation, 29 millions; deposits, 97 millions.

The Bank of France was authorized in 1800. Since 1803 it has had the exclusive privilege in Paris, and since 1857 in France, of issuing notes payable on demand. The bank in Mar., 1876, had 74 branches in the departments, and 14 others were in course of organization. Its present charter extends to the year 1897, and it is pledged to resume specie payments on Jan. 1, 1878. During the revolution of 1848 it was authorized to suspend specie payments and its notes were made a legal tender. The Bank of France is not a fiscal agent of the government, as is that of England. It does not collect or disburse the revenues of the exchequer, but lends to it largely in its exigencies, while its credits, in the form of circulating notes and other acceptances, have borne the government safely through extraordinary needs. During the late war with Prussia, which continued for ten months and terminated on May 10, 1871, it rendered unexampled service. According to the report of the minister of finance for 1873, the total expenditures arising out of the war to that date were 9288 millions of francs, or (at 20 cents to the franc) about 1857 millions of dollars—an amount equal to about two-thirds of the war-debt of the United States. When the war began the circulation of the bank was 251 millions of dollars, and its specie 229 millions, or 90 per cent. of its circulation. In June, 1871, the capital of the bank was 36½ million dollars, its circulation 442 millions, and its specie 110 millions, or about 25 per cent. of its circulation. In Nov., 1873, the circulation reached its maximum, and was 614 millions, while its specie had increased to 146 millions, or 24 per cent. of its circulation. In Dec., 1874, the ratio of specie to circulation was 52 per cent., and in Sept., 1875, 70 per cent. Since that date the amount of the circulation has fluctuated, standing on Nov. 2, 1876, at 515 millions, and on Feb. 8, 1877, at 533 millions. The stock of specie has risen rapidly since Dec., 1874. On Mar. 30, 1876, the bank held 350 millions of specie (of which 250 millions was in gold), being 76½ per cent. of its circulation and 63 per cent. of its deposits and circulation. In 1877, Feb. 22, it held 446 millions of specie, being 84½ per cent. of its circulation, which was 528 millions. The increase of the circulation from July, 1870, to Nov., 1873, was 351 millions, and the decrease in specie 83 millions. The decrease in circulation from Nov., 1873, to Sept., 1875, when it reached its lowest point, was 135 millions, and the increase in specie in the same period was 179 millions. In Aug., 1870, the bank was again authorized to suspend specie payments and its notes were made a legal tender, but it has since paid out a large amount of coin. In 1875 it paid out 126 millions in gold and 96 millions in silver, and yet its stock of coin increased over 67 millions. Since the declaration of war in 1870, the bank loaned to the government about $600,000,000, and since the suspension of specie payments in 1870 the notes of the bank have, except during a brief period, remained at par. Oct. 4, 1883, the bank held 195 millions of gold and 205 millions of silver; its circulation was 596 millions. It resumed specie payments Jan. 1, 1878.

The first organized bank in the United States had its origin in the formation of a banking company without charter, which was proposed in a resolution passed June 17, 1780, by citizens of Philadelphia. The first action in the Congress of the United States looking to the establishment of a bank was taken June 21, 1780, in reference to this proposed association. In the spring of 1781, Robert Morris, then superintendent of finance, submitted to Congress a plan for the establishment of the Bank of North America at Philadelphia; which plan was approved, and on Dec. 31 following a perpetual charter was granted to that institution. The bank opened for business on Jan. 2, 1782, and on Apr. 1 following the legislature of Pennsylvania granted to the company a perpetual charter, which, though repealed in 1785, was subsequently renewed from time to time to the date of its last charter, on Dec. 3, 1854. On Feb. 7, 1784, the State of Massachusetts incorporated the Massachusetts Bank. The Bank of New York was chartered on Mar. 21, 1791, although it had since 1784 been doing business under "articles of association" drawn by Alexander Hamilton, who was a member of its first board of directors. All of the above-named institutions are still in a prosperous condition, and all have been converted into national banks.

The plan of establishing a Bank of the United States originated with Alexander Hamilton, then secretary of the treasury, and was first embodied in his report to Congress on Dec. 13, 1790. The capital of the proposed bank was fixed at $10,000,000, one-fourth of the private and corporate subscriptions to be paid in gold and silver, and three-fourths in United States stocks bearing 6 per cent. interest. Two millions, to be subscribed by the United States, were to be paid in ten equal annual instalments by loans from the bank, or, as Mr. Hamilton describes the operation, "by borrowing with one hand what is lent with the other." This plan was adopted without material alteration by Congress, and approved by Washington Feb. 25, 1791. During the years 1796–1802 the government disposed of its stock in the bank at a considerable profit, 2200 shares having been sold in the last-mentioned year at a premium of 45 per cent.

On Jan. 20, 1815, in accordance with the recommendation of Secretary Dallas, a bill was passed reorganizing the bank, many prominent members of both houses who had previously voted against a renewal of the charter now voting in its favor. Pres. Madison ten days later returned the bill with his objections, but on the 10th of Apr., 1816, he approved a bill of substantially the same import; and this was the second and last charter of the bank granted by the general government. The plan proposed by Mr. Dallas was modelled upon the charter of the first United States Bank, and the act of incorporation, as finally passed, did not differ materially from the plan proposed by him. The charter was limited to twenty years, expiring on Mar. 3, 1836. The capital was fixed at $35,000,000, seven millions of which was to be subscribed by the government, payable in coin or in stock of the United States bearing interest at 5 per cent., and redeemable at the pleasure of the government.

During the following year the currency was greatly depreciated; very many failures of State banks, corporations, and individuals had occurred, and the country had not yet recovered from the exhausting effects of its late war. In this emergency the bank attempted, by the importation of more than seven millions of dollars from Europe, at a cost of half a million, to restore soundness to the currency; but it became itself embarrassed, largely through the mismanagement of the branch at Baltimore, and was in danger of absolute failure. Its losses were reported to exceed three millions of dollars; but the bank, as well as the business of the country, eventually recovered. The industries of the people and the finances of the government prospered from 1820 to 1835. In this interval the national debt was paid, and the stock of the bank rose in the market until it commanded a premium of 20 per cent.

Congress having refused to recharter the bank, a bill was introduced in the legislature of Pennsylvania to charter a State bank, to be called the United States Bank; which bill became a law just thirteen days before the expiration of the original charter. The circulating notes and the deposits of the Bank of the United States were eventually paid in full, and the accounts of the assignees were finally settled in 1856. The shares of the bank were quoted in 1837 at 125, in 1839 at 111, and in 1843, after its failure, at 1⅞ per cent. The shareholders received no returns on their stock in the final settlement, the whole twenty-eight millions invested by them having been a total loss. The treasury records show that the government realized a profit of $6,093,167 upon its investment in the stock of the bank.

State banks were organized in most of the States of the Union under special charters obtained from their several legislatures. Many of the States, chiefly Southern and Western, authorized banking corporations, with the State as part or sole stockholder. The amount of currency issued by them was frequently twice, and in many instances three times, the amount of their nominal capital. These charters were valuable, and the State legislatures were besieged by applicants for such special privileges. In 1814 a bill was passed, by a two-thirds vote over the second veto of Gov. Snyder of Pennsylvania, authorizing forty-one banks, with an aggregate capital of seventeen millions, of which only one-fifth part was required to be paid in. Charters of banks authorized by the New England and the Southern States in some instances were disposed of to non-residents, who organized banks of circulation with little or no capital, and the citizens of other remote States suffered great loss from the worthlessness of such bank issues. The charters of these banks were in the interest of individuals, and generally of the friends of the dominant political party in the legislature which granted them. In many instances they were corruptly obtained. Gov. Tompkins of New York in the year 1813, under authority of a clause in the constitution of 1777, prorogued the legislature of that State, assigning as one of the reasons for such action that bank applicants had used or attempted to use corrupt means to secure a charter; and a clause was inserted in the constitution of 1821 which required the assent of two-thirds of the legislature to the incorporation of a moneyed institution. In 1804 and in 1818 restraining acts were passed by the legislature of that State, the latter of which provided that no person or association, unless authorized by law, should open an office for the purpose of receiving deposits, discounting promissory notes, or issuing circulation. This act was not repealed until the year 1837. Specie payments were generally suspended in 1814, in 1837, and in 1857, but many of the banks, particularly in the Western and Southern States, which were authorized to issue currency without security, and without such judicious restrictions as should always accompany legislation of this kind, were in a continual state of suspension. The rates of exchange between the Eastern, Southern, and Western States were oppressive, and the losses to the bill-holders from this cause were estimated to be not less than 5 per cent. annually upon the circulation, and to equal in twenty years the entire amount of circulation outstanding.

In 1813 a movement toward a reform in bank currency began in Massachusetts. This system was more fully developed in 1825, when five Boston banks undertook its management. Its exclusive control was finally assumed by the Suffolk Bank, which association compelled the redemption at par in Boston of the notes of the New England banks by a system of assorting and returning the notes to the place of issue; and its operations were continued down to the establishment of the national bank system.

In 1829, Mr. Van Buren, then governor of New York, recommended a "safety-fund" system as affording greater security to the creditors and bill-holders of chartered banks; and during that year a bill which embodied his recommendation passed the legislature and became a law. The system continued in operation for nine years, and its chief features were subsequently copied by the State of Ohio and other States of the Union.

Suggestions regarding the expediency of requiring security to be given for bank issues were made by financial writers as early as 1815, and by Mr. Gallatin in 1831. The latter proposed that existing bank-notes be taxed out of existence, and suggested a system of currency which should be secured by stocks and real estate. The system of authorizing banks by special charter, with its attendant evils, continued, however, in all the States down to the passage by the New York legislature of the Free Bank act on Apr. 18, 1838. Under the provisions of this act any number of persons was authorized to form banking associations, upon the conditions and subject to the liabilities specified in the act. The law originally provided for the deposit of the stocks of the different States and bonds and mortgages as security for circulating notes. Previous to the year 1843 twenty-nine of these banks, with an aggregate circulation of $1,233,374, had failed, and their securities were sufficient to pay but 74 per cent. of the circulation alone. Losses to bill-holders occurred only in the cases of those banks which had deposited State stocks other than those of New York. The law was so amended in 1849 as to require that at least one-half of the securities so deposited should consist of New York State stocks, and that not more than one-half should be in the stocks of the United States, the securities in all cases to be, or to be made, equal to a stock producing an interest of 6 per cent. per annum, and to be taken at a rate not above their par value, and at not more than their market value. The banks were under the supervision of a commissioner appointed under the Safety-Fund act until the year 1843, in which year they were required to report to the State comptroller; but in 1851 the present office of bank superintendent was established. In 1840 a law was passed requiring the banks of New York to redeem their notes at an agency of the bank, either in New York City, Albany, or Troy, at one-half of 1 per cent. discount. This discount was reduced in 1851 to one-fourth of 1 per cent. After the passage of this act two of the principal banks in the city of New York inaugurated a plan of redemption similar to the Suffolk system. The notes of such associations as kept a deposit with them were returned to the banks of issue, and the discount of one-fourth of 1 per cent. was divided between the redemption agent and the associations whose notes were redeemed. Those banks which did not provide the means for redemption were forced to close up their affairs.

In the year 1832 a resolution of the national House of Representatives required the secretary of the treasury to compile statistics in reference to banks from the reports of State officials. The results, although the best that were attainable, are only approximately correct.

Secretary Chase, in his annual reports for 1861 and 1862, recommended the establishment of a national banking system.

The act of Congress which authorized the existing national system was approved on Feb. 25, 1863, but this law was subsequently superseded by the act of June 3, 1864, which provided for the establishment of a national bank bureau in the treasury department, the chief officer of which is the comptroller of the currency. Under this act national banks may be organized by any number of persons, not less than five, the capital in any instance to be not less than $100,000, except that in cities containing a population not exceeding 6000 banks may be established with a capital of not less than $50,000. The capital stock in cities having a population of 50,000 must not be less than $200,000. Not less than one-third of the capital was required to be invested in United States bonds, upon which circulating notes may be issued equal in amount to 90 per cent. of the current market value, but not exceeding 90 per cent. of the par value of the bonds deposited; the notes are receivable at par in the United States in all payments to and from the government, except for duties on imports, interest on the public debt, and in redemption of the national currency. On Mar. 3, 1865, an act was passed providing that every banking association should pay a tax of 10 per cent. on the notes of any person or State bank used for circulation and paid out by them; which act had the effect of taxing State-bank circulation out of existence.

The national bank act authorized the issue of 300 millions of circulation; which amount was increased to 354 millions by the act of May 12, 1870. The act of June 20, 1874, provided for the deposit by any association of lawful money with the treasurer in sums of not less than $9000, and the withdrawal of a proportionate amount of the bonds on deposit as security for its circulating notes. The act of Jan. 14, 1875, authorized the unlimited issue of circulating notes, subject to the restrictions of then existing law, but made it the duty of the secretary of the treasury to retire legal-tender notes to the extent of 80 per cent. of the additional national bank-notes issued, and to continue such retirement until the legal-tender notes should be reduced to 300 millions. The greatest amount of national bank circulation outstanding at any one time was on Oct, 13, 1882, when it reached $363,407,474. Since the passage of the act of Jan. 14, 1875, and up to Oct. 1, 1883, there has been a small increase of $737,687 in national bank-notes, and a decrease of legal-tender notes of $35,318,984 up to May 31, 1878, when the law requiring a reduction was repealed. There was also on Oct. 1, $36,821,501 of legal-tender notes on deposit with the treasurer for the purpose of retiring national bank notes.

The following table exhibits the amounts and kinds of paper currency outstanding on Aug. 31, 1865, when the public debt reached its maximum, and for several years thereafter to Jan. 1, 1885, inclusive:

DATE.	Legal-tender notes.	Old demand notes.	Fractional currency.	Totals.	Nat. bank notes.	Aggregate.	Currency price of gold.	Gold price of currency.
	Mill's.	Th's.	Mill's	Mill's.	Mill's.	Mill's.	Pr. ct.	Pr. ct.
Aug. 31, 1865..	432.8	403.	26.3	459.5	176.2	635.7	144.5	69.2
Jan. 1, 1867...	380.3	221.7	28.7	409.2	299.9	709.1	132.5	75.4
Jan. 1, 1870...	356.	113.	39.8	395.9	299.9	695.8	120.	83.3
Jan. 1, 1873...	358.5	84.4	45.7	404.3	344.6	748.9	112.	89.3
Jan. 1, 1874...	378.4	79.6	48.5	427.	350.8	777.8	110.3	90.6
Jan. 1, 1875...	382.	72.3	46.4	428.5	354.1	782.6	112.5	88.9
Jan. 1, 1877...	366.1	65.5	26.3	392.5	321.6	714.1	107.	93.4
Jan. 1, 1878...	349.9	63.5	17.8	367.7	321.7	689.4	102.9	97.2
Jan. 1, 1879...	346.7	62.	16.1	362.8	323.8	686.6	100.	100.
Jan. 1, 1880...	346.7	61.	15.7	362.4	342.4	704.8	100.	100.
Jan. 1, 1881...	346.7	61.	15.5	362.2	344.4	706.6	100.	100.
Jan. 1, 1882...	346.7	60.	15.5	362.2	362.4	724.6	100.	100.
Jan. 1, 1883...	346.7	59.	15.4	362.2	361.9	724.1	100.	100.
Jan. 1, 1884...	346.7	58.8	15.3	362.1	349.7	711.8	100.	100.
Jan. 1, 1885...	346.7	58.2	15.3	362.1	328.4	690.5	100.	100.

The National Bank act required that the national banks in the city of New York should hold in lawful money 25 per cent. of their deposits and circulation as a reserve fund, which fund should be retained in their own vaults; the banks in other principal or redeeming cities to hold the same percentage of reserve, but being allowed to keep one-half of this reserve in cash deposits in the city of New York. Other banks were required to hold a reserve of 15 per cent., three-fifths of which might consist of balances due from approved associations in the redemption cities. The act of June 20, 1874, repealed the provision requiring the national banks to hold a reserve on their circulation. The following table exhibits the amount of circulation, net deposits, and reserve of the national banks in the whole country at the dates named since 1870:

DATES.	National banks in the United States.						
	No. of banks.	Circulation.	Net deposits.	Specie.	Other lawful money.	Due from agents.	Ratio of reserve.
		Millions.	Millions.	Millions.	Millions.	Millions.	Pr ct.
Oct., 1870...	1615	291.8	523.5	14.5	122.6	66.3	24.9
Oct., 1871...	1767	315.5	636.7	12.0	134.5	86.9	24.5
Oct., 1872...	1919	333.5	619.8	10.2	119.0	80.7	22.1
Oct., 1880...	2090	317.4	968.0	108.2	80.2	134.6	33.4
Oct., 1881...	2132	320.2	1111.7	112.7	76.0	133.0	28.9
Oct., 1882...	2269	308.9	1118.6	102.9	87.8	113.3	27.2
Oct., 1883...	2501	310.5	1168.7	107.8	96.2	124.9	28.1
Oct., 1884...	2664	289.8	1098.7	128.6	91.2	112.	31.6

National banks are authorized to loan money at the rate of interest allowed by the laws of the State in which they are located. When no rate is fixed by the laws of the State, the banks may charge 7 per cent. Shareholders are held individually liable, equally and ratably, for all debts of the association to the extent of the amount of their stock, in addition to the amount invested therein. The banks are required, before the declaration of a dividend, to carry one-tenth part of their net profits of the preceding half year to a surplus fund until the same shall amount to 20 per cent. of the capital; and losses and bad debts must be deducted from net profits before any dividend is declared. In 1866 the surplus of the banks was 50 millions; in 1868, 70 millions; in 1872, 100 millions; in 1877, 130 millions; in 1883, 138½ millions. State banks to the number of 612 have been converted into national banks, and have brought with them into the system accumulated profits amounting to nearly 40 millions.

The following table exhibits, by geographical divisions, the ratio to capital, and to capital and surplus, of the dividends of national banks for 1877 to 1883 inclusive, and the average rates for the whole period:

GEOGRAPHICAL DIVISIONS.	Dividends to capital.								Dividends to capital and surplus.							
	1877.	1878.	1879.	1880.	1881.	1882.	1883.	Average.	1877.	1878	1879.	1880.	1881.	1882.	1883.	Average.
	Pr. ct.	Pr. ct.	Pr. ct.	Pr. ct.	Pr. ct.	Pr. ct.	Pr. ct.	Pr. ct.	Pr. ct.	Pr. ct.	Pr. ct.	Pr. ct.	Pr. ct.	Pr. ct.	Pr. ct.	Pr. ct.
New England States..........................	7.6	6.8	6.4	6.8	7.2	7.2	7.0	7.0	6.0	5.6	5.2	5.6	5.8	5.7	5.6	5.6
Middle States..	8.5	7.9	7.9	8.4	8.5	8.4	8.7	8.3	6.6	6.1	6.0	6.4	6.4	6.3	6.4	6.3
Southern States....................................	8.3	7.3	7.0	7.8	8.3	8.2	8.1	7.9	7.1	6.1	6.0	6.7	6.9	6.7	6.5	6.6
Western States and Territories........	12.2	9.6	9.4	9.5	10.4	12.1	9.8	10.4	9.6	7.7	7.5	7.5	8.1	9.4	7.9	8.2
United States..	8.9	7.8	7.6	8.0	8.4	8.7	8.3	8.2	7.1	6.2	6.1	6.4	6.6	6.8	6.5	6.5

A receiver may be appointed by the comptroller to close up, under his supervision, the affairs of any national bank which shall fail to keep good its lawful money reserve, to redeem its circulating notes, or which may become insolvent. From the date of the organization of the national banking system to Nov. 1, 1884, 100 banks have failed with an aggregate capital of 21 millions, amount of creditors' claims proved 38 millions, and dividends paid 23 millions, while the total loss to creditors is estimated at 8 millions. There has been no loss whatever on circulation. A suit may be brought for the forfeiture of the charter of a bank if the directors shall knowingly violate the law; and in such cases they may be held liable for damages in their individual capacity.

There are other restrictions in the law—such as, for instance, the prohibition against loaning to any one borrower of more than 10 per cent. of the capital of the association, or the holding of any real estate except such as is required for banking purposes, or the granting of loans upon the security of the stock of the bank or upon United States or national bank-notes.

The total number of shares of national bank stock on July 1, 1876, was 6,505,930, and the number of shareholders was 208,486; the average amount of stock held by each shareholder being about $3100. Shareholders of national bank stock reside in every State of the Union, in eleven countries or provinces of this continent and adjacent islands, and in twenty-five countries in Europe, Asia, and Africa and the islands of the sea.

The banks were, up to Mar. 3, 1883, at which date an act was passed repealing the tax on capital and deposits, required to pay annually 1 per cent. tax upon their circulation, and ½ per cent. upon their average deposits and upon their average capital not invested in United States bonds. The total amount of this tax on Jan. 1, 1883, was on circulation, $53,821,003; deposits, $60,940,067; capital, $7,855,888; making an aggregate of $122,616,958. The total taxation, national and State, of the national banks, for 1872–81, is shown in the following table:

YEARS.	Capital stock.	United States.	State.	Total.	U. S.	State.	Total.
					Per cent.	Per cent.	Per cent.
1872....	$472,956,958	$6,703,910	$8,343,772	$15,047,682	1.4	1.8	3.2
1873....	488,778,418	7,004,646	8,499,748	15,504,394	1.4	1.8	3.2
1874....	493,751,079	7,256,083	9,620,326	16,876,409	1.5	2.0	3.5
1875....	503,687,911	7,317,531	10,058,122	17,375,653	1.5	2.0	3.5
1876....	501,788,079	7,076,087	9,701,732	16,777,819	1.4	2.0	3.4
1877....	485,250,694	6,902,573	8,829,304	15,731,877	1.4	1.9	3.3
1878....	471,064,238	6,727,232	8,056,533	14,783,765	1.4	1.7	3.1
1879....	456,968,504	7,016,131	7,603,232	14,619,363	1.5	1.7	3.2
1880....	457,266,545	8,118,103	7,876,822	15,994,925	1.8	1.8	3.6
1881....	462,341,601	8,902,592	8,286 488	17,189,080	1.9	1.8	3.7

The ratio of taxation, State and national, in the New England States, in 1881 was 3.2 per cent.; in the Middle States, 4.2 per cent.; Southern States, in 1880 and 1881, 3 per cent.; Western States, in 1880, 3.9 per cent., and in 1881 4.1 per cent. The rate of taxation in Boston for 1881 was 3.5 per cent.; in New York, 6.8 per cent.; Philadelphia, 3.3 per cent.; Baltimore, 3.1 per cent.; and in St. Louis, 5.2 per cent. The United States law imposing tax on capital and deposits was repealed and took effect Jan. 1, 1883.

In Oct., 1864, there were 508 national banks in operation, with a capital of 86 millions; in 1865, 1513 banks, with a capital of 393 millions; and in 1867, 1642 banks, with a capital of 420 millions. The following table exhibits the number and resources and liabilities of the national banks at corresponding dates for ten years:

	Oct. 8, 1870.	Oct. 2, 1871.	Oct. 3, 1872.	Sept. 12, 1873.	Oct. 1, 1878.	Oct. 2, 1879.	Oct. 1, 1880.	Oct. 1, 1881.	Oct. 3, 1882.	Sept. 30, 1884.
	1615 banks.	1767 banks.	1919 banks.	1976 banks.	2053 banks.	2048 banks.	2090 banks.	2132 banks.	2269 banks.	2664 banks.
Resources.	Millions.	Millions.	Millions.	Millions.	Millions.	Millions.	Millions.	Millions.	Millions.	Millions.
Loans	715.9	831.6	877.2	944.2	834.0	878.5	1041.0	1173.8	1243.2	1245.3
Bonds for circulation	340.9	364.5	382.0	388.3	347.6	357.3	357.8	363.3	357.6	327.4
Other U. S. bonds	37.7	45.8	27.6	23.6	94.7	71.2	43.6	56.5	37.4	30.4
Stocks, bonds, etc	23.6	24.5	23.5	23.7	36.9	39.7	48.9	61.9	66.2	71.4
Due from banks	109.4	143.2	128.2	149.5	138.9	167.3	213.5	230.8	198.9	194.2
Real estate	27.5	30.1	32.3	34.7	46.7	47.8	48.0	47.3	46.5	49.9
Specie	18.5	13.2	10.2	19.9	30.7	42.2	109.3	114.3	102.9	128.6
Legal-tender notes	79.3	107.0	102.1	92.4	64.4	69.2	56.6	53.2	63.2	77.0
National bank-notes	12.5	14.3	15.8	16.1	16.9	16.7	18.2	17.7	20.7	23.3
Clearing-house exchanges	79.1	115.2	125.0	100.3	82.4	113.0	121.1	189.2	208.4	66.3
U. S. certificates of deposit	....	....	6.7	20.6	32.7	26.8	7.7	6.7	8.7	14.2
Due from U. S. Treasury	....	....	....	....	16.5	17.0	17.1	17.5	17.2	17.7
Other resources	66.3	41.2	25.2	17.3	24.9	22.1	23.0	26.2	28.9	33.8
Totals	1510.7	1730.6	1755.8	1830.6	1767.3	1868.8	2105.8	2358.4	2399.8	2279.5
Liabilities.										
Capital stock	430.4	458.3	479.6	491.0	466.2	454.1	457.6	463.8	483.1	524.3
Surplus fund	94.1	101.1	110.3	120.3	116.9	114.8	120.5	128.1	132.0	147.0
Undivided profits	38.6	42.0	46.6	54.5	44.9	41.3	46.1	56.4	61.2	63.2
Circulation	293.9	317.4	335.1	340.3	301.9	313.8	317.3	320.2	315.0	289.8
Due to depositors	515.2	631.4	628.9	640.0	668.4	736.9	887.9	1083.1	1134.9	993.0
Due to banks	130.1	171.9	143.8	173.0	165.1	201.2	267.9	294.9	259.9	246.4
Other liabilities	8.4	8.5	11.5	11.5	7.9	6.7	8.5	11.9	13.7	15.8
Totals	1510.7	1730.6	1755.8	1830.6	1767.3	1868.8	2105.8	2358.4	2399.8	2279.5

National banks are required to make not less than five reports annually to the comptroller of the currency, showing their condition; and all State banks and private bankers report to the commissioner of internal revenue semi-annually, for purposes of taxation, the amounts of their capital and deposits. From these returns the following table has been compiled by the comptroller of the currency, showing by geographical divisions the capital and deposits of the national banks for Dec. 30, 1882, and the average capital and deposits of State banks and private bankers for the six months ending Nov. 30, 1882. From this table it will be seen that the total number of banks and bankers in the country at the date named was 7448, with a banking capital of $717,318,882, and with total deposits of $2,902,522,245.

GEOGRAPHICAL DIVISIONS.	National banks.			State banks and private bankers.			Savings banks with and without capital.			Total.		
	No.	Capital.	Deposits.	No.	Capital.	Deposits.	No.	Capital.	Deposits.	No.	Capital.	Deposits.
		Millions.	Millions.		Millions.	Millions.		Millions.	Millions.		Millions.	Millions.
New England States	560	166.2	193.1	134	14.5	38.2	422	0.1	437.1	1116	180.8	668.4
Middle States	691	173.2	556.6	1177	103.0	356.7	179	0.6	492.3	2047	176.8	1405.6
Southern States	214	34.8	68.8	537	31.7	66.6	9	0.6	3.3	760	67.1	138.7
West. States and Territories	843	110.7	301.3	2625	79.2	317.4	57	2.7	71.0	3525	192.6	689.7
United States	2308	484.9	1119.8	4473	228.4	778.9	667	4.0	1003.7	7448	717.3	2902.4

The act of July 12, 1882, authorized the extension of the corporate existence of all national banks for twenty years by amending their articles of association with the consent, in writing, of shareholders owning not less than two-thirds of the capital stock of the association, and 270 banks have already extended their corporate existence under this act. The periods of succession of 240 banks will expire in 1884 and 730 banks in 1885, and, in all, 1278 banks previous to the year 1890.

The reports of the comptroller of the currency for 1875 and 1878 contain a review of the national banking system, and tables showing the condition of these banks yearly since the organization of the system; and the report for 1876 gives an historical sketch of the two Banks of the United States and of the State systems of banking, together with tables showing the resources and liabilities of these banks by geographical divisions and by States, from the earliest dates, so far as they could be obtained from official sources. The report for 1881 gives the proportion of coin and paper money and of checks received on two different days by the national banks of each State and principal city; and the report of 1883, in addition to the usual bank statistics, gives the amount of gold and silver coin and paper money (see CURRENCY) in the banks and in the treasury and in the hands of the people on Jan. 1, 1879, the date of the resumption of specie payment, and on Nov. 1 for each year subsequently.

The amount of bonds held by the national banks as security for circulation on Feb. 20, 1884, was $341,812,550. Of this amount nearly 189 millions were in three-per-cents. which are payable at the pleasure of the government. The banks also hold 107 millions of four-per-cents., which are quoted at 24 per cent. premium in the market, and 42 millions of four-and-one-half-per-cents., which are quoted at 14 per cent. premium. The receipts of the government over its expenditures for the current year were estimated at 80 millions, and from time to time, as the surplus accumulates, the secretary is compelled to call in rapidly for payment the three-per-cents., and the profit upon circulation issued by deposit of the four and four and one-half per cent. premium is not sufficient to induce the banks to deposit such bonds. A contraction of the circulation is therefore imminent for about the amount of bonds called by the secretary.

The comptroller in his report says: "This contraction of the bank circulation may be avoided by the reduction of the redundant revenue, and there is no doubt that this is the true policy. The contraction of the bank circulation may also be avoided by the conversion of the long bonds into three-per-cents. by offering inducements to the holders of these bonds to exchange them for three-per cents. to mature in 1907, the government paying to the holders thereof a reasonable amount for their difference in value. The principal objection made to this proposition is that the government would pay to the holders a large premium upon the bonds held by them, but it is evident that in the course of two or three years after the three-per-cents. are paid, if there is no reduction in the revenue, the surplus will enormously increase, unless the long bonds are then purchased by the government at a rate to be then fixed by the holders thereof, which will be a rate much higher than that now proposed. The premium to be paid to the holders of these long bonds may be considerably reduced by providing that the circulation to be issued upon the proposed bonds when deposited by the national banks as security therefor shall not be subject to the present tax of 1 per cent. per annum, or by postponing the time for their payment. Such legislation would make the new bonds more valuable for this purpose than for any other, and would be likely to prevent their withdrawal until maturity if once deposited; and for this reason the bonds would be more desirable as a basis for circulation than any which have heretofore been issued. The contraction would also be avoided by providing for the removal of the tax on circulation, and the increase of the amount of circulation to be issued to the banks upon the bonds deposited by them. . . . The proposition to convert the long bonds into threes is more desirable than the proposition to increase the rate of circulation, for the reason already referred to—that the new three-per-cents. payable in 1891 and 1907 would bear but a comparatively small premium in the market, and that the government would be enabled to use its surplus revenues to advantage. They would be the only bonds available for circulation, and would not be likely to be withdrawn for sale for the purpose of realizing the market price; and the profit on circulation would be sufficient to induce banks to deposit them whenever additional circulation is required. From time to time, as the present three-per-cents. are called for payment, the fours and four-and-a-halfs are likely to advance in the market, and subsequently to decline gradually until the day of payment. There will be a diversity of opinion in reference to the date when they will reach their maximum price in the market, and for that reason they will be deposited and withdrawn, not when a greater or less amount of circulation is needed, but when the holder believes that he can realize the greatest profit from their purchase or sale. The new long three-per-cents. would give that elasticity to the circulation which is greatly needed, and which cannot be obtained from the deposit of government securities worth a premium nearly equal to one-fourth of their par value."

Bills have been introduced (1884) in Congress containing each of these propositions. The propositions are: *First*, to fund the four-per-cents., which will mature in 1907, into three- or two-and-a-half-per-cents., paying in cash the difference in value to those holders who will voluntarily agree to such an exchange. *Secondly*, to increase the rate of issue upon four-per-cents, deposited prior to Jan. 1, 1890, an amount in the whole equal to 110 per cent. of the par value of the bonds, the issue of circulating notes during the year 1890 not to exceed 109 per cent. of the par value of the bonds, and the issue of such bonds deposited or held in each succeeding year shall be one per cent. less than in the year preceding, until the limit of issue of such circulating notes is reduced to par, circulation on other U. S. bonds to be issued to an amount not exceeding their par value, and not exceeding the amount at such time actually paid in of the capital stock of each bank. This proposition was rejected in the Senate by vote of 20 yeas to 36 nays. A proposition to authorize the increase of the issue of United States notes not a legal tender as the national bank-notes should diminish was also rejected; yeas 15, nays 35. A *third* measure, which was reported from the finance committee of the Senate with its approval, proposed to issue $100 of circulation on each one hundred bonds, whether it is a three or a four-and-a-half or a four-per-cent. bond. This bill has passed the Senate, and is now, Jan., 1885, pending in the House.

The profit on circulation upon the deposits of four-per-cents., after sinking the premium, under this bill, where the rate of interest is 5 per cent., is .98; where the rate of interest is 6 per cent., .84; and where the rate of interest is 7 per cent., .69. The profit on four-and-a-half-per-cents. where the rate of interest is 5 per cent. is 1.11; where the rate of interest is 6 per cent., 1.04; where the rate of interest is 7 per cent., .97. This bill may be so amended in the House as to authorize the issue of circulation upon the current market value; or the same object may be accomplished by reducing the tax on circulation issued upon the four-per-cents. from one per cent. per annum to one-half per cent. If this tax were reduced one-half, the profit on circulation where the rate of interest is 6 per cent. would be increased from .84 to 1.24 per cent. per annum. Such a measure would have the effect to raise the value of the four-per-cent. bonds slightly in the market, but the value of the circulation would increase in greater proportion, and it is probable that the banks would invest sufficiently in the long bonds to prevent any serious contraction.

The debate in the Senate was noted for almost an entire absence of opposition to the national banking system, the Democrats in the finance committee, without exception, having voted to report the bill authorizing the issue of bank-notes at the rate of 100 per cent. upon the par value of the bonds, instead of 90 per cent., which has been the rate since the first passage of the National Bank act, on Feb. 25, 1863. If the bill which has passed the Senate becomes a law, it will not interfere with the future passage of a bill authorizing the conversion of the long four-per-cent. bonds into two-and-a-half- or three-per-cents.; and further enacting that when the public debt is reduced to 500 or 1000 millions the further reduction shall cease, in order that a sufficient amount, at a rate not exceeding the lowest borrowing rate of the government, may be retained for the purpose of continuing and perpetuating the national banking system. John Jay Knox.

Bank-Ban, ban of Hungary, flourished in the first half of the thirteenth century, and acquired a kind of romantic fame from the prompt revenge he took upon Queen Gertrude, the spouse of Andreas II., king of Hungary. The queen's brother, Eckart, seduced the wife of the ban, and the queen aided him in carrying out his evil design. But as soon as Bank discovered the queen's participation in the conspiracy he gathered a mob, stormed the palace, and killed the queen, though he knew that it would cost him his life. And so it did. When King Andreas II., who was absent on a campaign in Poland, returned, he immediately put Bank to death. The story has several times been made the subject of dramatic treatment. Katona's drama "Bankbán" (Klausenburg, 1827) is considered one of the best dramas the Hungarian literature has produced; it was translated into German by Dux (Leipzig, 1858), and the genuine pathos of the characters and the scenic strength of the story made a great impression. Grillparzer's "Ein treuer Diener seines Herrn" (Vienna, 1830) was also a success.

Bankes (Henry), born in 1757, was educated at Westminster and Trinity College, Cambridge, and entered Parliament in 1780 for Corfe Castle, which place—the family borough—he continued to represent till 1824. He wrote "The Civil and Constitutional History of Rome from the Foundation to the Age of Augustus" (1818, 2 vols.). Died Dec. 17, 1834.

Bank'head (John Pine), U. S. N., born in South Carolina Aug. 3, 1821, entered the navy as a midshipman Aug. 6, 1838, became a passed midshipman in 1844, a lieutenant in 1852, a commander in 1862, and a captain in 1866. Died at Aden, Arabia, on his way home from the East Indies, Apr. 27, 1869. He commanded the gunboat Pembina at the battle of Port Royal, Nov. 7, 1861, and during the subsequent operations on the coast of South Carolina; commanded the Monitor when she foundered off Hatteras on the night of Dec. 31, 1863, and displayed admirable coolness on that trying occasion. Rear-Admiral Lee, in his official report of the disaster, says: "The vessel filling rapidly, Commander Bankhead ordered the men then left on board to leave in the Rhode Island's boat, then cautiously approaching, as the sea was breaking violently over the Monitor's submerged deck. In this perilous position Commander Bankhead *held a boat's painter until as* *many men got in as the boat could carry.* He did not leave his vessel so long as he could do anything towards saving his crew." He was a son of General James Bankhead, U. S. A. (1783–1856). FOXHALL A. PARKER.

Bank-Notes, Manufacture of. An important object in making bank-notes is to guard against counterfeits. The engraving should be such that the public can distinguish the genuine note by its superiority of execution, and the officers of the bank by secret peculiarities of design. These ends are secured mainly by the use, in engraving, of rare and very expensive lathes. The writing, the emblems, and figures are so combined as to render forgery difficult. The ink is peculiar. The paper also is of peculiar manufacture, both in Europe and America. About 1837 a great improvement was made in the engraving of bank-notes. This was the production of designs by the mill and die, by mechanical pressure, invented by Jacob Perkins. The pattern is engraved on a soft steel plate, which is then hardened to transfer the pattern by pressure to a soft steel roller, on which, of course, the pattern is produced in relief. The roller is then hardened to reproduce the pattern in the plate on which the note is to be printed. In England a process of lithographic transfer is employed. (See ENGRAVING, BANK-NOTE, by C. L. VAN ZANDT.)

Bank′rupt [Lat. *bancus*, a "bench," and *ruptus*, "broken"], a term originally applied to a merchant whose bench or counter had been broken by reason of inability to pay his debts. In its popular sense the word is now nearly synonymous with *insolvent*, and denotes any person unable to meet his liabilities. In England its legal signification is well defined. It embraces only traders, or persons whose business it is to buy and sell for gain, and the various statutes which have been enacted there since the reign of Henry VIII. in relation to bankrupts have been applicable to that class alone. By the English laws a bankrupt is a trader who has committed an act of bankruptcy, as defined by statute. A trader may have committed an act of bankruptcy, and have been formally adjudged a bankrupt, and yet be entirely solvent—that is, eventually able to pay his debts in full; and he may be wholly unable to pay his debts, and yet have committed no act of bankruptcy. A bankrupt was at first regarded as an offender against the law, and bankrupt laws were intended for the benefit of creditors. But at present they are founded on the interests of trade, and intended to be beneficial to both debtor and creditor. If the conduct of the bankrupt has been such as to entitle him to the consideration of the court, he is discharged for ever from all debts owing by him at the time he became a bankrupt. The law is confined to traders, because they are regarded as possessing peculiar facilities for delaying and defrauding creditors; and, on the other hand, they are considered, generally speaking, the only class subject to heavy accidental losses, and to an inability to pay their debts without any fault on their part. The above statements must be qualified by the results of the statute 32 & 33 Vict. c. 71, taking effect January 1, 1870. For the details of this act see INSOLVENCY.

In the U. S., Congress possesses the power, under the Constitution, to establish uniform laws on the subject of bankruptcies. Pursuant to this power, in the year 1800 Congress passed a bankrupt law, which by its own terms was limited to five years, but it was repealed in 1803. This law preserved the leading features of the English laws relating to bankruptcy. It could be enforced only on the application of creditors, and embraced only the mercantile class.

In the year 1841 the second bankrupt act was enacted by Congress. It could be taken advantage of by all persons whomsoever residing in the U. S. owing debts not contracted in a fiduciary capacity, although it could be enforced at the instance of creditors only against merchants, bankers, brokers, factors, and underwriters. This extended exercise of the power over the subject of bankruptcy was violently opposed as unconstitutional, on the ground that Congress was confined to the well-recognized meaning of the term bankruptcies as understood in the English courts when the Constitution was formed. The law was repealed in Mar., 1843.

But by act approved Mar. 2, 1867, Congress passed a third bankrupt law, even more general in its scope than the preceding. Under it any person residing in the U. S. and owing debts to the amount of $300 can, on his own application showing his inability to pay his debts in full, and his desire to surrender his property for the benefit of his creditors, take advantage of the act and be declared a bankrupt. So a debtor owing a specified amount can be forced to become a bankrupt upon the application of creditors if he has committed any of certain offences or acts specified in the statute. The bankrupt, after the distribution of his property amounting to a fixed per centage of his debts, obtains a discharge from all his indebtedness existing at the time the petition was filed, except in certain instances specified in the act. This act has been in its turn repealed (chap. 160, laws of 1878).

The distinguishing feature of a bankrupt act is the summary seizure of all the debtor's property, and its division among his creditors in proportion to their claims. The race of diligence among creditors is entirely at an end, and all legal proceedings, except such as are in conformity to the statute, are stayed. It is against the policy of the bankrupt law to allow the debtor, in contemplation of bankruptcy, to give preference to one creditor over another. All such preferences are void, and an attempt to make them is of itself an act of bankruptcy.

The various States also possess the power to pass bankrupt laws, but no State bankrupt or insolvent law can impair the obligations of contracts. Hence they cannot release a debtor from obligations incurred before the passage of such law, nor act upon the rights of citizens of other States. And when Congress sees fit to exercise the power over the subject of bankruptcies granted it by the Constitution, the State laws on the same subject are suspended. On the repeal of the Congressional law the State laws would revive. The power of Congress over the subject is plenary, and its law may affect existing debts as well as those which are contracted after its enactment.

The judicial business in bankruptcy is in the main transacted by the district court of the U. S., with officers called registers to conduct the administrative or non-contested business. The estate is managed by an assignee, who acts as a trustee, and is accountable to the court referred to. T. W. DWIGHT.

Banks (JOHN), an English dramatist of the seventeenth and eighteenth centuries, wrote several tragedies which were once popular, especially "The Unhappy Favorite; or, Earl of Essex." The date of his death is unknown.

Banks (JOHN), born in Berkshire, England in 1709, wrote "Critical Review of the Life of Oliver Cromwell." Died in 1751.

Banks (NATHANIEL PRENTISS), LL.D., a statesman and general, born at Waltham, Mass., Jan. 30, 1816. He learned the trade of a machinist, studied law, and was elected to the legislature as a Democrat in 1849, and was chosen speaker of the house of representatives of Massachusetts in 1851. Having been elected a member of the national Congress in 1852, he was separated from the Democratic party by his opposition to the extension of slavery, and in 1854 was returned to Congress by the Republicans and Know-Nothings. In Feb., 1856, after an exciting contest which occupied two months, he was chosen Speaker of the House on the one hundred and thirty-third ballot. He was elected governor of Massachusetts, in Nov., 1857, for one year, and was re-elected in 1858 and 1859. In May, 1861, he was appointed a major-general of volunteers, and soon obtained the command of an army on the Potomac. Having gained some advantage at Winchester in Mar., 1862, he pursued the enemy to Harrisonburg. On the 24th of May he was attacked by Stonewall Jackson, and retreated rapidly to the Potomac. In Dec., 1862, he succeeded General Butler as commander of the department of the Gulf. About the end of May, 1863, he invested Port Hudson, which was taken with about 6000 prisoners, July 9. In the spring of 1864 he conducted an expedition up the Red River, in which Rear-Admiral Porter co-operated with the gunboats. He ascended above Grand Ecore. After several battles at Pleasant Hill (April 9) and other places, being pressed by superior numbers, he retreated towards New Orleans, and was relieved from the command in May, 1864. He was chosen a member of Congress by the Republicans of Massachusetts in 1864, in 1866, in 1868, and in 1870. He served as chairman of the committee of foreign relations in the fortieth and forty-first Congresses. He advocated the election of Horace Greeley as President, and was defeated for Congress in 1872, but was re-elected in 1874 and 1876.

Banks (Sir JOSEPH), LL.D., F.R.S., an eminent English naturalist, born in London Jan. 4, 1743, inherited an easy fortune. He was educated at Oxford, which he quitted in 1763, was elected a fellow of the Royal Society in 1766, and sailed with Captain Cook in his voyage round the world in 1768. He returned in 1771 with rich collections of plants, animals, etc. In 1777 he was chosen president of the Royal Society, over which he presided forty-two years. He was a liberal patron of naturalists and scientific men, who under his auspices performed several voyages of discovery. The colony of Botany Bay owed its origin mainly to him. He contributed memoirs to the "Philosophical Transactions" and other publications. Died June 19, 1820. (See CUVIER, "Eulogy on Sir

J. Banks," 1821; Duncan, "Short Account of the Life of Sir J. Banks," 1821.)

Banks (Thomas), the first great English sculptor, born at Lambeth Dec. 22, 1735. He gained the gold medal of the Royal Academy in 1770, and went to Rome in 1772. He remained for several years in Rome, and produced there "Caractacus pleading before Claudius," and an admirable statue of "Psyche and the Butterfly," which was purchased by Catharine II. of Russia, at whose invitation he visited St. Petersburg in 1784. Among his masterpieces is the "Mourning Achilles." He excelled in imaginative works. He became a member of the Royal Academy. Died Feb. 2, 1805.

Bank'sia, a genus of Australian shrubs and trees of the order Proteaceæ (named in honor of Sir Joseph Banks), have hard dry leaves, and an umbellate arrangement of branches bearing near the extremities oblong heads of numerous flowers, which secrete much honey. They are called honeysuckle trees, and abound in all parts of Australia. One species (*Banksia grandis*), found at Swan River, grows to a height of fifty feet.

Banks, Savings. See Savings Banks.

Ban'nack City, or **Bannock City,** a mining-town of Beaver Head co., Mon. (see map of Montana, ref. 4-C, for location of county), is on or near the Jefferson Fork of the Missouri River, about 50 miles west of Virginia City. Gold and silver are found in this vicinity. The name is derived from the Bannack tribe of Indians, who are now much reduced in numbers. Pop. in 1880, 232.

Ban'natyne Club, a literary club deriving its name from George Bannatyne, who was born in Scotland about 1545. He compiled a collection of manuscripts called "Corpus Poeticum Scotorum." This club was founded at Edinburgh in 1823 by Sir Walter Scott, its design being to promote the knowledge of Scottish history and antiquities, and to print rare works which tend to illustrate those subjects. The club originally consisted of thirty-one members, and gradually increased to one hundred, to which number it was finally limited.

Ban'neker (Benjamin), a negro mathematician, born in Maryland Nov. 9, 1731. He was the author of an almanac (1792 sqq.), of which a copy was sent by Thomas Jefferson to the secretary of the Academy of Sciences at Paris. Banneker assisted in laying out Washington City and running the boundary-lines of the District of Columbia. Died at Baltimore in Oct., 1806.

Ban'ner [Fr. *bannière;* It. *bandie'ra;* Sp. *bande'ra;* so called, probably, because it was *bound* to the flag-staff: it is doubtless from the same root as the German *Band*, a "ribbon"], a military ensign or flag; the standard of a prince or state. Banners have been used in all ages and all countries for the purpose of directing the movements of armies. The banner of the ancient Romans was a square piece of drapery suspended from a transverse bar and supported on a staff. It was marked by the figure of an eagle and the initials S. P. Q. R.—*Senatus Populusque Romanus.* After Constantine became a patron of the Christian religion the Roman banners displayed the cross as the national emblem, and took the name of *labarum.* During the Middle Ages new forms of banners were adopted. From the banner royal, which bore the national emblem, to the pennon of the knight or the small streamer attached to a lance, there was a regular subordination. No one except a person of high rank was permitted to use the square banner. Bishops and abbots had the privilege of displaying banners in religious processions. Soldiers and patriots are warmly attached to the banner or flag of their country as a symbol of nationality and as a visible sign of the national unity and life. (See also Flag.)

Ban'neret, a title formerly given to a soldier for some heroic action. The banneret was higher in rank than a knight, and was so called because he had the privilege of displaying a square banner. When a knight was promoted to the rank of banneret the points of his pennon were cut off, and it was thus converted into a square form. The first English banneret was created by Edward I., and the last was Capt. John Smith, who rescued the banner of Charles I. at the battle of Edgehill.

Bannister (Henry), D. D., born Oct. 5, 1812, at Conway, Mass., graduated at the Wesleyan University, Conn., in 1836, studied at Auburn Theological Seminary, was principal of the Methodist academy at Cazenovia for some years, and in 1856 was appointed professor of exegetical theology in the Garrett Biblical Institute, which is now the theological department of the North-western University, at Evanston, Ill. He was author of several able published sermons, addresses, and reviews scattered in various periodicals. He was also a highly-esteemed professor, teacher, and lecturer. Died April 15, 1883.

Bannister (William Bostwick), born in Brookfield, Mass., Nov. 8, 1783, graduated at Dartmouth 1797, was a successful lawyer and merchant, and a noted friend of learning. He married Miss Grant, a celebrated teacher of Ipswich. Died at Newburyport, Mass., July 1, 1853, leaving $40,000 to various charitable institutions.

Ban'nockburn, a village of Scotland, in the county of Stirling, on the Bannock rivulet, 3 miles S. of Stirling. It was the scene of a famous and complete victory gained by Robert Bruce over the English army, led by the king Edward II., on the 24th of June, 1314. The English lost about 30,000 men. Here are important manufactures of woollens, especially tartans and carpets. Pop. about 2600.

Bannock City. See Bannack City.

Banns (or **Bans**) **of Marriage** [for etymology see Ban], a public notice of an intended marriage, given in a church or other place prescribed by law. The law of England requires that all banns of matrimony shall be published in an audible manner, according to the rubric prefixed to the marriage service in the Book of Common Prayer, upon three Sundays preceding the ceremony. This rubric is in the following terms: "I publish the banns of marriage between A, of ——, and B, of ——. If any of you know cause or just impediment why these persons should not be joined together in holy matrimony, ye are to declare it." The English law, however, dispenses with this preliminary publication if the parties obtain a license from a person authorized to grant it. The custom of banns has been abolished in most of the U. S. The practice was first directed in the times of the Fathers, was enacted afterwards by Odo, bishop of Paris, about 1176, placed in the canon law in 1200 by the Synod of Westminster, and prescribed for the whole Latin Church by the Council of Lateran in 1215. It is still required by the canon law of England and Roman Catholic countries.

Bantam', an old town of Java, on the N. coast, 44 miles W. of Batavia. It was formerly a large city and great entrepôt of trade, but on account of the unhealthy climate is at present almost deserted. In the fifteenth century it was the chief town of a powerful Mohammedan empire of the same name, which at one time even comprised the southern part of Sumatra and the W. coast of Borneo. In 1683 the sultan of Bantam became a vassal of the Netherlands, and in the beginning of the present century the Dutch took possession of the sultanate. The town is in lat. 6° 2′ S., lon. 106° 50′ E.

Ban'tam Fowl, a variety of the common fowl, first brought from the Indies, and supposed to derive its name from Bantam, Java. It is remarkable for its small size and its courage. There are many sub-varieties, most of which have the legs feathered.

Ban'teng' (*Bibos Sonda'icus*), a species of ox (*Bovidæ*), a native of Java and Borneo, which in color, shape, horns, and want of dewlap bears some resemblance to the gaur of India. It has short and sleek hair, slender limbs, and a sharp muzzle. Though extremely wild, it is often domesticated by the natives, and becomes a very serviceable animal.

Ban'tingism, a regimen for the reduction of corpulence; so called after an English gentleman named Banting, who introduced it as the result of his own experience. It consists essentially in the avoidance of food containing fatty matter, and of materials which may make fat in the body, as starch and sugar. Lean meat predominates in this diet; vegetables are almost excluded; butter, milk, sugar, and malt liquors are prohibited. With active exercise this method is often successful in reducing excessive weight.

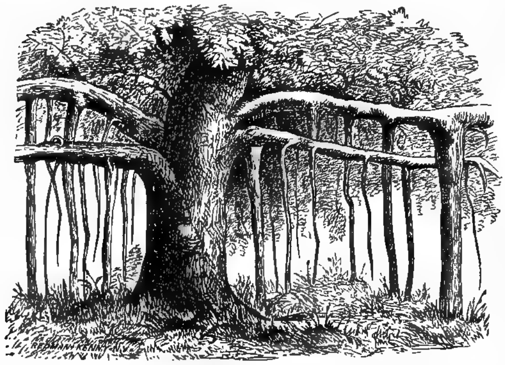
Ban'try, Earls of, and Viscounts Berehaven (1816), Viscounts Bantry (1800), Barons Bantry (1797, in the Irish peerage), a noble family of Great Britain.—William Henry Hare Hedges White, the third earl, was born Nov. 10, 1801, and succeeded his brother in 1868.

Bantry Bay, a deep inlet in the S. of Ireland, in Cork county, is 25 miles long and from 3 to 5 miles wide. It is one of the finest harbors in Europe, affording safe and commodious anchorage for ships of all sizes. The coast of the bay is high and rocky, consisting of Devonian strata, and exhibits some of the finest scenery in the island. Near the entrance of this bay occurred a naval action between the English and French in 1689.

Banvard' (Joseph), D. D., born in New York City in 1810, has held many prominent pastorates in the Baptist denomination, and is the author of numerous Sunday-school Question-books and other works, chiefly tales and histories for the young.

Banx'ring (*Tupai'a*), a genus of insectivorous quadrupeds, natives of Sumatra, India, Borneo, etc.; they climb trees with agility, like lemurs and squirrels. They have an elongated muzzle and a long bushy tail.

Ban'yan,* or **Banian** (*Fi'cus In'dica*), an East Indian tree remarkable for its mode of propagation by means of aërial roots, which, on descending to the ground and penetrating it, become stems or trunks. These roots at first hang like loose cords, but after they take hold they are gradually tightened, till they become almost as firm as a rod of iron. In this manner a single tree spreads over a large extent of ground, and endures for many centuries. One of these trees has been described as having 350 large stems, and occupying so large a space that many thousand persons might stand under its shade. It is a species of fig, and produces a fruit about as large as a cherry, and of a rich scarlet color. An abundance of gum-lac is procured from this tree, the bark of which is esteemed as a tonic by Hindoo physicians. The above illustration may serve to give one an idea of a vigorous and comparatively young banyan tree. In very old trees many of the stems often become almost or quite as large as the original trunk. Its wood is light, porous, and of little value.



Banyan Tree.

Banz, the name of one of the finest Benedictine abbeys known in history, is situated in Bavaria in the midst of a beautiful landscape. The monks of this abbey were noted for their learning and humane spirit. It was founded in 1058. The convent was abolished in 1802, and is now the summer residence of the princes of Bavaria. Here is a museum which is especially rich in petrifactions.

Baobab. See Adansonia.

Baour-Lormian (Pierre Marie François Louis), a French poet of the first empire, born at Toulouse, Mar. 4, 1770, translator of Tasso and Ossian, and author of many tragedies in the severely classic style, which were greatly admired in their time. He was favorably noticed by Napoleon, and was admitted into the French Academy in 1815. Died 1857.

Baph'omet, a mysterious symbol of the Knight Templars, was a small human figure cut out of stone, having two heads, male and female. It was environed with serpents and astrological attributes, and marked with inscriptions, mostly in Arabic. The word is supposed to be a corruption of Mohammed or Mahomet (called by the Portuguese, Bafoma), to whose religion the Templars were suspected of leaning. Others derive it from Βαφὴ Μήτεως, the "bath of wisdom," a reputed name of the Gnostic baptism, often called in old writings "baphometic baptism." Quite a number of baphomets are preserved in European archæological collections.

Bap'tism [Lat. *baptis'ma;* Gr. *βάπτισμα*, from *βαπτίζω*, to "baptize"], the act of initiating a person, by the application of water, into the visible Church of Christ. (See Baptists.

Bap'tistery [Gr. *βαπτιστήριον*], a name given to the building or chamber set apart for the sacrament of baptism. These buildings are either octagonal, polygonal, or circular. They began to be erected probably in the time of Constantine. The baptistery of the Lateran in Rome (about 62 feet in diameter) is said to have been built by him. The baptistery of Florence, among the most celebrated, is an octagonal structure about 100 feet in diameter, standing in close proximity to the cathedral. It is built of black and white marble. The most remarkable features of this baptistery are the magnificent bronze doors, adorned with bas-reliefs by Ghiberti and others. In the centre of each of these buildings erected for baptismal purposes is a font, which is often of considerable proportions—that at Ravenna being about nine feet square, and that of the Lateran, at Rome, thirty-seven inches or more in depth.

Bap'tists, a body of Christians who maintain those views of Christian truth which are commonly regarded as "evangelical," but who differ from adherents of the Church of Rome and from most Protestants in the following respects:

1. They maintain that immersion is an essential condition of valid baptism—appealing, in support of their position, to the significance of the Greek word *βαπτίζω* and its Latin equivalents; to the circumstances in which the baptisms of the New Testament were administered; to the scriptural significance of the rite as a burial with Christ; to the practice of the Church in the early Christian centuries; and to the concessions of those who, while practically rejecting immersion, admit that it was practised by the apostles and the early churches. All pleas for a modification of the rite on the ground of indifference or expediency they meet by insisting on the duty of literal compliance with the precepts and example of Christ, and the importance of maintaining the emblematical significance of the rite.

2. They maintain that a visible Church should be composed of such only, and that such only should be admitted to baptism, as give credible evidence of regeneration—in opposition to those who would make the Church coterminous with a state or states, and those who would include in the Church the unregenerate members of Christian households. These views also they profess to derive from the New Testament, and enforce them on the ground of reason and common sense. They were the first among the various sects of modern Christendom to insist on "a spiritual church-membership;" and it is largely through their influence that that idea has gained such wide acceptance in this country, and is gradually spreading throughout Europe. (See Curtis's "Progress of Baptist Principles.")

3. They maintain that professed believers only should receive baptism. This position is a natural sequence of their view of the spiritual nature of the Church when coupled with the almost universally conceded doctrine that baptism is the initiatory rite of the Church. They point, however, to the baptisms of the New Testament as by explicit statement or fair inference the baptism of believers; and insist that the baptism of an unconscious infant, either on the responsibility of the Church, the State, or the religious household, is a violation of the rights of the individual conscience, which should, in their opinion, "give account of itself unto God" in all matters of religious faith and practice. They maintain, in short, that all the Christian ordinances are acts of faith, requiring the conscious consent of the subject. In reply to arguments drawn from the mention of the baptism of households in the New Testament, they reply that they would cheerfully baptize such households as that of Stephanas baptized by Paul (which is described as "the first-fruits of Achaia, and addicted to the ministry of the saints"), or the household of the Philippian jailer, of which it is explicitly affirmed that they were all believers; and point to the large number of believing households in membership with Baptist churches to show that household baptism does not necessarily imply infant baptism.

4. They maintain that there should be no organic connection between the Church and the State; and, further, that each individual church (by which they understand, "a body of baptized believers, with its pastor and deacons, covenanted together for religious worship and religious work") should be absolutely independent of any other body, whether ecclesiastical or political, being accountable for its doctrines and practices only to the great Head of the Church. As a consequence of this, though Baptist churches are frequently grouped together in "associations," and the "associations" of a State are further combined in "general associations" or "State conventions," though Baptists frequently call "councils" for the recognition of churches, the ordination of ministers, and the adjustment of difficulties, "associations," "conventions," and "councils" have with them no ecclesiastical authority whatever, save that with which the Christian comity of those constituting them invests them, and the moral weight which their conclusions carry.

In view of the facts just stated, the substantial homogeneity in doctrine and practice of a body of Christians which embraces, in the U. S. alone, more than 2,000,000 communicants, may be a matter of surprise; and that surprise will be enhanced when it is understood that the Baptists have no authoritative creeds or symbols, but appeal, in support of doctrine or practice, directly to the word of God. This homogeneity (as complete as that which exists in any denomination of Christians) is attributed by the Baptists to the fact that members enter their churches consciously adopting a coherent, self-consistent, and scriptural system of Christian truth.

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* Probably derived from the Sanscrit *vânyâ* (pronounced *bânyâ* in Bengal), a "grove" or "thicket," a single banyan tree often forming a grove (or thicket) of itself.

It is to reinforce their utterances in behalf of a spiritual church-membership and allegiance in religious matters to Christ alone, by an acted protest to what they believe to be a departure from the apostolic conception of the Christian Church, that the Baptists take a position with reference to the Lord's Supper similar to that taken by the Episcopalians with reference to ministers not episcopally ordained. While cordially co-operating with other religious denominations in all forms of moral and religious activity, they decline to invite them to participation in the Lord's Supper, taking the ground that there is an obvious and necessary distinction between Christian fellowship and church fellowship. Their position with reference to this matter is, briefly stated, that the Lord's Supper is an ordinance designed by Christ for his churches, and entrusted to their care; that baptism is the initiatory rite of the Christian Church; that valid baptism involves the immersion of a professed believer. In the first two particulars they agree with most Christian sects; and hence are accustomed to claim that they do not practise "close communion," but close baptism; that most of the other Christian sects are no more willing than they to invite to the Lord's Supper those whom they do not conscientiously regard as baptized.

In 1815, Robert Hall (one of the most gifted and influential Baptist ministers of England) published a treatise on the "Terms of Communion," in which he endeavored to satisfy himself and others that baptism was not a prerequisite to communion. His general conclusion has been accepted by many who reject the premise from which alone a Baptist could logically derive it; and since his day most of the Baptists of England, and a few in America, have been "open communionists."

History.—The name "Baptists" has been borne by the denomination whom it now designates only about 200 years. It was given to them, as is supposed, either during the Commonwealth in England or shortly afterwards. The name by which they were known previous to the Commonwealth was Anabaptist, and the same name in a German translation, "Wiedertäufer," had for more than a hundred years before been applied to the predecessors of English Baptists in Switzerland and Germany. But as in Switzerland, Germany, Moravia, and Holland these Christians had from the first denied the appropriateness of the name "Wiedertäufer" (Rebaptizer), so in England their first recorded Confession of Faith (A. D. 1644) is said to be of "churches of Christ in London which are commonly (but unjustly) called Anabaptists." In this historical sketch the name *Baptist* will be used to designate the German "Wiedertäufer," the Dutch "Doopsgezinden," and English "Anabaptists" and "Baptists," without intending by the name to assert a perfect similarity between them in all things. The German "Anabaptists" (see article ANABAPTISTS) more frequently practised pouring than immersion; and the same statement may be made (see below) respecting the Dutch "Mennonites." These bodies of Christians agreed with our modern Baptists, however, in admitting only professed believers to baptism, and in maintaining the independence of a gospel Church of ecclesiastical or political control. They are, in some sense, the progenitors of the Baptists of to-day, though the historical connection between the two cannot be easily traced.

Over the continental Baptists of the time of the Reformation has hung a cloud of misrepresentation for three centuries. The Peasant War (1525) and the Münster Rebellion (1535) have been laid at their door. That there were some renegade Baptists at Münster no one would deny, as there were more renegade Lutherans. But Baptists were no more responsible for that rebellion and its results than English missionaries were responsible for the Sepoy rebellion, or than Baptists of America are now responsible for Mormonism because Joseph Smith was a renegade Baptist and Mormons practise immersion. With respect to the Peasant War, Münzer, its leader, never was a Baptist, and never acted in concert with Baptists. In proof of this the letter of Baptist ministers of Switzerland (dated Oct., 1524) is still preserved at St. Gall, in which, while they express sympathy with some of his views (*i. e.* rejection of the mass and infant baptism), they rebuke him for taking the sword. In the discussions with Zwingle before 1525, the Baptists of Switzerland had maintained the view held by many of their descendants in Europe, that Christians had no right to use arms for self-defence or the defence of the land; and this view was maintained by the Swiss and German Baptists at their convention at Schleitheim, near Schaffhausen, Sept., 1527.

The Baptists in the earliest years of the Reformation consisted of the poor and obscure. The persecutions of centuries had taught them concealment. After 1522 there was in Switzerland a band of scholars who had been converted by means of these obscure men, and who literally gave their lives for the defence of the faith. Balthazar Hubmaier had been pro-rector of the University of Ingoldstadt, and was said by Eck to be the most eloquent man in Europe; Conrad Grebel was the scion of a noble house, and one of the first scholars of Vienna and Paris; Felix Mantz as a Hebraist occupied a high rank; Johann Denk and Ludwig Hetzer made a translation of the Prophets that compelled the praise of their enemies. These were the men whose names appear most frequently in the conflict which Zwingle provoked with the Baptists. There is not one of them who before becoming a Baptist was not the friend and associate of Zwingle and his fellow-workers.

Baptists, Zwinglians, and Lutherans agreed, in substance, in holding the doctrines of justification by faith and regeneration by the Holy Spirit, but they differed most widely in their view of the connection of these doctrines with the doctrine of the Church. Luther and Zwingle, though preaching the great doctrine of justification by faith, hesitated to institute radical changes either in the constitution or the worship of the Church. While they both in the earlier part of their work asserted that the Church should consist only of believers, and should be independent of the state, they both very soon came to consider the whole state Christian, and gave all power over the Church into the hands of the civil government, and infractions of the ecclesiastical laws, passed by the states for the protection of the Lutheran and Zwinglian reformations, were punished by fine, imprisonment, and death, with their approval. Baptists, on the contrary, held that the only churches spoken of in the New Testament are churches of believers, and claimed that to bring in as members of a Church those who give no evidence of regeneration is to institute a practice for which there is not the least scriptural warrant, and to subvert the fundamental principles of the Reformation itself.

The claims of Baptists were—freedom to form churches which should be separate from the world, to exercise church-discipline over their members, and to have the entire control of their own ecclesiastical affairs without interference of the state. As citizens they declared that they owed dutiful obedience to the state in all things not in conflict with God's laws, but the state had no right to compel to any religious faith or to punish men for their faith. By this position, which they held most firmly, they stood not only in antagonism to the Reformers, but to the states which had passed laws to enforce the Reformed views, and hence arose the cry which pursued them for three hundred years, of being both heretics and rebels.

The liberty of private judgment, which both Luther and Zwingle claimed in their discussions with Romanists, they were unwilling to grant to Baptists, and Protestant and Romanist joined hands in persecuting them unto death.

It is claimed by some writers that the Baptists of the period of the Reformation were wild and fanatical, and that Menno Simons of Holland (A. D. 1536–61) first introduced order and milder views among them. The writings of Grebel, Denk, Hetzer, Hubmaier, the confessions of Baptists before the Protestant inquisitors of Switzerland—all given before 1530—disprove the assertion. Fanaticism cannot be justly charged upon the early Baptists of Switzerland.

How furious the persecution was against Baptists from 1525 to 1530 may be learned from the fact that within these years all the great leaders had been either killed or banished from Switzerland, from what is now Elsass, Baden, Würtemberg, and Germany, and churches, many of them of large membership, were dispersed by fire and sword.

Hubmaier, during the two years of his banishment from Switzerland, under the protection of the counts of Liechtenstein at Nicolsburg, became the apostle of Moravia, and soon that land was filled with Baptists, and made the refuge of Baptists fleeing from other countries where the persecution was more severe. For a hundred years great numbers of the Swiss braved the loss of their goods, and the long journey through hostile territory, and the price set upon their heads by the Bavarian dukes, to reach Moravia, where they might enjoy some little religious freedom. From Moravia they sent out their missionaries to all parts of Germany, the Tyrol, and Switzerland, to Hungary, Silesia, and Poland. The Romish historians say that these missionaries were very successful in their efforts "to delude the people." The "Chronicle" of the Moravian brethren in manuscript in the town-library of Hamburg, the lately discovered complete works of Hubmaier, and Ryedeman's "Account," set before us the scriptural views and the steadfastness of these Moravian Baptists.

Until 1531–32, Baptists had been most numerous in Switzerland, in Southern Germany, the Tyrol, Austria, and

Moravia; after this date they appear in large numbers in the Netherlands, and in the countries bordering the Baltic up to the boundary of Russia. When they first appeared in the Netherlands cannot be decided. Ypeij and Dermout say Anabaptists were, according to the archives of Groningen, expelled in 1517. Professor van Oostersee (*Herzog's Encyclopædie*, vol. ix., 346) says of the Mennonites or Netherlands Baptists: "They are peculiar to the Netherlands, and are older than the Reformation, and must therefore by no means be confounded with the Protestantism of the sixteenth century, for it can be shown that the origin of the Baptists reaches much farther back and is more venerable. . . . The history of the Netherlands Baptists, particularly at first, is written in blood and tears. Unceasingly confounded with the fanatical party at Münster, they were persecuted in the most horrible manner by Catholics and non-Catholics. Their Church has given a great host of martyrs for the cause of Christ. The doctrines of baptism and of oaths raised up between them and their opponents walls of division as high as those between the defenders and opponents of the mass."

The Netherlands were the inheritance of Charles V., while in Germany he was emperor only by election, and the local government was largely in other hands. This accounts for the difference in the means used by him in resisting the Reformation. In Germany, till 1546, he temporized, but in the Netherlands he opposed fire and sword to the spread of the new doctrines. The history of the heroic contest here between the Protestants and Romanists is one of the most glorious in the history of the Church. Long before Menno, who is commonly regarded as the founder of the Netherlands Baptists, was converted and became a Baptist, Baptists were found in the Netherlands, and were united in churches from the borders of France to the northern bounds of Friesland, and proved steadfast unto death in the maintenance of their principles. In 1527, at The Hague, the daughter of Weynken Claes of Monickendam was strangled and burnt; also Jan Walen and two companions at Haarlem. In 1532, Kraen of Harzenswoude, his wife, and two others, were put to death at Haarlem. In the same year nine citizens of Amsterdam suffered martyrdom at The Hague. Between the Baptists of the Netherlands and those in the Rhine Provinces and in Switzerland there was an intimate union. In the writings of Menno and Philips we find the same views respecting Scripture doctrines which were held by the Swiss Baptists in 1524. Their church-government was the same, and they also agreed with respect to the unlawfulness of taking an oath or bearing arms or accepting civil office. The Moravian "Chronicle" and the Dutch martyrologies include the Swiss, German, and Netherlands Baptists as brethren together in their witness for the truth of God.

The Baptists in the Netherlands have been for a long time generally termed Mennonites, from Menno, one of their chief teachers. Menno Simons was a priest in the Roman Catholic Church in Friesland, who underwent a change of religious opinions and preached evangelical doctrines (though, as he afterwards asserted, without a change of heart) while still a priest. Influenced by the courageous martyrdom of a young Baptist, he examined and espoused Baptist principles, though he did not openly avow them until 1537, when the revolt at Münster had led him to realize that his influence ought to be felt as a Baptist on the side of order and humanity. From that time till his death (1561) he labored fearlessly and incessantly (though a price was set upon his head) to disseminate the principles which he had adopted; and with such pre-eminent success as to give his name to the Netherlands Baptists. The minister of no particular congregation, Menno's life was spent in travelling through the countries between the Rhine and the Elbe, from Cologne to Liefland. It is a great mistake, however, to suppose that he was their only prominent man at this time. He has left his impress upon his people by means of his writings, as well as his fearless and unceasing labors, but there were others who stood with him in the front rank as ministers. Dirk Philips found his field of activity mostly in Prussia and the lands bordering the Baltic, and Leenert Bouwens was the apostle of Friesland. Philips, like Menno, was a writer as well as a preacher and worker, and has left his interpretation of Baptist belief in his works. Leenert Bouwens deserves to be remembered for his marvellous exertions and almost unparalleled success in winning souls to God. His diary is still preserved, and reaches from 1551 to 1578, in which latter year he died. When we remember that these years are covered by the inhuman decrees of Charles V. and Philip II. against the Baptists, that during a portion of these years Alva ruled in the Netherlands, that a price was set on Bouwen's head, and every one in the land ordered on pain of death to arrest him if found, it is little short of the incredible that he should have during all these years been steadily at work, and should have baptized ten thousand persons as the fruit of his labors; yet the places where, and the persons whom, he baptized are set down with so much particularity that there seems to be no room for doubting the truthfulness of the record.

Is it any wonder that men like Menno, Philips, and Bouwens, who sought only to conform their faith and life to the word of God, and to gain others to the same living faith, should be stung into strong expressions against Catholic and Protestant preachers, who urged on, with all the arguments in their power, the civil authority to take the lives of Baptists? Like their brethren in Central Europe, they sought only freedom to serve God according to their understanding of the Scriptures, while they acknowledged their full duty of obedience to the civil power in all matters not contrary to God's word. Their church-discipline was strict even to severity, and wherever they were allowed to remain in peace they created centres of temporal as well as spiritual prosperity around them, were renowned for the probity of their dealings and for the purity of their domestic relations and life, and in their confessions and practices they urged the duty of complete religious liberty for all. Yet they were denounced from the pulpits of other confessions as "Münsterites, who if they could would seize land and city, draw the sword, steal, not only practise polygamy, but community of women and of property, revolt against the government, slay their children in body and soul," etc.

While William the Silent was a devoted courtier of Charles V., while he was a boon-companion of Egmont and Horn in their Belshazzar feasts, defenceless men and women were facing terrors more dreadful than death in battle for the sake of religious liberty. When, long years afterwards, William became the Christian hero and champion of the precious rights of liberty of conscience, at one of the darkest hours of his history, at Roermonde, he came to know the Baptists as fast friends of the cause. Opposed to the bearing of arms and to war, they yet recognized the duty they owed to their country to assist her in the hour of need, and when William despaired of help from other quarters he appealed to them, and they out of their poverty contributed a sum which was the token of their sympathy. His receipt for this money freely given, not lent, is still extant. He never forgot that act. Far in advance of his coreligionists, he was true as steel to the liberty of religious thought, and again and again lifted his arm against the tyranny which the hardly-emancipated Reformed sought to exercise over the Baptists. Motley's account has shown us with what disdain and indignation William rejected the request of the Reformed, through Aldegonde, in 1577, that Baptists should be excluded from citizenship because of their faith, and how he then indicated his high esteem of them by saying "their yea was equal to the oath" of the Reformed. He repeats this in his rebuke of the magistrates of Middleburg in 1578 for persecuting the Baptists, and praises their peaceful character.

From 1520 to 1575, Baptists had preceded the Reformed in all parts of the Netherlands, and in the long lists of martyrs for the faith ten Baptists suffered to one of the Reformed.

Though never opposed to general culture, and cordially welcoming to the ranks of the ministry men of the profoundest scholarship who felt it a duty to preach the gospel, the early Baptists held that mere education could not supply the lack of spiritual gifts, and maintained that any brother of good report, with sound knowledge of the Scriptures and evincing aptness to teach, should be licensed to preach the gospel. Shut out from all the higher institutions of learning in the sixteenth century, and observing that ministerial education was not incompatible with corruption in morals and bigotry in religion, they gradually fell into the tenet that special education was a disadvantage for the office of the ministry, and looked with disfavor on any attempt to prepare for it otherwise than by private reading of the Bible. The injurious effects of this view became apparent when, in the middle of the seventeenth century, the Socinians, expelled from Poland, came to Holland, and began to infect the churches with their views. In many churches the tares grew and choked the wheat. While full freedom under the law had not come for the Baptists, the time of severe persecution had passed. They pursued their callings in peace and with frugality, and riches flowed in upon them apace. They were largely concerned in commerce with foreign nations, and when Holland was in straits for money to carry on the war with England (1666–72) the Baptists lent the government large sums of money at a low rate of interest, and were rewarded with full religious and political liberty. But from that time to the present their numbers have steadily declined in Holland. The causes are not difficult to explain—the spread of Socinian doctrines among them, by which all the fervor of life and missionary enterprise was lost; their church constitution altered, so that children who reached a certain age, whether converted or not, were baptized and made members of the Church; an uneducated ministry, with the members of churches far in advance of their pastors; the exclusion of all who married one of another religious confession; and last, but not least, riches not used for God.

Commerce, manufactures, and neighborhood had long bound England with many ties to the Netherlands. Those persecuted in the one country would flee to the other. During the sixteenth century there is frequent mention made in documents of state, as well as in the writings of private persons, of the presence of Anabaptists in England. The same cry was raised against them which was common in Europe, and they were exposed to the same persecutions. Some of those punished most severely were Hollanders who had fled to escape death in their own land. The English "Anabaptists" of the sixteenth century are shown by their statements, when on trial, to have been brethren of the Dutch Baptists. No persecution was severe enough to extirpate the Baptists from England, though it caused them to keep their meetings and their views very quiet. Banishishment, whipping, or death at the stake awaited any public "conventicles." Before a hand was laid to the reformation of the Established Church in England, Baptists were numerous in the kingdom, and the reigns of Henry VIII., Edward VI., Mary, and Elizabeth are blotted with the blood of martyred Baptists.

The same differences which existed among the continental Baptists on the schemes of doctrine, since termed Calvinism and Arminianism, were found among the English Baptists. Before and after the Synod of Dort these discussions in England and on the Continent increased in heat, and caused separation among confessors of the same views on other points. In the early part of the seventeenth century, in the reign of James I., the Arminian Baptists were numerous in England. But as in Holland, so in England, the Arminian Baptists gradually withered under the influence of Socinianism.

In Switzerland, in Germany, and in Holland it has been found impossible to decide when Baptists first appeared, or which were the first churches of Baptists in those lands (their simultaneous appearance on every hand being a natural result of that appeal to the Scriptures, in contradistinction to tradition, made by Luther, Zwingle, and Melanchthon); and it is quite as difficult to decide the question about the Baptists of England. If one would make the first Baptist church to appear under Helwisse in 1614, then we must deny the historical evidence for the conventicles of Baptists in the preceding century. If we make the church formed in London in 1633 the first Calvinistic Baptist church in England, we assume that all the Baptists and the Baptist churches of the sixteenth century were Arminian in their views, which has never been shown, and is contrary to all probability. Baptists were found in the north, in the west, but principally in the east, of England. Under the dreadful persecutions of the Tudors the churches knew little of each other unless they were situated near together. We hear more of the Calvinistic church formed in 1633, because it was situated in London, and performed an important work in the following years.

On the Continent some who have been classed with the Baptists, but who agree with them only in restricting baptism to believers, and in maintaining the independence of a Christian Church, regarded pouring as valid baptism, while others practised immersion. Pouring was most common among the Mennonites, though some among them held to immersion, and from those who practised immersion it was received by the English brethren, and has continued to be their practice to the present day. Crosby relates, on the authority of an old manuscript, said to be written by Kiffin, that a certain Richard Blount was sent from England to Holland to receive immersion from the hands of a regularly baptized minister, because the brethren did not know of any regularly baptized minister in England. Richard Blount was baptized in Holland, and returned and baptized others in England. It has been held that no Mennonites ever practised immersion, but facts are against the statement. The truth seems to be, that pouring or sprinkling was most common among the Mennonites, but there were some, and those who held Calvinistic views, who practised immersion in the seventeenth century, and by some one of these pastors Blount was baptized.

As the Dutch Baptists differed in some minor tenets from the Swiss, so the English differed from the Dutch and Swiss, while holding firmly to the principle common to them all, that the visible Church should be composed only of those who are baptized upon credible evidence of their being regenerated by the Spirit. The English Baptists did not regard it unlawful to take a solemn oath in court or to serve in the army. Like their brethren on the Continent, they were from the time of Henry VIII. the unflinching, unwearied witnesses and advocates of religious liberty—not for themselves only, but for all men, for the Turk as well as for the Christian; and when the upheaval of the English nation under Cromwell took place, by the pen and by the sword they strove to accomplish their ideal. They were found in the council of state, in the army, in the navy, while their ministers redoubled their labors, and God bore witness to their work by a rich harvest of converts. Raised to a height of influence and power, it is the striking manifestation of the grace of God in them that in prosperity as in adversity they advocated unlimited religious freedom for all men—"a free Church in a free State."

It is not a mere chance that the two greatest pleaders for the rights of conscience whom the centuries have produced—Milton in England and Roger Williams in Rhode Island—held, after mature consideration, those opinions for which Bunyan, the Baptist preacher, suffered fine and imprisonment. In simple devotion to God's word, in pleading for that word before the masses of men, in pleading for the highest and inalienable right of man against all spiritual and political tyranny, the entire denomination, in fact, have led the van of all Christian denominations and borne the brunt of the battle.

Under the Restoration, from Charles II. to William III., they suffered bitterly, as did all dissenters, and then with peace came the time of rest, degenerating to sloth. Calvinism hardened into hyper-Calvinism (only to be rationalized—humanized—scripturalized, through the influence of Andrew Fuller). Arminianism deliquesced into Socinianism, divisions separated the orthodox churches, and the eighteenth century was a period of stagnation in growth. But God had not forgotten them. Near the close of the century (when only the Moravians had preceded the English Baptists in the work of foreign missions), Carey, "the consecrated cobbler," as he was sneeringly called by Sydney Smith, went forth to India to overthrow heathenism, and then arose the Baptist Missionary Society (1792). Marshman and Ward soon followed and joined Carey, forming a triumvirate of Christian missionaries unexcelled in labor and results of work; while at the same time they made contributions of no slight importance to Oriental scholarship. Baptist missionaries from England have labored in India, Ceylon, China, Africa, and the West Indies, and with almost equal success.

The English Separatists who fled to Holland in the last part of the sixteenth century became very largely leavened with the views of the Baptists, who were numerous in Holland. When the tide of emigration set towards the bleak shores of North America, many who felt the strength of these views joined the emigration and came out boldly on the side of the Baptists after reaching America. The sorrowful history of the early continental Reformation was repeated in the New World. Those who had just escaped from oppressive ecclesiastical thraldom fitted a yoke for the necks of men guilty of no crime but devotion to God's word. The Church became political and the state ecclesiastical, and the union produced the unavoidable bastard fruit of persecution. In opposition to this error of the centuries, Roger Williams and a small band of Baptists, driven from Massachusetts, founded the colony which afterwards became Rhode Island, the type of all true democratic government, on the principle which Baptists had professed for more than a century—of freedom for God's word and freedom for man's conscience. From New England, Baptists emigrated to New York and to Virginia. They experienced in both colonies the lot of a proscribed people until the agitation of the country just preceding the Revolution turned the attention of the dominant parties to other issues than the persecution of their own people. During the Revolution the Baptists rendered effective service to the infant republic, and at its close were instrumental in securing the recognition of complete religious liberty in the Constitution of the U. S.

The nineteenth century has witnessed a marvellous increase in the Baptists of the U. S. From 77 churches, with hardly more than 5000 members, in 1770, they had increased in 1880 to 26,060 churches, with 2,296,327 members and 16,596 ordained ministers. For the latter year (1880) they reported 102,724 baptisms, 1,043,334 officers, teachers, and scholars in Sunday-schools, and $4,389,752.81 for benevolent contributions. In the same year the Baptists in England reported 1893 churches, 203,304 members, 1360 ordained ministers. The following table gives the statistics of the Baptist denomination, by continents, for the year 1880:

	Churches.	Baptisms.	Members.
North America	26,945	109,739	2,388,632
Europe	3,028	5,083	326,950
Asia	520	3,345	42,072
Africa	60	429	3,603
Australasia	143	331	7.918
	30,696	118,927	2,769,175

In this statement no account is taken of the many religious sects in the U. S. which hold similar opinions to the "regular" Baptists with reference to the ordinance of baptism, though differing from them in other essential particulars. Among these may be mentioned the Free-Will Baptists (Arminian), with 1463 churches, 1145 ministers, and 69,910 members (mostly in the New England States); the Seventh-Day Baptists, with 7000 members; the Dunkers, with 50,000 members; the Disciples or "Campbellites" (found mostly in the Northern States), with about 700,000 members. (See these denominations under their names.)

Allusion has already been made to the missionary-work of the English Baptists. Stimulated by the example of their English brethren, and providentially impelled to the work by Dr. Judson's adoption of Baptist views, the Baptists of the U. S. organized in 1814 the Baptist Foreign Mission Society (now the American Baptist Missionary Union), which had in 1880 five missions in Asia, five in Europe, and one in Africa. In these missions there are 1001 churches, 1393 laborers of all classes, and 89,593 church-members. The receipts of the "Union" in 1880 were $288,802.84. It has met with the most marked success in its missions among the Karens in Burmah, the Teloogoos in India, in Germany, and in Sweden. Under the auspices of this society 203,382,898 pages had, in 1864, been published in 33 languages and dialects, several of which were first reduced to writing by its missionaries. The Southern Baptist Convention sustains missions in China, Africa, and Italy. The American Baptist Home Mission Society, organized in 1832, supported, in 1880, 392 missionaries and teachers among the freedmen, and received into its treasury $235,032.44. The Baptist Bible and Publication Society, organized in 1824, received, in 1880, $349,564.46, and issued 364,635,025 pages.

It has already been said that the early Baptists were not especially interested in ministerial education, and reasons have been given why their indifference was natural. From the fact, however, that they appeal so constantly to the original Scripture in support of their opinions, education soon became a necessity with them, and for more than a century, both in England and America, they have given to this subject that attention which its importance demands. In 1764, when the Baptists of the U. S. numbered barely 5000, they established Rhode Island College (now Brown University). In 1880 they numbered 8 theological seminaries, 31 colleges, and 47 academies, with a total (according to the very imperfect return which we condense) of 707 instructors, 10,263 students, and property and endowments to the amount of $16,959,552. The best of these institutions (which are noticed under their appropriate titles) will compare favorably with those of any other denomination; and efforts are being made, through the National Baptist Educational Commission, to excite a yet deeper interest in education among the masses of the denomination, and secure for its institutions of learning a more generous patronage. The mention of such names as those of Francis Wayland, Barnas Sears, Horatio B. Hackett, Thomas J. Conant, Ezekiel G. Robinson, and Asahel C. Kendrick may serve as types of the Baptist educators of the present day. (With reference to Baptist history, reference may be made to the tracts of Denk; the works of Hubmaier; Ten Cate's "Geschiedenis der Doopsgezinden," etc.; Schyn, "Historia Mennonitarum," ed. Matschoen; Thomas Crosby, "History of the English Baptists from the Reformation to the Reign of George I." (1738–40); Ivimey, "History of the English Baptists" (1811–23); Taylor, "History of the General Baptists;" I. Backus, "History of Baptists of New England;" "The Publications of the Hansard Knollys Society;" Cramp's "Baptist History" (the best popular work); and Cutting's "Historic Vindications." For works in exposition and defence of Baptist principles and practices, see Wayland's "Principles and Practices of the Baptists;" Dagg's "Church Order;" Hiscox's "Baptist Church Directory;" Chase, Ripley, Judson, and Wiberg on Baptism; Arnold, Pepper, and Hovey on the Lord's Supper.) Revised by M. B. Anderson.

Baquoy' (Jean Charles), born at Paris, France, in 1721, became an engraver, and made vignettes for an edition of Ovid's "Metamorphoses." Died in 1777.

Baquoy (Pierre Charles), son of the above, was born at Paris, France, in 1759, and, like his father, was an engraver. He engraved, among other subjects, Le Sueur's "Martyrdom of St. Gervais and St. Protais." The latter engraving was his best work. Died in 1829.

Bar, a long and narrow piece of wood, metal, or other solid substance, generally round, quadrangular, and other uniform section. Bar in hydrography, an accumulation of mud or sand in any navigable channel by which navigation is obstructed, but more particularly a similar formation almost universally found across and exterior to the mouths of rivers and harbors, by which the draught of vessels entering is limited. Bar in music is a straight line drawn across the staff to divide the music into small portions of equal duration, and also comprises the musical notes written or played between such lines. Bar, in heraldry, is one of the important charges known as ordinaries. The bar is formed by two horizontal lines passing over the shield; it differs from the fess in size, the bar occupying only one-fifth of the shield.

Bar, in law. 1st, that part of the court-room in which prisoners are arraigned or sentenced, and in which the members of the legal profession usually sit. It takes its name from the bar or railing which generally separates it from the rest of the room. Hence the word often signifies lawyers, or persons admitted to practise in the courts; and in some cases it refers to or implies the presence of the court itself. A trial at bar is a trial before a full bench of judges, as distinguished from a *nisi prius* trial—that is, a trial before a single judge. 2d, a complete defence to an action in law. A plea in bar is a plea which, if true, completely defeats the plaintiff's action.

Bar, a town of Russia, in the government of Podolia. In 1768 the Confederation of Bar was formed here, by the nobility of Poland, to counteract the influence of Russia on the king, Stanislas Augustus. Bar was taken by the Russians in the same year, and the confederates were compelled to go to Wallachia. Here they declared the king dethroned, and had him carried off from Warsaw in 1771, and were only suppressed by Russia after four years' hard fighting. Pop. in 1882, 7789.

Bar (Jean Étienne) was born at Anneville in 1748, became an advocate, and was elected to the National Convention of France. He voted for the death of the king, and became secretary of the Convention after the fall of Robespierre. He was afterward a member of the Council of Five Hundred, and president of the civil tribunal of Thionville. Died in 1801.

Bar, de (Adrien Aimé Fleury), born at Thiais in 1783, was a French general, and served in the most important campaigns of the first empire. He afterward became famous in Algeria, and was made lieutenant-general in 1844 and senator in 1852. Died in 1861.

Bar'aba', a vast steppe of Siberia, extending between the rivers Obi and Irtish on the W. and the Altai Mountains on the N. W., occupies more than 100,000 square miles. Many salt lakes and marshes occur in it. It was colonized by the Russians in 1730.

Baraboo', city, on R. R., capital of Sauk co., Wis. (see map of Wisconsin, ref. 6–D, for location of county), is noted for wild and beautiful scenery. It is situated on Baraboo River, is the centre of the Wisconsin hop-producing district, and is in the neighborhood of valuable iron-mines. It is in a good fruit, grain, and stock-producing region. Pop. in 1870, 1528; in 1880, 3266; in 1885, 4168.

Barab'ra, or **Berab'era,** the name applied by the Egyptians to the inhabitants of a small district in Upper Nubia. They are not the same as the Berbers, the latter having derived their name from the Arabians. They trade with the Egyptians in cattle, which they pasture among the mountains beyond the Atbara and near the Red Sea.

Baraco'a, a seaport-town on the N. E. coast of Cuba, has considerable trade. In its vicinity is a remarkable mountain called the "Anvil of Baracoa."

Bara'da, a river of Syria, probably the Abana of the Old Testament. Its remotest, though not its largest, source is a lake, some 300 yards by 50, in the plain of Zebdany (8 miles by 3), 3349 feet above the level of the sea, in the heart of Anti-Lebanon. It flows south-eastward, passing the ruins of the ancient city of Abila, breaking through three ridges of the mountain, and reaching Damascus (23 miles from its source) after a descent of 1149 feet. Then it flows on eastward some 17 or 18 miles farther, emptying itself into two marshy lakes, each about 20 miles in circumference. In going through the city and gardens of Damascus it is parted into at least seven streams, which afterwards reunite. (See Porter's "Damascus.")

Baraga (Friedrich), D. D., a Catholic missionary, born near Dobernik, in Carniola, in 1797. He visited America in 1831, devoted himself to missionary labor among the Indians of the Lake Superior region, and was made bishop of Sault St. Mary and Marquette. He published numerous works in the Ojibbeway (or Chippeway) dialect, a "Grammar of the Otchipwe Language" (1851), and a "Dictionary of the Otchipwe Language" (1853). Died Jan. 19, 1868.

Baraguey d'Hilliers (Achille), Count, a French general, born Sept. 6, 1795. Having served with distinction in Algeria, he obtained the rank of general of division in 1843. In the autumn of 1849 he became commander of the army that occupied Rome. He returned to France in

1850, and in the Crimean war commanded a corps which co-operated with the British fleet in the Baltic. He was made a marshal of France in 1854. D. June 6, 1878.

Baraguey d'Hilliers (LOUIS), a French general, the father of the preceding, was born in Paris Aug. 13, 1764. He served in the Italian campaigns of 1796–97, soon after which he became a general of division. He commanded the dragoons of the grand army in Austria in 1805, and was appointed governor of Venice in 1808. In the Russian campaign of 1812 he was taken prisoner with all his division. He died in Berlin Dec., 1812.

Barante, de (AMABLE GUILLAUME PROSPER BRUGIÈRE), a French statesman and historian of great merit, was born at Riom June 10, 1782. He came of a literary stock, his father and his great-grandfather having distinguished themselves as writers. He was appointed collector-in-chief of customs in 1818, and became a peer of France in 1819. His chief works are a "History of the Dukes of Burgundy" (13 vols., 1826), and a "History of the National Convention" (1853). Died Nov. 22, 1866. (See GUIZOT, "Memoir of Prosper de Barante," 1867.)

Baran'ya, one of the most populous counties of Hungary, is bounded on the N. by Tolna, on the E. by Bacs, on the S. by Slavonia, on the W. by Somogy, and has an area of 1966 square miles. It is partly mountainous, but is very fertile. The Danube forms part of the western boundary. Capital, Fünfkirchen. Pop. in 1880, 293,101.

Barataria Bay, Louisiana, an inlet of the Gulf of Mexico, lying between the Mississippi and the Bayou la Fourche, is about 12 miles long from N. to S., and 5 or 6 miles broad, communicating with bayous and lakes of the interior. Its shores are marshes little elevated above the tides, which extend to the cypress swamps. Grande Terre Island, a ridge of sand which lies across the mouth, was the head-quarters of the brothers Laffite, the so-called "pirates." (See LAFFITE.) The entrance to the bay has been fortified by the U. S. in 1840–50, by the construction of Fort Livingston on the W. end of Grande Terre Island. The bar has seven feet of water. Barataria lighthouse, on Grande Terre Island, is in lat. 29° 16′ 47″ N., lon. 89° 54′ 33″ W. It is of brick, and is 60 feet high.

Baratier (JOHANN PHILIPP), born of French ancestry at Swabach, near Nuremberg, Jan. 19, 1721, when five years old spoke French, German, and Latin; when seven could repeat the Psalms in Hebrew; and when nine composed a Hebrew dictionary; when thirteen years old translated the "Itinerary" of Benjamin of Tudela. He wrote a reply to Crellius's "Artemonius," called "Antiartemonius" (1735), and a "Disquisition on the Succession of the Roman Pontiffs in very Ancient Times" (1749). He was a Protestant, studied theology and law, and died at Halle Oct. 5, 1740, aged nineteen.

Barb [probably derived from *Barbary*], the name of a noble breed of horses which originated among the Moors of Barbary, who introduced it into Spain. Barbs are remarkable for their endurance, docility, and gentleness. The Carthaginian cavalry, which decided several victories over the Romans, are said to have been mounted on horses of this breed, which is a variety of the Arabian horse. The celebrated "Godolphin Arabian" was a barb, as were most of the progenitors of the thoroughbred horse of the present day. It is also the name given in New Jersey to the king-fish (*Menticirrus nebulosus*).

Barbace'na (F. CALDEIRA BRANT), MARQUIS OF, a Brazilian soldier and diplomatist, born at Sabora in 1772. He was appointed by the emperor of Brazil to negotiate concerning the independence of that country with Portugal, and for his success was created a marquis. He was afterwards twice minister of finance. He introduced steam-engines, steamboats, and the printing-press into Brazil. Died in 1842.

Barba'does Cher'ry, the edible fruit of two small West Indian trees (the *Malpighia urens* and *Malpighia glabra*). Each fruit contains three seeds. The leaves of *Malpighia urens* have stinging hairs on the lower side.

Barbadoes Gooseberry, the edible fruit of *Pereskia aculeata*, a plant of the order Cactaceæ, having a round stem, thick, alternate leaves, and large spines. The fruit has expectorant properties. It grows in the West Indies.

Barbadoes Leg. See ELEPHANTIASIS.

Barbadoes Tar, or petroleum, is a black, opaque, inflammable liquid of the consistence of molasses. By distillation it yields naphtha and a residuum of asphaltum.

Barba'dos,* or **Barba'does,** the most eastern of the Caribbee Islands, belongs to the British. Its capital, Bridgetown, is situated in lat. 13° 4′ N. and lon. 59° 37′ W. The island is 21 miles long, 14 miles wide, and has an area of 166 square miles. It is nearly encircled by coral reefs, which are dangerous to navigation. The highest point of the island has an altitude of 1140 feet. Destructive hurricanes often occur here. The soil is fertile, and produces sugar, cotton, arrow-root, etc. The population and prosperity of Barbados have increased since the abolition of slavery (Aug. 1, 1834). In 1880, the imports were £1,170,735, and the exports £1,166,388. P. in 1881, 171,889.

Bar'bara, SAINT, a virgin martyr of the ancient Church, in regard to whom traditions clash. Baronius accepts the story of her martyrdom at Nicomedia in the reign of Maximinus (235–238), and says that she had been a pupil of Origen. Assemani thinks she suffered martyrdom under Galerius, about 306, at Heliopolis in Cœle-Syria. She is commemorated Dec. 4.

Barba'rian [Gr. βάρβαρος; Lat. *bar'barus*], a term applied by the ancient Greeks to all foreigners and all who could not speak the Greek language. Plato divided the human family into two great classes—*Hellenes* ("Greeks") and *Barbaroi* ("barbarians"). After the Persian invasion the Greeks used the word as a term of reproach, implying hostility to their own freedom and civilization. After the Romans had conquered Greece, and had become in some measure Hellenized, the word barbarian was applied to all nations except Greeks and Romans. Saint Paul uses the word in this sense in Romans i. 14 (see also Acts xxviii. 4).

Barbaros'sa, the name of two brothers, renegade Greeks and natives of Mitylene, who became Turkish corsairs, and were the scourge of Christendom for many years (1510–46). The elder, Arooj (Horush or Horuc), made himself master of Algiers in 1516. He was defeated and slain by the army of Charles V. in that year. He was succeeded in 1518 as ruler of Algiers by his brother, Hadher, or Khair-ed-Deen. He obtained Tunis by conquest in 1532, and became the chief admiral of Sultan Solyman. Died July 4, 1546.

Barbaroux (CHARLES JEAN MARIE), an eminent French Girondist and eloquent advocate, born at Marseilles Mar. 6, 1767. He was chosen a deputy to the Legislative Assembly in 1791, and a member of the National Convention in 1792. He denounced Robespierre, and on the trial of the king voted for an appeal to the people. He was distinguished for his energy and personal beauty. Having been proscribed by the Jacobins in May, 1793, he fled from Paris. He was guillotined at Bordeaux June 25, 1794. (See his "Mémoires," 1822.)

Bar'bary [derived from *Berber*, the name of a native race], an extensive region of Northern Africa, comprising the modern Barca, Tripoli, Tunis, Fezzan, Algeria, and Morocco, and extending from Egypt to the Atlantic Ocean. It is included between lat. 25° and 37° N., and lon. 10° W. and 25° E. It included the ancient *Mauritania*, *Numidia*, *Africa propria*, and *Cyrenaica*. Barbary is divided by the Atlas Mountains. The N. side comprises Tunis, Tripoli, Morocco, and Algeria. The S. is called Beled-el-Jereed (*i. e.* "the country of dates"). The soil is generally fertile. It was very rich and populous under the rule of the Carthaginians and of the ancient Romans, who became masters of this region about 146 B. C. It was conquered about 430 A. D. by the Vandals, who misgoverned it for a hundred years, and it fell under the domination of the Arabs in 647 A. D. The inhabitants are mostly Mohammedans.

Barbary Ape, Pigmy Ape, or **Magot,** a small species of tailless monkey, is a native of Europe, but is found in only one place in Europe—that is, the Rock of Gibraltar. It also abounds in Northern Africa, especially among rocky mountains and forests. It is gregarious, displays great agility in passing from tree to tree, and usually walks on four feet. It is of a greenish-gray color, and rather larger than a large cat. It belongs to the genus *Inuus*. The tail is reduced to a mere tubercle. Bands of these apes often plunder gardens. This species of monkey is frequently seen in captivity, and is capable of being trained to many tricks. It is not regarded as a true ape.

Barbas'tro, a walled town of Spain, in the province of Huesca, on the river Cinca, 57 miles N. E. of Saragossa. It has a cathedral and several convents. Pop. 8164.

Bar'bauld (ANNA LETITIA), an English authoress, born in Leicestershire June 20, 1743, was a daughter of Rev. John Aikin. She published a volume of poems in 1773, and was married in 1774 to Rochemont Barbauld, a dissenting minister, with whom she lived at Palgrave, in Suffolk, and taught a boarding-school for ten years. She published, besides other works, "Devotional Pieces" (1775) and "Early Lessons for Children," which are highly commended, and assisted her brother, Dr. John Aikin, in the composition of a popular work called "Evenings at Home." Her writings are characterized by an easy, flowing style and pure and elevated sentiment. Died Mar. 9, 1825. She wrote, also, "A Legacy for Young Ladies," published after her death. (See a "Life of Mrs. Barbauld," prefixed to her works, by Lucy Aitkin, 2 vols., 1825.)

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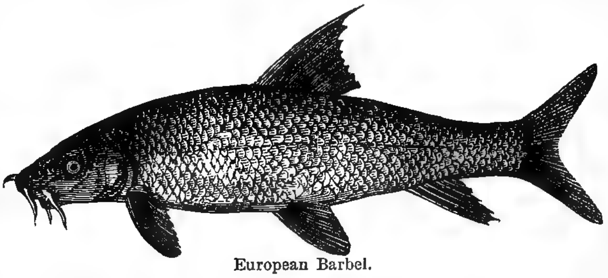
* *Barbados* is a Spanish word signifying the "bearded:" it is said that as the Spaniards approached the island they saw a certain plant growing abundantly on the banks, which resembled (as they fancied) men with long beards, hence the name.

Bar'bee (Rev. William J.), M. D., born in Winchester, Ky., in 1816, was educated at Miami University, O., practised medicine ten years in Cincinnati, O., and became widely known as a teacher, author, and preacher of the Christian ("Campbellite") denomination. He has published "Physical and Moral Aspects of Geology," "The Cotton Question," and various religious and scientific and other works.

Bar'bel, species of *Bar'bus*, and related to fishes of the family of Cyprinidæ, furnished with four soft barbules, pendent from the snout and upper jaw, and suggesting the name, derived from the Latin *barba*, "beard." The upper jaw extends beyond the lower. The numerous species of barbel are all inhabitants of fresh water, and seek their food by inserting their snouts into the mud like swine. The *Barbus vulgaris* is abundant in the Thames, and affords sport to anglers, but is not much esteemed for food. It sometimes measures three feet long, and weighs about sixteen pounds. Another species, called binny or barbel, is abundant in the Nile and the Jordan, and is much esteemed for food. It grows to a large size, and sometimes weighs seventy pounds. The barbel of the U. S. is the horned sucker or dace (*Catostomus tuberculatus*), which is readily taken by the hook. It belongs to the same family with the true barbel.



European Barbel.

Barbé-Marbois, de (François), Marquis, a French statesman, born in 1745, was consul to the U. S. under Louis XVI., director of the treasury under Napoleon, and was made a senator in 1813. Died in 1837. He wrote a "History of Louisiana" (1829).

Bar'ber [Fr. *barbier*, from the Lat. *bar'ba*, "beard"], a person who shaves others and cuts their hair. This trade or profession is very ancient, and is mentioned by the prophet Ezekiel (chap. v. 1). In China and other Oriental countries barbers shave the whole or part of the head. The practice of shaving the beard was common among the ancient Egyptians, Greeks, and Romans. Among the ancient Israelites the removal of the beard by shaving or plucking it out was a sign of mourning. In former times barbers served the public in the capacity of surgeons, and performed the operation of bleeding. The spiral red stripe often seen on the barber's pole is said to symbolize the winding of a ribbon round the arm previous to letting blood. In London the barber-surgeons formed a corporation with certain privileges. They were incorporated in England in 1461, and were united with the surgeons in the reign of Henry VIII. The connection was dissolved in the reign of George II. by an act the preamble of which affirms that the trade of a barber is "foreign to and independent of the practice of surgery." Quite recently the surgeons of the Swedish navy were also barbers for the crews. The barber's art was practised in Greece about 420 B. C., and is said to have been brought from Sicily to Rome in 299 B. C.

Barber (Francis), an American officer and teacher, born at Princeton, N. J., in 1751, graduated at Princeton in 1767. He entered the army in 1776 with the rank of major, and took part in the battles of Trenton, Princeton, Brandywine, Germantown, and Monmouth. He was afterwards raised to the rank of colonel, and in 1781 was selected by General Washington for the delicate duty of suppressing a mutiny of the troops, which he performed with success. He was killed accidentally by the fall of a tree at Newburg Jan. 11, 1783.

Barber (John Warner) was born at Windsor, Conn., in 1798. He published a "History of New Haven" (1831), "Historical Collections" of Connecticut (1836), Massachusetts (1839), New Jersey (1844), Virginia (1844), Ohio (1847), "Incidents of American History" (1847), "Elements of General History" (1844), "Our Whole Country" (1861), and several other works.

Barberi'ni (Francesco), an Italian cardinal, a nephew of Pope Urban VIII., was born in 1597. He became librarian of the Vatican, and translated the twelve books of Marcus Aurelius from Greek into Italian. He was the founder of the great Barberini Library. Died in 1679.

Bar'berry (*Ber'beris*), a genus of plants of the natural order Berberidacæ, comprises many species, which are all shrubs and natives of temperate climates in both hemispheres. They have six stamens, which, when touched at the base, show signs of irritability. The fruit is a berry with two or three seeds. They are divided into two subgenera, sometimes ranked as genera; those with simple leaves forming the *Berberis*, and those with pinnate leaves the sub-genus *Mahonia*. The barberries of Asia are numerous and important for their fruits. Those of our Pacific slope are *Mahonias*. The common barberry (*Berberis vulgaris*) is a native of Europe, sparingly naturalized in the U. S., a shrub armed with spines, and produces small oval red berries in pendulous clusters, which contain free malic acid, and are valuable for preserves and jelly. The bark is astringent, and is used in medicine, and the inner bark and root furnish a good yellow dye. On account of its yellow color the inner bark was formerly in much repute as a remedy for jaundice. Several fine species of *Berberis* grow in the central and western portions of North America. *B. aquifolium*, with spiny leaves and yellow flowers, is generally cultivated as an ornamental shrub. *B. pinnata* of Oregon bears blue acid berries, and is sometimes called the *Oregon grape*. *B. Canadensis* is a native of the Alleghanies. Parts of South America abound in native species of the barberry.

Barber's Itch, a term applied somewhat indiscriminately by the public and many physicians to two distinct diseases. 1. A majority of cases are instances of *impetigo mentis*, or pustular eruption on the face, from the irritation of too frequent and close shaving. The face is inflamed, red, tender, and nodular, with numerous pustules of various size, discharging pus, which mats in the stumps of the beard and forms scabs. 2. The second form is the true barber's itch, contracted by contact of person or the soiled and contaminated razors and brushes of the barber. It is really "ringworm in the beard." Each hair of the infected beard is covered with a whitish powder of parasitic scales or sporules. The parasitic vegetation is the *Microsporon mentagrophytes*. In either the *impetigo mentis* or the true *sycosis* the inflammation is to be removed by frequent applications of cold water, perfect cleanliness, and soothing lotions, as of glycerine, opium, and acetate of lead. With the first form such methods will suffice. In the second or parasitic form all the infected hairs should be pulled out with the depilation-forceps, and the parasites destroyed in the hair-follicles by parasiticide lotions or unguents. Chief of these are sulphurous acid, either pure or diluted, carbolic acid in glycerine, weak solutions of corrosive sublimate, and ointments of sulphur, iodide of sulphur, nitrate of mercury, and white precipitate.
E. D. Hudson, Jr.

Barbés (Armand), a French conspirator and Red Republican, born in Guadaloupe Sept. 18, 1809. He was imprisoned in France for political reasons in 1834–35. As an accomplice of Blanqui and others in a seditious plot in 1839, he was condemned to imprisonment for life, but was released in 1848. Having conspired against the new régime in May, 1848, he was again confined for several years.

Barbésieux', de (Louis François **Le Tellier**), Marquis, born at Paris, France, in 1668, was a son of Louvois, and became minister of state under Louis XIV. Died in 1701.

Bar'bet (*Laimodon*), a genus of birds related to the Picidæ or woodpeckers. They have a large conical beak surrounded with tufts of bristles, suggesting the name, which is derived from the Latin *barba*, "beard." They inhabit warm countries, particularly tropical Africa. They feed on insects.

Barbet is also the name given to birds of various genera, chiefly South American and Asiatic, together forming a connecting link between the kingfishers and the trogons. Among the numerous species are the *Bucco versicolor* of Sumatra and the *Tamatia maculata*, the red-throated barbet of Guiana.

Barbet, a small variety of the poodle-dog, remarkable for its activity, intelligence, and fidelity to its master, but equally distinguished for its ill-temper and its dislike of all strangers. It is also very liable to disease, and hence is not a general favorite.

Barbette, a platform of earth on which guns are mounted to fire over a parapet.

Bar′bican, or **Barbacan,** a watch-tower or advanced work before the gate of a castle or town. The term was especially applied to the outwork intended to defend the drawbridge, which in modern fortifications corresponds to the *tête-du-pont*. Several perfect barbicans remain in England at Alnwick, Warwick, etc.

Barbier (Antoine Alexandre), a French bibliographer, born Jan. 11, 1765, became private librarian to Napoleon in 1807, and after the restoration of 1815 was superintendent of the private libraries of the king. His chief production is a "Dictionnaire des Ouvrages Anonymes et Pseudonymes" (3 vols., 1822–24), which is highly commended. Died Dec. 6, 1825.

Barbour (James), an American statesman, born in Orange co., Va., June 10, 1775. He was governor of Virginia 1812–14, and a Senator of the U. S. 1815–25. He voted for a U. S. bank, and became president of the Senate *pro tem.* He was secretary of war in the Cabinet of J. Quincy Adams (1825–27), and was sent as minister to England in 1828, but was recalled in 1829. In 1839 he was president of the Whig national convention. Died June 8, 1842.

Barbour, or **Barber** (John), an eminent Scottish poet, a contemporary of Chaucer, was born about 1320. He became archdeacon of Aberdeen in 1356, and went to Oxford in 1357 to complete his education. About 1374 he was appointed one of the auditors of the exchequer. His chief work is a national epic called "The Bruce," a history of Robert Bruce, which, in addition to its poetical merit, has much historical value. Died Mar. 13, 1396.

Barbour (John S.), born in Culpeper co., Va., Aug. 8, 1790, was educated at William and Mary College, was a staff officer in the war of 1812, and a prominent State Rights member of Congress, 1823–33. Died Jan. 12, 1855.

Barbour (Lucien), born at Canton, Conn., Mar. 4, 1811; graduated at Amherst College in 1837; removed to Indiana; studied law and practised it at Indianapolis; was appointed U. S. district attorney by President Polk; in 1852 became a commissioner to prepare a code of practice for Indiana, and was a Representative from Indiana in the 34th Congress.

Barbour (Philip Pendleton), a jurist, born in Orange co., Va., May 25, 1783, was a brother of James, noticed above. He gained distinction as a criminal lawyer, and became a member of Congress in 1814. He was afterwards chosen Speaker of the House, and remained in that body until 1825. He was appointed an associate judge of the Supreme Court of the U. S. in 1836. Died Feb. 24, 1841.

Bar′boursville, capital of Knox co., Ky. (see map of Kentucky, ref. 5–I, for location of county), on the Cumberland River, 116 miles S. E. of Frankfort. Pop. in 1870, 438; in 1880, 250.

Barboursville, or **Cabell Court-house,** the capital of Cabell co., West Va. (see map of West Virginia, ref. 5–B, for location of county), on R. R. and the Guyandotte River, 154 miles S. W. of Wheeling. It is the seat of a State normal school. July 13, 1861, it was the scene of a brilliant action in which the Federal troops were successful. Pop. in 1870, 371; in 1880, 361.

Barbu′da [Fr. *La Barbonde*], one of the British West India Islands, 22 miles N. of Antigua. Its area is 75 square miles. It is of coral formation, has no harbor, and is partly covered with forests. Pop. 813.

Bar′by, a walled town of Prussian Saxony, on the Elbe, 15 miles S. E. of Magdeburg, has an old castle and manufactures of woollen and linen stuffs. Pop. in 1880, 5540.

Bar′ca (anc. *Cyrena′ica*), a region of Northern Africa, bounded on the N. by the Mediterranean, on the E. by Egypt, on the S. by the Libyan desert, and on the W. by Tripoli and the Gulf of Sidra, having an area of about 60,700 square miles. It is deficient in permanent streams, and the southern part is a desert, but the soil near the sea is fertile. On the mountain-sides are pines, date-palms, and olive trees. The inhabitants are Arabs and Berbers, who are Mohammedans. Formerly it belonged to Tripoli, but since 1869 has been immediately dependent upon Turkey. Capital, Benghazi. Pop. estimated at 302,000.

Barcello′na, a town of Sicily, in the province of Messina, 21 miles W. S. W. of Messina, near the coast. It has a gymnasium. Pop. in 1881, 20,961.

Barcelo′na, a province of Spain, comprising the south-eastern part of Catalonia, and sloping down towards the Mediterranean. It has an area of 2983 square miles, and a population of 835,306. It is one of the most fertile and best-cultivated provinces of Spain.

Barcelo′na [Lat. *Bar′cino*; Gr. Βαρκινών], the most important manufacturing city of Spain, and the capital of the province of the same name, in Catalonia, is beautifully situated on the Mediterranean, 113 miles E. of Lerida; lat. 41° 23′ N., lon. 2° 11′ E. Next to Cadiz, it is the most important seaport of Spain. Pop. in 1877, 249,706. It is surrounded by a wall, and defended by a citadel and the strong fort of Montjoi. The city is divided into two parts, the old and the new town, by a beautiful promenade called La Rambla. The streets of the new town are more spacious and regular than those of the old. Many of the houses are built of hewn stone, and have an imposing appearance. The most remarkable public edifices are the Gothic cathedral, which is about 600 years old, and the Audiencia, or Palacio de la Deputacion, which is now occupied by the courts of law. Barcelona has a university, several public libraries, a fine theatre, an academy of arts and sciences, and two museums. Here are extensive manufactures of silks, woollen stuffs, calicoes or figured cotton stuffs, lace, shoes, and firearms, which, with copper, wine, and brandy, constitute the principal exports of the city. The harbor is commodious, but is obstructed by a bar which excludes vessels drawing more than twelve feet of water. This is the most populous city of Spain, except Madrid. Barcelona is supposed to have been founded by Hamilcar Barca. The Romans became masters of it at the end of the third Punic war (146 B. C.). It was taken by the Saracens or Moors about 714 A. D., and became in 878 an independent state. In the twelfth century it was annexed to Aragon. In 1714 it was taken by the duke of Berwick after a long and heroic defence.

Barcelona, a province of Venezuela, is bounded on the N. by the Caribbean Sea, on the E. by Cumana, on the S. by Guiana, and on the W. by Guarica and Caracas. Area, 13,800 square miles. The country consists almost entirely of plains and low plateaux, and is crossed only in the N. by the Coast Range, which also is not very high. It has but very little commerce. Chief town, Barcelona. Pop. 123,828.

Barcelona, a town and seaport of Venezuela, and capital of the province of the same name, on the Caribbean Sea, at the mouth of the river Neveri; lat. 10° 10′ N., lon. 64° 48′ W. It is an unhealthy place. The houses are built of mud. Pop. about 6000.

Barclay, or **Barklay** (Alexander), an eminent British writer and translator, supposed to have been born in Scotland about 1480. He studied in one of the English universities, travelled on the Continent, and was made vicar at Ottery St. Mary in Devonshire. He afterward entered the Benedictine monastery of Ely, and in 1546 became vicar of Wokey. He wrote the lives of several saints, and translated Sallust's "Jugurthine War" and a French poem called "The Castle of Labor." His most popular work is his "Ship of Fools," a free translation from the German of Sebastian Brandt. Died in 1552.

Barclay (John), M.D., born in Perthshire, Scotland, in 1760, was educated at the United College of St. Andrews, where he afterward studied divinity. He was licensed as a preacher by the Dunkeld Presbytery; became tutor at Edinburgh in 1789 to the family of Sir James Campbell, and commenced the study of medicine, human and comparative anatomy; took the degree of M.D. in 1796. He became a noted lecturer on anatomy, commencing his lectures at Edinburgh in 1797, and continuing them until a short time before his death. Died in 1826, and left to the Royal College of Surgeons his anatomical collection, afterward called the Barclayan Museum.

Barclay (Robert), an eminent reformer and apologist for the Society of Friends, was born at Gordonstown, in Morayshire, Scotland, Dec. 23, 1648. He was educated in Paris at the Scottish College, of which his uncle was rector, and learned to write and speak Latin correctly and fluently. He returned to Scotland in 1664, and became a member and minister of the Society of Friends in 1666. In 1670 he published a defence of his religion, entitled "Truth Cleared of Calumnies." He married Christian Mollison in his early life. He afterwards published a "Catechism and Confession of Faith" (1675) and the "Anarchy of the Ranters" (1676). In 1677 he visited Germany on a religious mission, in company with George Fox and William Penn. In addition to superior talents, he had moral courage, which qualified him for the part of a reformer. His principal work is "An Apology for the True Christian Divinity, as the same is held forth and preached by the People called in scorn Quakers" (1676), written and published in Latin, and afterwards translated by the author into English. This work exhibits great logical acumen, and has been commended by eminent persons of different creeds. In 1679 he published a "Vindication" of his Apology, which had been criticised by several writers. He was appointed governor of the province of East Jersey in 1682, but he never went to America. He died at Ury Oct. 13, 1690. (See Joseph G. Bevan, "Life of Robert Barclay," 1802; W. Sewell, "History of the Quakers.")

Bar'clay de Tolly (Michael), Prince, a celebrated Russian general of Scottish extraction, was born in Livonia in 1759. He fought against the Swedes in 1790, and against the Poles in 1792 and 1794. With the rank of major-general he led Benningsen's advanced guard in 1806. In 1809, at the head of 10,000 men, he crossed the frozen Gulf of Bothnia, and advanced as far as Stockholm. In 1810 he was appointed minister of war. He became in 1812 commander-in-chief of the Army of the West, but having been defeated by the French at Smolensko in August of that year, he was soon removed. After the death of Kutuzof (1813) he again obtained the chief command of the army, which he directed at Bautzen, Culm, and Leipsic. He was raised to the rank of field-marshal in 1814. Died May 25, 1818.

Barcokh'eba, or **Barcoch'ebas** ("son of a star"), (Simon), a famous Jewish impostor, claiming to be the Messiah. His real name was Akiba. In the reign of Hadrian (A.D. 132) he excited an insurrection among the Jews, and seized Jerusalem and many fortified places. After a long and bloody contest the city was retaken by the Roman general Julius Severus, and Barcokheba was killed in the fortress of Bethar on the 9th of Ab (August), 135. His disappointed countrymen afterwards changed his name to Bar-cosba ("son of a lie").

Bard, the term originally applied to the ancient poets of the Celtic tribes, who composed and sang verses in honor of the exploits of brave men. In poetical language it is often applied by modern usage to any poet.

Bard (Samuel), M. D., LL.D., an American physician, born in Philadelphia April 1, 1742, was educated at Edinburgh, where he was an inmate in the family of Doctor Robertson, the historian. He practised in New York City, and was the family physician of General Washington. He published several medical works, and became president of the College of Physicians and Surgeons of New York. He was an active promoter of benevolent enterprises. Died May 24, 1821. (See Rev. J. McVickar's "Life of Samuel Bard," 1822.)

Bardesa'nes (Bardaisan) of Edessa, commonly but not quite justly called a Gnostic. His treatise "On Fate," or "The Laws of Countries," was written during the last half of the second century. We had only a few fragments of it till in 1843 the entire treatise, in the original Syriac (the manuscript belonging to the sixth or seventh century), was obtained by Archdeacon Tatham from the Syrian convent in the desert of Nitria, and was published, with an English translation, by Rev. William Cureton in 1855. Ephraem Syrus, who flourished about two centuries later, says Bardesanes wrote also 150 hymns, which appear to have been more dualistic than the treatise just spoken of. The best compendious notice of Bardesanes is that by Gallandi, "Bibliotheca Veterum Patrum," 1765. (See also Strunzius, "Historia Bardesanis," 1710; Hahn, "Bardesanes Gnosticus," 1819.) See the article by Hort in Smith and Wace's "Dictionary of Christian Biography."

Bard'ings, or **Bard,** the name applied to the horse-armor of the Middle Ages, which consisted of four pieces: 1, the chamfront (Norman-French, *cheveron*), protecting the forehead and face, and having a steel spike like the horn of a unicorn between the eyes; 2, the manifaire, which was made of articulated plates, and covered the crest and neck; 3, the poitrel, a solid piece of plate-armor, guarding the entire shoulders and chest; the bard proper, defending the croup of the charger from the cantle of the saddle to the tail. A steed thus armed was said to be "barded."

Bards'town, on R. R., capital of Nelson co., Ky. (see map of Ky., ref. 3-G, for location of county), 39 m. S. E. of Louisville, has several academies and St. Joseph's Roman Catholic coll. Pop. in 1870, 1835; in 1880, 1803.

Bare'bones, or **Bar'bone** (Praise God), a fanatic who was a member of Cromwell's Parliament in 1653, which was named after him the "Barebones' Parliament." When General Monk came to London, Barebones headed a procession of the people, and presented a remonstrance to Parliament against the restoration of Charles II.

Barefooted Friars [Lat. *Discalceati*], an appellation of certain Roman Catholic monks who either wear sandals or go entirely barefoot. They are connected with various congregations of the strict observance in nearly all the orders. There are also barefooted nuns. In some places they wear shoes in severe weather.

Bar'egine, a mucus-like substance produced by the algæ which grow in mineral springs. It abounds in the hot springs of Barréges in France; hence the name. It is a substance resembling, to some extent, the white of an egg, imparts a flesh-broth flavor and odor to the water, and is prized for that reason.

Bareil'y, a city of British India, in the North-west Provinces, is on the river Jooa, 151 miles E. of Delhi. It contains a number of mosques, a college, and many Hindoo schools. Here are manufactures of cutlery, carpets, brazen water-pots, tables, and ornamental chairs. Bareily was a scene of outrage and rapine during the mutiny of 1857, when the Sepoys murdered a number of Europeans. Pop. 109,844.

Barère de Vieuzac (Bertrand), a French demagogue and lawyer, born at Tarbes Sept. 10, 1755. He was elected in 1792 to the Convention, in which he voted for the death of the king. In April, 1793, he was chosen a member of the Committee of Public Safety. He supported the Jacobins in their contest with the Girondists, and became the reporter of the committee which usurped supreme power in July, 1793. He was the first who proposed that "terror should be the order of the day," and he dressed the atrocious decrees of the committee in such flowery language that he was called the "Anacreon of the guillotine." On the 9th Thermidor, 1794, he acted with the enemies of Robespierre. He was banished as a regicide in 1816, but was permitted to return in 1830. Died Jan. 14, 1841. (See "Mémoires de Barère," 4 vols., 1843, and the notice of Barère in Macaulay's "Essays.")

Baret'ti (Giuseppe), an Italian writer, born at Turin Mar. 22, 1716. He removed to London in 1751, and became a teacher of Italian and a friend of Dr. Johnson. He published an Italian-and-English dictionary (1760), and "Travels through Spain, Portugal, and France" (1770), which is highly commended by Dr. Johnson, and other works. Died in London May 5, 1789. (See G. Franchi, "Notizie intorno alla Vita di G. Baretti," 1790.)

Bar'gain [Old Fr. *bargaine*, "trade," from *barca*, a "bark," a "boat"] **and Sale,** the act of conveying and transferring real or personal property for a valuable consideration. The term is also employed to indicate the instrument by which the transfer is made. In the law of real estate this form of conveyance is in extensive use. The original mode of conveying corporeal real estate was by means of a ceremony termed livery of seisin, in which the seller delivered to the purchaser some visible symbol, such as a clod of earth or twig of a tree, in the name of the property to be conveyed. This method of conveyance came to be regarded as cumbersome and inconvenient. It was governed by strict and technical rules, and the estates that could be created by it were inelastic—not readily moulded to the demands of a growing civilization. The attention of conveyancers was attracted to other methods more suited to modern necessities. These methods were found in the doctrine of uses. A use in land was a notion derived from the Roman law, by means of which the formal title remained in one person, while the beneficial estate or enjoyment of the profits appertained to another. It corresponded in the main to the idea of trusts in modern law. A use could be created by a pecuniary or other legal consideration. For example, if an owner of land for a pecuniary consideration purported by present words to sell it, he would be at once converted into a formal owner, and the person advancing the money would be the beneficial owner, or, in technical language, would have "a use" in the land. He could become formal or legal owner by the action of a court of equity, which would, on application, direct that a conveyance should be made. While the law was in this condition an important statute was passed, 27 Hen. VIII., c. 10, called the "Statute of Uses," the effect of which, in substance, was to declare that one who had acquired a use under certain prescribed conditions in an estate in land should be the legal or formal, as well as the beneficial, owner. One great consequence of this statute was to introduce new conveyances. The principal one was "bargain and sale." The sale of land for a consideration, as already explained, created a use, and the statute gave the owner of the use the title. A subsequent statute (known as the statute of Frauds) requires conveyances to be in writing. This is the foundation of the modern system of conveyancing, both in England and the U. S. Other conveyances, proceeding either wholly or in part on the same theory, are "covenant to stand seised" and "lease and release." In the first of these the consideration is the affection between near relatives, technically called a "good" consideration, as distinguished from "valuable." In the second, the doctrine of uses is resorted to to put the purchaser in constructive possession of an estate for years in the land, whereupon he may receive a release, and thus become complete owner. T. W. Dwight.

Barge, a pleasure-boat, a boat of state elegantly furnished and propelled by oars; these are used on ceremonial occasions by princes and men of high station. Also a flat-bottomed vessel of burden employed in loading and unloading ships or in conveying freight from one town to another.

Ba'ri (anc. *Ba'rium*), a fortified city and seaport of Italy, capital of the province of Bari, is situated on the Adriatic Sea, 56 miles by rail N. W. of Brindisi; lat. 41° 9′ N., lon. 16° 54′ E. It is defended by a massive old castle of Norman origin. The harbor admits only small vessels. Bari is the see of an archbishop, and has some fine ecclesiastical buildings, among which is the priory of St. Nicholas, founded in 1087. It contains a cathedral, two theatres, an arsenal, etc.; also manufactures of silk, cotton, linen, and glass. *Barium* was a very ancient city, and was flourishing as early as 200 B. C. Pop. of commune in 1881, 60,575.

Bari, a province of Italy, bounded on the N. E. by the Adriatic Sea, on the S. by Lecce and Potenza, on the W. by Potenza, and on the N. W. by Foggia. Area, 2293 square miles. The surface is mostly level; the soil is very fertile, producing wheat, fruits, and wine. The climate is very hot in summer. This province formed a part of ancient *Apulia*. Capital, Bari. Pop. in 1881, 678,968.

Bari, the name of a negro tribe on the White Nile, between lat. 3½° and 6½° N., are well built and often attain a height of six feet. They are fetish worshippers and practise polygamy. The men go entirely naked and paint themselves with ochre, while the women only wear short aprons.

Baril'la [Fr. *barille*], a crude, impure carbonate of soda, which is a considerable article of commerce, and is used in the manufacture of soap and glass. It is procured by burning plants of the genus *Salsola* or other plants which grow near the sea. Large quantities of it are exported from Spain and the Balearic Isles. The *Salsola sativa* is cultivated on ground adjacent to the sea, by which it is occasionally submerged, the sea being admitted by floodgates through an embankment. The *Salsola* is cut in September, is dried, and burned in a hole in the ground.

Bari'nas, a province of Venezuela, between Truxillo, Portugueza, and Merida on the N. and W., Guarico on the E., and Apure on the S. Area, 17,008 square miles. It consists of fertile plains drained by numerous streams. The S. boundary is the river Apule. The chief products are hides, cacao, coffee, and tobacco. Capital, Barinas. Pop. 126,925.

Bar'inas, or **Vari'nas,** capital of the above province, near the river Santo Domingo. The city, founded in the sixteenth century, has suffered devastation twice within a century. It is noted for the exportation of the tobacco which bears its name. Pop. 14,000.

Baring (Sir Francis), an English financier, born near Exeter in 1740, was the father of Lord Ashburton, and the principal founder of the great banking-house of Baring Brothers & Co. of London. He was made a baronet in 1793. Died 1810.—His eldest son, Thomas, was born June 12, 1772; was a member of the House of Commons 1830–32. Died Apr. 3, 1848.

Baring-Gould (Sabine). See Appendix.

Bari'tah, the name of certain large Australian birds belonging to the Corvidæ (crow family). The bill is large and conical, the base of it extending far backward on the forehead. The *Gymnorhina tibicen* (piping crow or piping grakle) has a melodious voice, is easily tamed, and learns to whistle tunes. There are several genera of these birds.

Baritah, or Piping Crow.

Ba'rium [from the Gr. βαρύς, "heavy," as it is an ingredient of "heavy spar"], one of the alkaline earthy metals. It occurs in nature chiefly in the forms of sulphate, barite, barytes, or heavy spar, of carbonate, witherite, and of silicate, harmotome. Its symbol is Ba, and its atomic weight 137. It is very rarely prepared in the metallic state. Barium salts are prepared either from the native carbonate by the action of acids, or from the native sulphate by first reducing it to sulphide by treating with sawdust or some other reducing agent, then acting upon this with the proper acids. The most important salts are the chloride and nitrate; both are used as tests for sulphuric acid and soluble sulphates. The chloride is used as a preventive of boiler incrustations, owing to its action on the sulphate of lime of the feed-water. It is also extensively used for the preparation of an artificial sulphate known as *blanc fix*, which is used in enamelling paper. Barium forms a protoxide, BaO, called baryta, and a dioxide, BaO_2. The latter is employed in the preparation of hydrogen dioxide, HO_2. Baric hydrate, BaH_2O_2, is the most soluble of the alkaline earthy hydrates; it is used in the laboratory as a test for carbonic acid, with which it forms a white precipitate. Baric sulphate is one of the most insoluble salts known. In its native form, barytes or heavy spar, it is extensively mined and used to adulterate white lead, an application for which it is specially adapted by its high specific gravity. The soluble barium salts are all poisonous. Any soluble sulphate, as sodic, Glauber's salt, or magnesic sulphate, Epsom salt, is an antidote.

C. F. Chandler.

Bark [Lat. *cor'tex*], the external covering of a tree, is composed of cellular tissue. The development of bark is most perfect in exogenous plants with perennial woody stems, in which only the distinction between wood and bark is plainly marked. The outermost layer of bark is called *epider'mis*, which, however, is generally seen only in annual stems or in the youngest parts of woody stems. Beneath the epidermis is the true bark, the outer layer of which is called *epiphlœ'um*, and the inner layer *mesophlœ'um*. Within the mesophlœum is a distinct layer named *liber* or *endophlœum* (*i. e.* "inner bark"), which is composed of bundles of woody fibre or vascular tissue, mixed with cellular tissue. The last layer of bark is contiguous to the *alburnum* or sap-wood. The bark increases by the addition of an annual layer on its inner surface, next to the alburnum or cambium, through which the sap circulates. The annual layers cannot long be distinctly recognized in the bark, and in the older portions of trees the outer layers of bark, becoming dry and lifeless, are gradually shed or thrown off. The peculiar juices and characteristic properties of a plant are often most abundant in the true bark, which is the most important part of many medicinal plants, especially of Cinchona (which see). In making leather, tanners prefer those kinds of bark which contain most tannic acid. Oak bark is chiefly used in the tanneries of Europe. In the U. S. the bark of several species of oak, and also that of the hemlock, is used. The Spaniards employ the inner layer of the bark of the cork tree (*Quercus suber*), and the Australians that of the *Eucalyptus*. The bark can be separated with facility from the wood only when the sap is flowing. It should be carefully dried, as it is liable to be injured by mould.

Bark Beetle, or **Bark Chafer,** a name of several genera of coleopterous insects, belonging to the family Scolylide. They bore holes in bark, deposit their eggs in the inner bark, and often kill the tree. One species (*Tom'icus typog'raphus*, or the typographic beetle) infests the forests of Germany in great numbers. In 1783 it caused the death of a million pines or more in the Hartz Forest. It receives its name from the circumstance that the burrows formed by it in feeding upon the soft wood immediately within the bark often present a rude resemblance to printed characters. The U. S. have several destructive species.

Barker (A. J.), U. S. N., born Mar. 13, 1843, in Massachusetts, graduated at the Naval Academy in 1861, became an ensign in 1862, a lieutenant in 1864, and a lieutenant-commander in 1866. He served in the steamer Mississippi at the passage of Forts Jackson and St. Philip and capture of New Orleans, Apr. 24, 1862, and in the attack on Port Hudson, Mar. 14, 1863, where the Mississippi grounded and was destroyed; and afterwards in the Monongahela at the siege of Port Hudson, and was in various engagements in her with batteries on the Mississippi River.

Foxhall A. Parker.

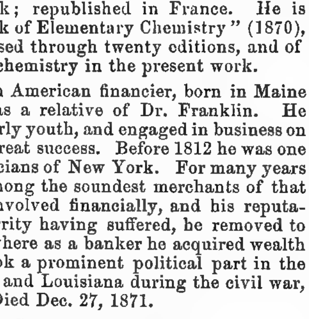
Barker (Fordyce), M. D., LL.D., born May 2, 1819, at Wilton, Me., educated at Bowdoin College, and studied medicine in Boston and Paris. He became in 1845 professor of midwifery in the medical school at Brunswick, Me., held the same position in the N. Y. Medical College (1850–57), and in 1860 became obstetric physician and prof. of midwifery at Bellevue Hospital, N. Y.; published many papers on obstetrical and other kindred subjects, a treatise on "Sea-sickness," and one on "Puerperal Diseases."

Barker (George F.), M. D., an American chemist and physicist, born in Charlestown, Mass., July 14, 1835. He became an apprentice in 1851 in a philosophical instrument manufactory in Boston, where he remained until 1856, in which year he entered the Yale Scientific School, and graduated as bachelor of philosophy in 1858. He was chemical assistant for two winters (1858–61) in the Harvard medical school. In 1861 he was appointed professor of chemistry and geology in Wheaton College, Ill., and was acting professor of chemistry in 1862–63 in the Albany Medical College, where he graduated as M. D. in 1863. Early in 1864 he became professor of natural sciences in the Western University of Pennsylvania at Pittsburg, was instructor (1865) in the Yale Medical College, and was appointed professor of physiological chemistry and toxicology at Yale in 1867. In 1878 he was chosen president of the American Association for the Advancement of Science. In 1873 he became professor of physics in the University of Pennsylvania. In 1876 he was elected a member of the National Academy of Sciences. In 1881 he received the decoration of commander of the Legion of Honor from the French government. He was one of the U. S. commissioners to the Paris Int. Elec. Exhibition in 1881, a delegate to the Int. Congress of Electricians, and a vice-president of the jury. He was appointed by President Arthur a member of the U. S. Electrical Commission in 1884. Among his various productions may be named a "Lecture on the Force of Nature," delivered (1863) before the Chemical Society of Union College, by whom it was published; and one on the "Correlation of Vital and Physical Forces," delivered (Dec. 31, 1869) before the American Institute in New York; republished in France. He is author of a "Text-book of Elementary Chemistry" (1870), which has already passed through twenty editions, and of the article on general chemistry in the present work.

Barker (Jacob), an American financier, born in Maine Dec. 7, 1779. He was a relative of Dr. Franklin. He went to New York in early youth, and engaged in business on his own account with great success. Before 1812 he was one of the prominent politicians of New York. For many years he was regarded as among the soundest merchants of that city; but he became involved financially, and his reputation for business integrity having suffered, he removed to New Orleans in 1834, where as a banker he acquired wealth and influence. He took a prominent political part in the affairs of New Orleans and Louisiana during the civil war, loyally to the U. S. Died Dec. 27, 1871.

Barker's Mill, or **Segner's Wheel,** an hydraulic machine invented by Dr. Barker towards the close of the seventeenth century. The following description may serve to exhibit the principle of this machine in its simplest form. To those who have any knowledge of hydrostatics it is scarcely necessary to observe that every equal unit of surface of a vessel full of water is subject to a pressure proportional to the depth of the unit below the surface (see Lateral Pressure of Liquids); every unit of surface at the same depth is equally pushed outward. For each such pressure on one side of a vessel there is an equal and opposite pressure on the other, whereby the whole vessel is kept in equilibrium. If one such unit of area be removed—that is, if a hole be cut in the side of a vessel of water—the water in flowing out will no longer be able to press upon the surface which has been removed, but will nevertheless continue to press with equal force on the opposite unit of area. The consequence will be that the vessel will be urged in the direction opposite to that in which the water flows out. Barker's mill in its simplest form is shown in the annexed figure. A tube *a c c* with lateral arms below, shaped somewhat like an inverted T, rests upon a pivot at *b*. Now, suppose this tube to be supplied with water at the top, and an opening be made on opposite sides of the horizontal arms *c c;* the water, of course, ceases to press on the tube at the opening, while it continues to press on the opposite side; and if the wheel be so constructed as to turn with but little friction at *a* and *b*, the arms of the tube will be moved round in a direction opposite to that in which the water flows. It is obviously necessary that the opening in the two arms should be on opposite sides, for if they were on the same side the pressure on the one (supposing the openings to be of equal size) would exactly counterbalance the pressure on the other, and the wheel would remain stationary. But being on opposite sides, the arms are moved round in the same direction, the pressure on each co-operating with that on the other. As the rotation proceeds, the pressure at the extremities of the arms, *c c*, generated by centrifugal force is added to that due to the head, increasing correspondingly the driving power. Hence the machine is often called "the centrifugal mill." Various contrivances may be adopted to facilitate the supply of water, to lessen the friction, etc., but the above explanation may serve to show the general principle on which such a machine operates.

F. A. P. Barnard.



Barker's Mill.

Barks'dale (William), a brigadier-general in the Confederate service, born in Rutherford co., Tenn., Aug. 21, 1821, killed July 2, 1863, at Gettysburg, Pa. He was educated at Nashville University, removed to Mississippi, studied law, and was admitted to the bar. He served in the Mexican war. In 1853 he was elected to Congress from Mississippi, and resigned his congressional seat and became a brigadier-general in the Confederate army; and it was at the head of his brigade that he was killed on the second day of the battle of Gettysburg.

Bar'laam, born at Seminara in Calabria, Southern Italy, near the end of the thirteenth century, was of Greek descent. He was educated in the Roman Church, and became a monk of the order of St. Basil; continued his studies afterward at Thessalonica, becoming proficient in theology, philosophy, and mathematics; went to Constantinople in 1327, where he joined the Greek Church, and was made abbot of St. Salvador. He returned to Italy and the Roman Church in 1341, and was made bishop of Gieraci, in the kingdom of Naples, in 1342. Died in 1348.

Bar-le-Duc, or **Bar-sur-Ornain,** a town of France, capital of the department of Meuse, is on the river Ornain, and on the railway which connects Paris with Nancy, 159 miles by rail E. of Paris. It has a communal college, a normal school, and a public library; also manufactures of cotton stuffs, hosiery, and calicoes. Its trade is facilitated by a canal which connects the Marne with the Rhine. Pop. 15,334.

Barlet'ta (anc. *Barduli*), a fortified seaport of Italy, in the province of Bari, on the Adriatic, and on a rocky island 34 miles by rail W. N. W. of Bari; lat. 41° 20′ N., lon. 16° 19′ E. It is well built, has handsome stone houses, and wide, well-paved streets. It contains a fine cathedral, a college, a strong citadel or castle, and a colossal statue of the emperor Heraclius, said to have been found in the sea. Grain, wine, oil, and fruits are exported from this town. Pop. in 1881, 33,179.

Bar'ley [Lat. *hor'deum*], a plant of the order Gramineæ, is a valuable cereal, said to be more widely distributed than any other grain. It was cultivated by the ancient Hebrews, Greeks, and Romans, and was an important article of food in a remote antiquity. First mentioned in Exodus ix. 31. It is adapted to both cold and warm climates. The genus *Hordeum* is distinguished by a spiked inflorescence, has three spikelets at each joint of the rachis, and has three stamens. The lower palea or palet is long-awned. The species are mostly annual. Barley meal is used for bread in Northern Europe, but in many parts of the world this grain is mostly malted (*germinated*) for the manufacture of beer. It is also valuable as food for horses. When the pellicle of the grain is removed and the grain is rounded, it is called pearl barley, which is used as food for invalids. Two species or varieties of barley are cultivated in the U. S.—namely, *Hordeum vulgare*, with its grains arranged in four rows; and *Hordeum distichon*, in which there are only two rows. The farmers of Europe also cultivate the *Hordeum hexastichon*, the six-rowed barley. The sprat or battledore barley (sometimes called German rice) is much esteemed in Germany. It has only two rows, and has widely-spreading awns. The Nepaul or Himalaya barley is well adapted for cold and mountainous regions, as it produces good crops at the height of 14,000 feet above the level of the sea.

Bar'leycorn (John), a personification of the spirit of barley or malt liquor, used in humorous poetical composition and in jocular parlance. There is an old whimsical English tract entitled "The Arraigning and Indicting of

Sir John Barleycorn, printed for Timothy Tosspot," in which Barleycorn is described as of "noble blood, well beloved in England," etc.; but John Barleycorn is best known by Burns's humorous poem of that name.

Barlow (FRANCIS CHANNING), MAJOR-GENERAL, born at Brooklyn, N. Y., Oct. 19, 1834, graduated first in his class at Harvard College in 1855, served in the Union army 1862–65. He was at Fair Oaks and in almost every subsequent battle of the army of the Potomac, and won a distinguished reputation as a brave and able officer. He was secretary of state for New York in 1866–68, and was elected attorney-general of New York in 1871.

Barlow (JOEL), an American poet, born at Reading, Conn., Mar. 24, 1755, graduated at Yale College in 1778. He served as chaplain in the army in the Revolutionary war, after which he studied law. He produced in 1787 "The Vision of Columbus," a poem which was very popular. Having visited Europe on business in 1788, he passed some years in Paris during the French Revolution, and amassed a competence by trade or speculation. He returned to the U. S. in 1805, and published in 1808 "The Columbiad," a mediocre epic poem. He was sent as ambassador to France in 1811, and died near Cracow Dec. 22, 1812, while on his way to Wilna, whither he had been invited to meet Napoleon. (See C. E. OELSNER, "Notice sur la Vie de J. Barlow," 1813; GRISWOLD'S "Poets and Poetry of America.")

Barlow (SAMUEL LATHAM MITCHILL). See APPENDIX.

Bar'mecides (sing. **Bar'mecide**), a distinguished and powerful Persian family, whose name was derived from Barmak or Barmek. His son, Khâled-ben-Barmak, became the prime minister of the caliph Al-Mansoor, and also of Al-Mahdi, who appointed him tutor to Haroun-al-Raschid. Yahya, the son of Khâled, was vizier under Haroun-al-Raschid, to whom he rendered important services. Yahya had three sons, named Yahya, Fadhl, and Jaafar, who enjoyed the favor of the sovereign. Fadhl was vizier for some time. Haroun-al-Raschid, who was jealous of their power and popularity, ordered them to be put to death about 802 A. D. (See JAAFAR.) The virtues and misfortunes of the Barmecides have been celebrated by many Oriental poets and historians.

Barmecide's Feast, a celebrated tale from the "Arabian Nights;" a term often applied to an ostentatious display of worthless bounty. The tale is as follows: Schacabac being reduced to great poverty, and having eaten nothing for two days together, made a visit to a noble Barmecide in Persia who was very hospitable, but withal a great humorist. The Barmecide was sitting at his table, that seemed ready covered for an entertainment. Upon hearing Schacabac's complaint, he desired him to sit down and fall to. He then gave him an empty plate, and asked him how he liked his rice-soup. Schacabac, who was a man of wit, and resolved to comply with the Barmecide in all his humors, told him it was admirable, and at the same time lifted up the empty spoon to his mouth [apparently] with great pleasure. The Barmecide then asked him if he ever saw whiter bread. Schacabac, who saw neither bread nor meat, answered, "If I did not like it, you may be sure I should not eat so heartily of it." Several other fine dishes were served up in idea, which both of them commended and feasted on after the same manner. This was followed by an invisible dessert; and Schacabac, at length being tired of moving his jaws up and down to no purpose, desired to be excused, for that really he was so full he could not eat a bit more. "Come, then," said the Barmecide, "you shall taste of my wines, which, I may say without vanity, are the best in Persia." He then filled their glasses out of an empty decanter. Schacabac would have excused himself from drinking so much at once, because he said he was a little quarrelsome in his liquor; however, being pressed to it, he pretended to take it off, having beforehand praised the color and afterwards the flavor. Being plied with other imaginary bumpers of different wines, he pretended to grow flustered, and gave the Barmecide a box on the ear; but immediately recovering himself, "Sir," said he, "I beg ten thousand pardons, but I told you before that it was my misfortune to be quarrelsome in my drink." The Barmecide, who was pleased with the complaisance of his guest, then ordered a good substantial dinner to be served up.

Bar'men, a town and beautiful valley of Rhenish Prussia, is on river Whipper, 17 miles by rail E. N. E. of Düsseldorf. The town is 3 miles E. of Elberfeld, or, according to one statement, is a continuation of Elberfeld, with which it forms one uninterrupted street six miles long. Barmen is the principal seat of the ribbon manufacture on the Continent, and its fabrics are distributed to all parts of the world. Here are also manufactures of cotton and linen goods, velvet, lace, hardware, and chemical products. The district which contains Barmen and Elberfeld is the most populous, industrious, and thriving in Germany. Barmen has a handsome church, an asylum for the deaf and dumb, an exchange, etc. Pop. in 1880, 95,941.

Bar'nabas [Gr. Βαρνάβας], SAINT, an early Christian and apostle, originally named JOSEPH, was born in the island of Cyprus. He was a companion and fellow-laborer of the apostle Paul, and appears to have been the principal founder of the church of Antioch, to which he was sent by the church of Jerusalem. "He was a good man, and full of the Holy Ghost and of faith" (Acts xi. 24). According to one tradition, he was the first bishop of Milan. (See Acts xiii.-xv.; P. PUCCINELLI, "Vita di S. Barnaba," 1649.)

Barnabas, Epistle of, an epistle of twenty-one chapters, which is supposed to have been written between 107–120 A. D. After having been lost sight of for several centuries, this epistle was first published in 1645, but the first four chapters and a part of the fifth were only in Latin. In 1859, Tischendorf discovered the whole in Greek MS. of the fourth century at Mount Sinai, and it was published in 1862. Another MS. (dated 1056) was discovered at Constantinople by Bryennios in 1875. It was formerly ascribed to the apostle Barnabas, but it is evidently the work of another and later hand. It is frequently cited by the Fathers, and was by many regarded as being of authority in the Church, some even claiming for it a place in the sacred canon. It is chiefly directed against the Judaizing Christians, and its principal value now is in the light it throws upon the customs and doctrines of the Christians of that time. Several English translations have been published. The best recent editions of Barnabas are by Funk (1878) and Gebhardt and Harnack (1878).

Bar'nabites, an order of monks which originated at Milan in 1533, and were so called because they preached in the church of St. Barnabas. Their duties were to attend the sick, to preach, to instruct the young, etc. They became numerous, and established monasteries or colleges in Italy, France, Austria, and Spain.

Barnacle. See CIRRIPEDIA.

Bar'nacle Goose (*An'ser ber'nicla* or *Ber'nicla leucop'sis*), a bird which frequents the coasts of Britain in winter, and migrates northward in spring. It is smaller than the common wild-goose, and is esteemed for food. The plumage of the upper part of its body is ash-gray and black, and that of the lower part white. The name of barnacle is sometimes applied to the brent goose (*An'ser bren'ta* or *torqua'tus*), which is smaller than the preceding, and has a darker plumage, which is nearly all black except the lower part of the body. It is remarkable for powerful flight and distant migrations, and is prized for the table. It is a winter bird of passage in the U. S. It takes its name from the old belief that barnacles were often transmuted into geese—a superstition which was once shared by learned and unlearned alike.

BARNACLES, in heraldry, are frequently introduced into coats-of-arms as a charge. They were instruments used by farriers to curb and command unruly horses, and resembled what are now called twitchers.

Barnard (DANIEL DEWEY), LL.D., a lawyer and Whig politician, born at Sheffield, Mass., in 1797, graduated at Williams College in 1818, was admitted to the bar at Rochester, N. Y., in 1821, and was county attorney in 1826, and a member of Congress from New York (1828–30 and 1839–45). He travelled in Europe in 1830–31, corresponding with a Rochester newspaper, and removed to Albany in 1832, became noted in the Whig party and a member of the New York assembly, and was U. S. minister to Prussia (1849–53). He was the author of many published reviews, speeches, etc., including "An Historical Sketch of the Colony of Rensselaerwick." Died Apr. 24, 1861.

Barnard (FREDERICK AUGUSTUS PORTER), S. T. D., LL.D., L. H. D., mathematician, physicist, and educator, born in Sheffield, Mass., May 5, 1809, graduated at Yale College in 1828, tutor in Yale College 1830, professor of mathematics and natural philosophy in the University of Alabama 1837–48, professor of chemistry and natural history in the same 1848–54, professor of mathematics, natural philosophy, and civil engineering in the University of Mississippi 1854–61, president of the University of Mississippi 1856–58, and chancellor of the same 1858–61. In 1854 he took orders in the Protestant Episcopal Church, resigned his chancellorship and his chair in the university in 1861, and in 1863–64 was connected with the U. S. coast survey, in charge of chart-printing and lithography. In May, 1864, was elected president of Columbia College, New York City, which post he still holds. He received the honorary degree of LL.D. from Jefferson College, Miss., in 1855, and from Yale College in 1859; also the degree of S. T. D. from the University of Mississippi in 1861, and that of L. H. D. from the regents of the University of the State of New York in 1872. In 1860 he was a member of the eclipse expedition sent to Labrador (Cape Chudleigh) by the U. S. coast survey; and during this absence was elected president of the American Association for the Advancement of Science. In the act of Congress establishing the National Academy of Sciences (1863) he was named as one of the original corporators, and was chairman of the physical section, 1870–72; in 1867 he was one of the U. S. commissioners to the Paris Exposition. He is also a member of the American Philosophical Society, an associate member of the American Academy of Arts and Sciences, corresponding member of the Royal Society of Liège, and member of many other scientific and literary associations. During his long residence in the South, Dr. Barnard was actively engaged in promoting public education, both primary and higher, encouraging and assisting in all departments of scientific research and literary culture. His publications have related chiefly to scientific and educational subjects. Among these may be mentioned "Letters on College Government" (1854), "Report on Collegiate Education" (1854), "Art Culture" (1854), "History of the American Coast Survey" (an extended Report to the American Association for the Advancement of Science, 1857), "University Education" (1858), "Undulatory Theory of Light" (1862), "Machinery and Processes of the Industrial Arts, and Apparatus of the Exact Sciences" (1868), "Metric System of Weights and Measures" (1871).

Barnard (Henry), LL.D., an eminent educator, born at Hartford, Conn., Jan. 24, 1811, graduated at Yale College in 1830, and was called to the bar in 1836. Having been elected to the legislature of Connecticut in 1837, he reorganized the public schools. He was superintendent of schools in Connecticut (1838–42 and 1850–54), in Rhode Island (1843–49), president State University of Wisconsin (1856–59), and of St. John's College (1865–67). He published, besides other works, the "Connecticut Common School Journal," which had reached several volumes in 1855; "Normal Schools in the U. S. and Europe" (1851); "Education in Factories" (1842); "School Libraries" (1854); "Hints and Methods for the Use of Teachers" (1857); and "National Education in Europe" (1851), when he commenced the publication of the "American Journal of Education." He was appointed in 1867 U. S. commissioner of education, but resigned in 1871.

Barnard (John), a famous minister of Marblehead, Mass., was born in Boston Nov. 6, 1681, and graduated at Harvard in 1700. He was a chaplain in the Port Royal expedition of 1707, of which he wrote an unpublished account. Visiting England, he was offered a chaplaincy to Lord Wharton, but refused to conform. He was ordained colleague minister of Marblehead in 1716, and there remained for life. He took great pains in establishing the fisheries and commerce of his people. He published a version of the Psalms, sermons, etc. Died Jan. 24, 1770.

Barnard (John Gross), LL.D., was born May 19, 1815, in Sheffield, Mass., graduated at U. S. Military Academy 1833, and was commissioned as brevet second lieutenant in the corps of engineers. In 1835 was sent to the Gulf coast, where he served seventeen years as an assistant or principal engineer for the fortifications of Pensacola and New Orleans, and on works of harbor improvement. During the war with Mexico he was twice called to the field, and received the brevet of major "for meritorious services while serving in the enemy's country." In 1850 he was named by the President (Taylor) as chief of a scientific commission for the survey of the Isthmus of Tehuantepec, with the view of establishing a route of commerce and travel to our newly-acquired Pacific possessions. The report drawn up by J. J. Williams (1852) gives the first full account of that isthmus ever published. In 1854 he was in charge of the construction of the new fortifications of San Francisco, Cal., in 1855–56 superintendent of the U. S. Military Academy. Subsequently, till 1861, he was in charge of the fortifications of New York harbor. Serving as chief engineer under Gen. McDowell in the first Bull Run campaign, he was present on the field of that battle, as also at the earlier combat at Blackburn's Ford, the very first of the inchoate "Army of the Potomac." As chief engineer (with the rank of brigadier-general) of the Army of the Potomac in the Virginia Peninsular campaign of 1862, he directed the siege operations at Yorktown and before Richmond; and subsequently, as "Chief engineer of the defences of Washington," the extensive works for the defence of the national capital. In the campaign of 1864–65 he served on the staff of Lieut.-Gen. Grant as "Chief engineer of the armies in the field," until the surrender of Lee's army at Appomattox Courthouse, at which he was present. He was brevetted through several grades, and finally received the brevet of major-general U. S. army "for gallant and meritorious services in the field;" also brevetted July 4, 1864, major-general U. S. volunteers "for meritorious and distinguished services." From the close of the late civil war he served as senior member of the board of engineers for permanent fortifications, and as a member of the U. S. lighthouse board. He was a member and original corporator of the National Academy of Sciences. The degree of A. M. was conferred upon him by the University of Alabama in 1838, and of LL.D. by Yale College 1864. He was a member of the American Institute of Architects, and an honorary member of the American Society of Civil Engineers. His principal publications are "The Phenomena of the Gyroscope analytically examined" (1858); "Notes on Sea-Coast Defence" (1861); "Reports of the Engineer and Artillery Operations of the Army of the Potomac" (1863); in conjunction with Gen. W. F. Barry, chief of artillery; "Report on the Defences of Washington" (1871); "Report on the Fabrication of Iron for Defensive Purposes," etc. (1871), made in conjunction with Gen. H. G. Wright and Col. P. S. Michie; "The North Sea Canal of Holland, and Improvement of Navigation from Rotterdam to the Sea;" "Problems of Rotary Motion presented by the Gyroscope, the Precession of the Equinoxes, and the Pendulum." In May, 1864, he was nominated brig.-gen. and chief of engineers. The nomination was withdrawn at his own request. Retired with rank of col. of engineers Jan. 2, 1881. D. May 14, 1882.

Barnaul′, a town of Siberia, in the government of Tomsk, at the junction of the Barnaul with the river Obi, 230 miles S. S. W. of Tomsk. It has a mining school, four churches, and several hospitals. All the gold of the Altai Mountains is brought here to be smelted. A magnetic and meteorological observatory was established here about 1841. Pop. in 1882, 13,529.

Barnave (Antoine Pierre Joseph Marie), a French revolutionist and able advocate, was born at Grenoble in 1761. He was elected in 1789 to the States-General, and became a leader of the popular party. As a member of the National Assembly he opposed the absolute veto, and advocated the confiscation of church lands and the abolition of convents. He was a member of the committee appointed to attend the king on his return from Varennes to Paris in 1791, after which he became a more moderate reformer, and even defended the royal cause. This change of course rendered him unpopular. He retired to private life in Sept., 1791, and was guillotined Nov. 29, 1793. According to Macaulay, he was "the best debater in the National Assembly, but he flinched before the energy of Mirabeau." He left several political treatises, among which is "Réflexions politiques." (See "Life of Barnave," by M. de Salvandy, and "History of the Girondists," by Lamartine.)

Barn′burners, a nickname given to that portion of the Democratic party of the State of New York which opposed the extension of slavery and supported Van Buren against Cass for President in 1848. They were esteemed too radical by their adversaries, one of whom illustrated his meaning by a story of a farmer who was so greatly annoyed by the rats who devoured his grain that he burned his barn to get rid of them. The Barnburners, led by Col. Samuel Young, Hon. Silas Wright, Michael Hoffman, etc., opposed further borrowing for the improvement or extension of their State canals, and were hostile generally to public debts, corporate privileges, etc.

Barnegat Bay, in Ocean co., N. J., connects with the Atlantic by an inlet over a mile wide. The bay extends 23 miles N. to the mouth of Metetecunk River. There is a lighthouse 150 feet high on the S. side of the inlet, with a flashing white light; lat. 39° 45′ 48″ N., lon. 74° 6′ 3″ W. Barnegat Bay is separated from the ocean by Squan Beach and Island Beach.

Barnes (Albert), an eminent American divine, born at Rome, N. Y., Dec. 1, 1798. He graduated at Hamilton College in 1820. He became, in 1830, pastor of the First Presbyterian church at Philadelphia, where he preached upwards of thirty years. As a commentator on the Scriptures, Mr. Barnes has a high reputation, and his scriptural commentaries are popular with the religious community on both sides of the Atlantic. The circulation of his "Notes on the New Testament" (in eleven volumes) is said to have reached more than a million volumes. He commented also on Isaiah (1840), Job (1844), Daniel (1853), and the Psalms (1871). Among his other works may be named "The Church and Slavery" (1857), "The Atonement in its Relations to Law and Moral Government" (1859), "Lectures on the Evidences of Christianity" (1868), "Life at Threescore and Ten" (1868), and "Scenes and Incidents in the Life of the Apostle Paul" (1869). Mr. Barnes took a leading part in the controversy which divided the Presbyterian Church, and in 1837 was one of the most prominent advocates of the New School doctrines. Died Dec. 24, 1870.

Barnes (James), an American officer and engineer, born in 1806 at Boston, Mass., graduated at West Point in 1829, was a lieutenant of artillery till he resigned from the army July 31, 1836, serving at Military Academy as assistant instructor 1829–30 and 1833–36, at Fort McHenry, Md., 1830–32, in Black Hawk expedition 1832, and at Charleston harbor 1832–33, during the threatened nullification of South Carolina. He was a prominent civil engineer (1836–57), and constructed many important railroads. At the beginning of the civil war he resumed the military profession as colonel Eighteenth Massachusetts volunteers, was appointed Nov. 29, 1862, brigadier-general U. S. volunteers, and served in the Virginia peninsula 1862, Northern Virginia campaign 1862, in Maryland campaign 1862, and at Antietam; in Rappahannock campaign 1862–63, at Fredericksburg and Chancellorsville, in Pennsylvania campaign, in several skirmishes, and at the battle of Gettysburg (wounded), and was in command of the defences of Norfolk and Portsmouth, Va., 1863–64, of St. Mary's district 1864–65, and Point Lookout camp for prisoners of war 1864–65. Brevet major-general U. S. volunteers Mar. 13, 1865, for meritorious services, and mustered out of service Jan. 15, 1866. With health destroyed he remained at his home in Springfield, Mass., where he died Feb. 12, 1869.

George W. Cullum.

Barnes (Joseph K.), brigadier-general and surgeon-general U. S. army, born in Philadelphia July 21, 1817, educated in Philadelphia, receiving his degree of M. D. from the medical department of the University of Pennsylvania, class of 1837–38. He followed the practice of his profession in the hospitals and as physician to the outdoor poor of Philadelphia till June 15, 1840, when he was appointed an assistant surgeon in the army, and a surgeon Aug. 29, 1856. In 1863 (Feb. 9) he was appointed medical inspector, and Aug. 10 medical inspector-general with the rank of colonel. On Aug. 25 he was placed in charge of the surgeon-general's office, and Aug. 22, 1864, received the appointment of surgeon-general until retired, June 30, 1882, administering the responsible duties of his department with marked ability. Died Apr. 5, 1883.

Barnes (Joshua), born in 1654, was an English scholar, and was made queen's professor of Greek in 1695. Among his works are a "Life of Edward III.," "Life of Oliver Cromwell, the Tyrant," and a poetical paraphrase on the history of Esther, in Greek verse. Died 1712.

Barnes (Phineas), a politician of Maine, born in 1811, graduated at Bowdoin College in 1829, was professor of Greek and Latin at Waterville (1834–39), and afterwards editor of the "Portland Advertiser," and held many responsible offices in Me. In 1860 he was nominated for governor on Bell and Everett ticket. Died Aug 21, 1871.

Barnes (Thomas), born about 1786, was educated at Christ's Hospital, London, and Pembroke College, Cambridge. He became chief editor of the London "Times," and held that position for over twenty years, finally becoming one of the proprietors. Died May 7, 1841.

Barnes (William), born in Dorsetshire, England, about 1810, was a philologist, clergyman, and poet, and published a number of works, among which were a "Philological Grammar" and "Poems of Rural Life."

Barnesville, Ga. See Appendix.

Barnesville, on R. R., in the S. W. part of Belmont co., O. (see map of Ohio, ref. 5–I, for location of county), 32 miles W. of Wheeling. It has a variety of manufactures, is the commercial centre of a large and wealthy agricultural district, and is noted for its superior strawberries and tobacco. Pop. in 1870, 2063; in 1880, 2435.

Barnet, or **Chipping Barnet,** 11 miles N. N. W. of London, England, is a market-town of Hertford co. The famous battle of Barnet was fought near here in 1471 between the Yorkists and Lancastrians, in which the latter were routed. The earl of Warwick, "the King-Maker," their leader, was killed. The result of this battle was to firmly establish Edward IV. Pop. in 1881, 4095.

Bar'neveld, a town in Holland, 6 miles S. S. E. of Nykerk, in the province of Gelders. There are fine monuments in one of the churches. Pop. 6576.

Bar'neveldt (John van Olden), an eminent Dutch statesman, born at Ameersfort in 1549. He was a member of an important embassy sent to England in 1585, and after his return was appointed advocate-general of Holland. He was an adversary of the earl of Leicester, and became the head of the republican party, while Maurice of Nassau was the chief of its opponents. Barneveldt opposed the ambitious designs and warlike policy of Maurice, and in 1609 concluded a truce with Spain for twelve years. He was for many years grand-pensionary of Holland. The animosity between the two parties was aggravated by religious dissension. Barneveldt favored the Arminians or Remonstrants, while Maurice patronized the intolerant Gomarists, who were also supported by the majority of the army, the clergy, and the populace. The Synod of Dort having condemned the Arminians in 1618, Barneveldt was accused of treason, unjustly convicted, and beheaded May 14, 1619. Motley's "Life of Barneveldt" appeared in 1874.

Bar'ney (Joshua), an American commodore, born in Baltimore July 6, 1759. Having passed through the inferior grades, he obtained command of the Hyder Ali, and captured the General Monk in 1782. He commanded a flotilla in 1813, and was wounded at the battle of Bladensburg in 1814. Died Dec. 1, 1818.

Barn'hart's Mills (Millerstown), on R. R., Butler co., Pa. (see map of Pennsylvania, ref. 4–B, for location of county). Pop. not given in census of 1880.

Barns'ley, a market-town of England in the West Riding of Yorkshire, on the river Dearne, 18 miles by rail N. of Sheffield, on the North Midland Railway. It is situated on a hill, has coal and iron mines, and manufactures of linen, glass, etc. The damasks and drills of Barnsley were considered to be unrivalled. Here are also bleaching and dye works and iron foundries. Pop. in 1881, 29,789.

Barnstable, port of entry and capital of Barnstable co., Mass. (see map of Massachusetts, ref. 5–K, for location of county), on R. R. and Barnstable Bay, 72 miles S. S. E. of Boston. The inhabitants are principally engaged in maritime pursuits. The southerly portion of the township, on Vineyard Sound, is a noted place of summer resort, and contains Hyannis, Cotuit Port, Osterville, and other villages. Pop. of township in 1880, 4242, including 780 in village; of township in 1885, 4050.

Barn'staple, a town and seaport of England, in Devonshire, on the river Taw, 6 miles from its mouth, and 40 miles by rail N. W. of Exeter. The Taw is here crossed by an old bridge of sixteen arches. Barnstaple is pleasantly situated and well built, and has manufactures of pottery, lace, etc. It sends two members to Parliament. The harbor has been filled with sand, so that it will not admit large vessels. Pop. in 1881, 12,283.

Bar'num (Phineas Taylor), born in Bethel, Conn., July 5, 1810. He became an editor, a trader, and afterwards a public showman. In 1841 he established in the city of New York a museum which was very successful. In 1849 he engaged Jenny Lind to sing in America, and paid her $1000 per night for 150 nights. He afterwards experienced severe reverses of fortune, but his perseverance and energy overcame the difficulties. He also has some fame as a temperance lecturer, gives freely to philanthropic enterprises, and has several times been elected mayor of Bridgeport. (See his "Life," written by himself, 1855.)

Barnwell C.-H., on R. R., cap. of Barnwell co., S. C. (see map of South Carolina, ref. 6–D, for location of county), 60 miles S. S. W. of Columbia. Pop. in 1880, 648.

Barnwell (Robert Woodward), LL.D., a statesman, born at Beaufort, S. C., Aug. 10, 1801, and graduated at Harvard in 1821. He studied law, was a member of Congress from South Carolina (1829–33), U. S. Senator in 1850, and afterwards a member of the Confederate Congress. He was president of South Carolina College (now University of South Carolina) (1835–43), and after the civil war held the same position until 1873. Died Nov. 25, 1882.

Baroach', a town of British India, in the province of Bombay, is on the Nerbudda, 40 miles N. N. E. of Surat. Here is a hospital for animals, receiving even insects, which is endowed by the Brahmanists. On an island near this town is the largest banyan tree in India, which is said to have sheltered an army of 7000 men.

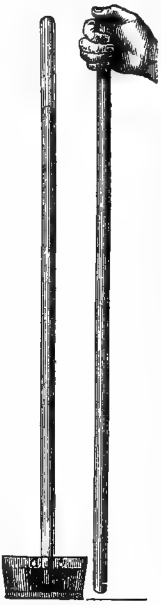
Barocci [Fr. Baroche], or **Baroccio** (Fiori Federigo d'Urbino), a famous Italian painter, born at Urbino in 1528. Among his best works are a "Descent from the Cross," at Perugia, and a "Holy Family," in the Museum at Naples. He also engraved in excellent style a number of his pictures. Died in 1612.

Baroche' (Pierre Jules), born at Paris Nov. 18, 1802, was a French advocate and minister of state. He became a member of the Constituent Assembly 1848–49, and was minister of the interior in 1850; minister of foreign affairs in 1851 from Apr. to Oct. He was appointed president of the council of state immediately after the *coup d'etat* of Dec., 1851, and became minister of justice and keeper of the seals in 1863. He became a senator in 1864.

Baro'da, a city of Hindostan, in Guzerat, about 90 miles by rail N. N. E. of Surat, lat. 22° 16′ N., lon. 73° 14′ E. It is the residence of the guicowar, a Mahratta prince, and has an extensive trade, for which its position is advantageous. A railroad extends from Baroda *viâ* Surat to Bombay, 231 miles. It is a rich city in proportion to its size. Pop. 112,057.

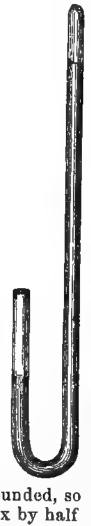
Barom′eter [Gr. βάρος, "weight," and μέτρον, "measure"], an instrument for measuring the weight or pressure of the atmosphere. If a tube of uniform bore be bent into the form of the letter U, and partially filled with a liquid, the height of the liquid column, as measured above the bend, will be found to be the same in both branches. This will continue to be true though the air be withdrawn from above the liquid on both sides—a thing which may easily be effected by suitably connecting the two extremities of the tube with an air-pump. But if, while things are in this condition, the air be gradually readmitted to one of the branches and not to the other, the column in that branch will steadily sink, and that in the other will correspondingly rise. Arresting this process at any moment, we may say that the difference of height of the two liquid columns is a measure of the pressure of the air on the surface of the lower; or that the *weight* of a column of the liquid having a height equal to this difference is just equal to the pressure on that surface. In this experiment it would be easy to expel the liquid entirely from one branch of the tube, without establishing an equilibrium with the column in the other, unless the apparatus should be of inconveniently large dimensions, or the liquid employed should be one having great specific gravity. Mercury, in fact, which is nearly fourteen times (13.6) heavier than water, is the only liquid convenient for the purpose of the experiment; and if this be used, the difference of height of the columns in the two branches will be found to be about 30 inches when the full pressure of the atmosphere is admitted to one branch, while it is wholly withdrawn from the other. The weight of a vertical column of mercury, therefore, of uniform horizontal section, 30 inches in height, is equal to the mean pressure of the atmosphere at the surface of the earth on an area equal to the base of the column. The same fact is demonstrated more expeditiously by simply taking a straight tube 32 or 33 inches in length (Fig. 1), closed at one extremity and open at the other, filling it entirely full of mercury, placing the thumb firmly on the open end, inverting it and plunging this extremity beneath the surface of mercury in a basin, and finally removing the thumb. The column will fall, and stand as before at about 30 inches above the level of the mercury in the basin. This is the original experiment of Torricelli, made early in the seventeenth century, by which he furnished the first satisfactory explanation of the phenomena which the old philosophers vaguely ascribed to Nature's abhorrence of a vacuum.

FIG. 1.



If the pressure of the atmosphere were invariable, the barometer would be an instrument of no practical use, and would simply serve to illustrate an interesting physical truth. But this pressure is constantly fluctuating, and its fluctuations are measured by the varying heights of the Torricellian column. All that is necessary to form a barometer, therefore, is to connect with the tube and basin of Torricelli some kind of scale suitable to measure these variations. In English and American barometers this scale is divided into inches and decimals; in France and in continental Europe generally, into millimètres. If the instrument is to be stationary, the scale need only have a range of three or four inches, since even in localities where the fluctuations are largest, they never transcend these limits. The divisions directly marked on the scale are made sufficiently large to be read by the unassisted eye. For smaller divisions a vernier must be employed. (See VERNIER.) In the best instruments the height of the column may be read by means of the vernier to the $\frac{1}{1000}$th of an inch. Some little practice is required in order to learn to read with accuracy. The vernier carries a horizontal index which moves close to the glass tube containing the mercurial column; but the top of the column is rounded, so that the highest point is distant from the index by half the exterior diameter of the tube. Ordinarily, the bore of the tube is small, not exceeding three-sixteenths to three-eighths of an inch; but in large standards a tube an entire inch in bore is often employed, and in such instruments the index is a ring or thimble surrounding the tube entirely.

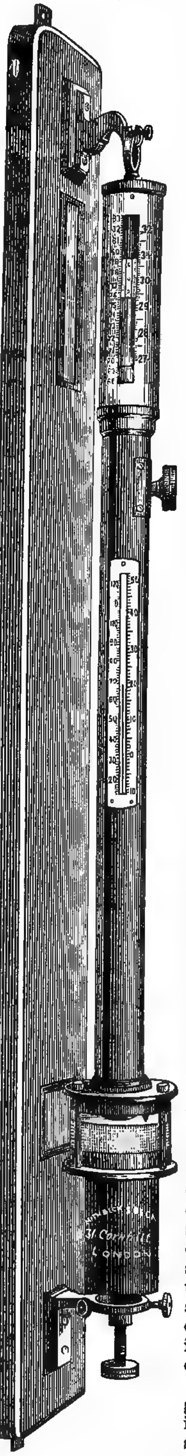
FIG. 2.



The height of the column must be measured from the surface of the mercury in the basin; but the level of this surface itself varies with the rising and falling of the column in the tube. To provide against error from this cause, the whole scale is, in some barometers, made movable, and is raised or depressed as may be necessary, by means of a thumb-screw, before observation. An ivory point directed downward from a short projecting arm carried by the scale is brought so as exactly to meet its image reflected in the mercury of the basin, and this indicates that the zero of the scale is in its true position. In other instruments, and generally in those in common use, the adjustment is made by raising or depressing the level of the mercury itself while the scale remains fixed. Instead of the ivory point, an ivory float is sometimes used, carrying an upright stem on which is a fiducial mark designed to be brought, in the adjustment, into coincidence with a similar fixed mark.

In tubes of small bore the mercurial column does not reach the full height due to the pressure, owing to the effect of CAPILLARY ACTION (which see). A small correction is therefore necessary on this account, which depends on the diameter of the tube. With tubes of large dimensions this effect is insensible; and it may in any case be completely eliminated by giving to the barometer the form shown in Fig. 2, called a siphon barometer, in which the basin is dispensed with, and the tube is bent upward at the bottom, the recurved part serving as a substitute for the basin. In this form of the instrument, if the bore be uniform throughout, every fluctuation of pressure occasions equal and opposite movements of the two surfaces of mercury; and the reading on a fixed scale will change only half as much as in the common instrument. The whole scale should therefore be movable; or if a fixed scale only be used, the divisions should be made of only half their nominal magnitude. An attempt has been made to magnify the barometric indications of fluctuating atmospheric pressure, by transforming the vertical movements of the mercurial column into rotary movements of a long index upon a dial. The siphon barometer presents a convenient means of doing this. A float introduced into the open short arm of the siphon, and connected by a silk thread with a small pulley on the axis of the index, will render conspicuous even a very minute change in the altitude of the column. The uncertain action of this apparatus, however, owing to friction and other causes, is such as to deprive it of any scientific value.

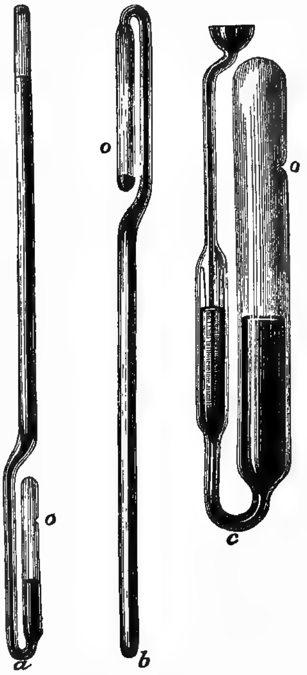
FIG. 3.



The form of barometer now most generally approved, constructed originally by Fortin of Paris, and since adopted by Casella, Beck, and others of London, and by James Green of New York, who has made in it important improvements, is shown in Fig. 3. In this, the glass tube is entirely surrounded by a protecting tube of brass, somewhat enlarged at the top, for convenience in applying a scale and vernier, and having a vertical opening at the same part to allow the summit of the mercurial column to be seen. The cistern at the bottom, which is of boxwood, except the upper portion, which is a short glass cylinder, is similarly protected—the glass portion, however, being uncovered, in order to allow the surface of the mercury in the cistern to be visible. The cistern has a bottom of flexible leather, which rests on a broad disk of metal supported by a vertical screw, of which the milled head is represented in the figure below the instrument. By turning this screw, the level of the mercury in the cistern is brought to the true zero of the scale, indicated by a fixed fiducial point of steel or ivory seen within the cistern.

Since the barometer measures the pressure of the atmosphere, and since this pressure is simply the weight of a vertical column of the aërial ocean above the level of the place of observation, it follows that, if we carry the instrument from a lower to a higher level, the barometric column will fall. One of the most important uses of the barometer, therefore, is as a means of determining heights. (See HYPSOMETRY.) But a barometer intended for this purpose, or a so-called "mountain-barometer," must have a construction in a number of respects differing from the barometer in common use. It must have, of course, a much larger range of scale, and especial care must be taken to guard it against the danger of fracture in transportation. If it is a cistern barometer, the cistern should be air-tight, and should have no communication with the atmosphere, except through an aperture which may be stopped by a closely-fitting screw or cock; and the adjusting screw at the bottom should have so large a range of movement as to allow all the air of the cistern to be expelled by raising the leather bottom, so that the cistern and tube may be both entirely filled with the mercury. The danger of fracture from the oscillations of this dense liquid may thus be avoided. The best mercurial mountain barometer, however, is the siphon barometer of Gay-Lussac, shown in Fig. 4, *a*, without its scale or mounting. In this instrument a tube bent in the manner shown, and closed at both ends, has two straight portions, of small but equal bore, connected by an intermediate portion so much smaller that when, after being filled with mercury, it is reversed, as shown in Fig. 4, *b*, the mercury will be held in the bend by capillarity. The only communication with the air is by the aperture *o*, which is so small that any drops of mercury which may fall into the short arm from the bend, when the instrument is reversed, cannot escape. The design, however, is to have no excess of mercury beyond what will be held by capillarity in the position *b*. This tube is suitably supported throughout its whole length, and protected by a surrounding tube of brass. The zero of its scale is at the middle of the length, and it reads from this zero both upward and downward. The readings are taken at both surfaces of the mercury, and their sum gives the true barometric height. The scale is usually inscribed on the tube itself. In transporting the instrument it is carried in the inverted position, where the mercury, filling the whole tube, is necessarily prevented from oscillating. It is usually carried by the mountaineer in a leather case swung over his back, and when set up for observation is suspended in gimbal rings, supported by a tripod.

FIG. 4.



When a barometer of this kind is carried from place to place, subject to occasional jars and concussions, sometimes perhaps in a horizontal position, there is a possibility that minute portions of air may now and then intrude into the tube, between the mercury and the glass. An effectual contrivance for preventing these from making their way into the Torricellian vacuum was devised by M. Bunten, which is represented in Fig. 4, *c*. The capillary part of the tube is divided; the extremity of the upper portion is drawn out to a minute orifice; that of the lower is widened, so as to form a globular or cylindrical chamber contracted at the mouth; and then the two are united again by fusion in the manner shown in the figure. Any air which may make its way into the tube from below is caught in this chamber, and afterwards, when the instrument is inverted for transportation, it escapes by the way it entered. The invention evinces a high degree of ingenuity.

An interesting form of the mercurial barometer, though one which wants the important property of portability, is the balance barometer, employed by Father Secchi of Rome in his "Meteorograph," or instrument for automatically recording the varying conditions of the atmosphere as to temperature, pressure, moisture, movement, etc. from day to day and from hour to hour. In this, the barometric tube is suspended from the short end of a lever or balance-beam, while the longer end may serve as an index, or may control, as in Father Secchi's apparatus, the registering pens. Of course, when the column rises, the weight is increased, and the arm of the lever which carries the tube descends. In Father Secchi's barometer the tube is of forged iron, bored truly to a diameter of two centimètres (0.8 inch), but in the superior part having the bore enlarged to six centimètres (2.4 inches) in order to increase the difference of weight caused by small variations of atmospheric pressure, and thus render the instrument more sensitive. Such a barometer requires, of course, a large cistern of mercury; especially since, in order to relieve the pressure on the pivot of the balance, it is advisable to connect with the lower end of the tube a cylinder of wood of some size, which, plunging into the mercury, sustains by its buoyancy the greater part of the weight.

Another very interesting form of mercurial barometer, which has in the highest degree the characteristic wanting in the last, of extreme portability, is one recently introduced by Mr. L. Casella, instrument-maker to the Admiralty, London, which may be called a measurer of the elasticity, rather than of the pressure, of the air—a distinction which is real, though the numerical results obtained are identical. In this instrument a glass cylinder two or three inches in height, resembling somewhat a Fortin's barometer cistern, closed at top, has a small and short glass tube descending into it to a point near the bottom. Mercury is contained in a chamber beneath this glass cylinder, and may be forced up into the cylinder by a screw acting on a flexible bottom, in the same manner as in Fortin's barometer. When the surface of the mercury reaches the extremity of the descending tube, it imprisons a certain quantity of air within the glass cylinder, and as the surface is raised higher, this air is compressed, and causes a column of mercury to rise in the tube. A scale and vernier connected with this tube enables the observer to read the height of this column, and when the level of the mercury in the cylinder reaches a certain fixed fiducial point, the reading is taken. The height of the column is really the measure of the difference between the elasticity of the compressed air and that of the free air of the atmosphere; but inasmuch as the first of these values is a simple function of the second, it is easy so to construct the scale that the readings may be the true barometric readings due to the pressure of the atmosphere at the time. This instrument possesses two important advantages: first, its very moderate dimensions; and secondly, its exemption from liability to fracture in transportation, since the quantity of mercury necessary in its construction is very small; and when this is withdrawn into the lower chamber, it may be confined there by turning a stopcock, and kept perfectly motionless. On all accounts, therefore, the instrument is admirably suited to the purposes of a mountain-barometer.

When scientific accuracy is necessary in barometric observations, all mercurial barometers require that their readings should be corrected for temperature. According to Regnault, the absolute dilatation of mercury between 0° and 100° C. = 32° and 212° F., is 0.01813, or about $\frac{1}{55}$th of its bulk. This corresponds to $\frac{1}{9916}$th of the bulk for each degree of Fahrenheit's thermometer, which would be equal, for the mean column of 30 inches, to an increase of altitude of about $\frac{3}{990}$ths, or $\frac{1}{330}$th per degree. Assuming the height at 32° F., therefore, to be the normal height, the reading at 54° F. will be $\frac{22}{330}$ths, or $\frac{1}{15}$th inch too great; at 76° F., or so-called "summer-heat," $\frac{44}{330}$ths, or $\frac{2}{15}$ths inch too great; and at 98° F., $\frac{66}{330}$ths, or 0.2 inch too great. The correction for any temperature may be made by calculation from the data here given; but it is more convenient to be provided with a table which has been calculated in advance for all the temperatures to which the observation is likely to extend.

The process of filling the mercurial barometer is one which requires great care. In pouring mercury into a long and narrow tube it is almost impossible to avoid introducing along with it some bubbles of air, which adhere with tenacity to the sides of the tube, but which, after the tube is inverted, gradually find their way into the space above the column and vitiate the vacuum. These may be expelled by boiling the mercury in the tube before inversion, when they will be carried off with the vapor. The operation is attended with some danger to the tube, the boiling-point of mercury being above 660° F., and the concussions of the heavy column in ebullition violent. It is expedient, therefore, to introduce at first only a small quantity, and after boiling that to add more, and so proceed till the tube is filled, always applying the heat at a point but a few inches below the top of the column. Mr. Green, however, recommends filling the tube completely before beginning the operation, then boiling downward from the top, and finally upward from the bottom. There is a method of getting rid of air-bubbles, however, which is much less hazardous, and hardly less effectual, than this, and which only requires a little dexterity of manipulation to be successfully employed. In the process here referred to the tube is filled at first to within two or three inches of the open end, without any special precaution against the introduction of air. A piece of buckskin is then placed over this end and held firmly there, while the tube is carefully brought into the horizontal position, when the confined air will of course occupy the upper part of the bore throughout. If the tube in this position be slowly rotated around its own axis, the great bubble which extends along its whole length will swallow up all the small ones; so that, when it is once more made vertical they will be removed along with it. The filling is then to be carefully completed, and if any additional bubbles be noticed they will be near the mouth, and may be detached by the aid of a steel wire. Professional instrument-makers often, after employing this method, boil the mercury in the tube also for greater security.

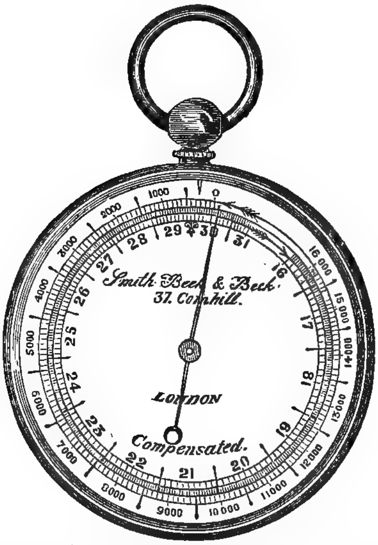
It is of the highest importance that the mercury used in barometers should be quite pure. To be entirely safe on this score, it is best that the metal should be distilled before using, but it may also be purified by chemical means. The effect of the presence of impurities is to diminish the specific gravity of the fluid, and therefore to make its indications uncertain; but it is also to tarnish the tube, and to render observation after a time difficult or impossible.

Other fluids besides mercury may, of course, be employed in the construction of barometers, but the height of the column will in every case be greater in proportion as the specific gravity of the liquid is less. Water, for example, requires a column of 34 feet, mean height. On the other hand, the fluctuations of height of the water column are proportionally large, and serve to render conspicuous slight changes of pressure, which, in the mercurial barometer, are nearly or quite imperceptible. It is an objection, however, to the water barometer that its indications are largely affected by the vapor from the liquid which occupies the space above the column, and that the error thus arising varies with the temperature. Thus, at 70° F. the column is depressed by this cause 10 inches; at 80° F., 14 inches; and at 90° F., nearly 20 inches; while even at 32° F., the freezing-point, below which the water barometer is unavailable, the depression from the same cause is no less than 2½ inches. To all observations of such a barometer, therefore, a tabular correction must be applied, depending on the state of the attached thermometer. Another source of error in these barometers is found in the fact that all natural waters contain more or less air, which, when the atmospheric pressure is removed, makes its escape; so that, if the water for such a barometer be taken directly from a natural source, the vacuum above the column will soon be to some extent vitiated by the pressure of permanent gases as well as of vapor. This evil may be prevented, at least for a time, by thoroughly boiling the water immediately before its introduction into the tube; but it will return in consequence of the absorption of air through the surface of the fluid which is exposed to the atmospheric pressure, unless that be protected by some covering impervious to air. In the water barometer erected in the rooms of the Royal Society in London, such a protection is provided in a stratum of solution of caoutchouc in glycerine. Very few water barometers have ever been constructed. The first of the kind was erected by Otto Guericke, the inventor of the air-pump, in his house at Magdeburg. The upper portion of the tube only, to an extent of about six feet, was of glass, and this was but partially exposed to view, the rest being concealed behind the woodwork of the apartment. Floating on the top of the liquid the inventor had introduced a diminutive figure of a man, which, with the rising of the column in fair weather, presented itself to view, but with the approach of foul weather retreated out of sight. The water barometer in the rooms of the Royal Society has just been mentioned. There is such a barometer also in the theatre of the natural philosophy class in the University of Edinburgh. At the Smithsonian Institution in Washington there was set up, some twenty-five years ago, by Mr. James Green of New York, under the direction of Prof. Henry, a barometer of large dimensions in which the fluid used was sulphuric acid. This liquid is free from the objection of forming vapor in the Torricellian void; and owing to its large specific gravity a column of it less than 20 feet high suffices to balance the mean atmospheric pressure. Such, however, is the avidity with which this acid absorbs watery vapor, that its exposed surface must be in some manner protected from direct contact with the atmosphere. The protection used in this case was a balloon of India-rubber firmly secured to the short arm of the siphon barometric tube. But, though moisture was thus excluded, air was found to make its way gradually into the void above the column, and the instrument was finally disused and taken down.

A description of barometer employing no liquid has, in recent years, come extensively into use, known as the Aneroid Barometer, the invention of M. Vidi, a physicist of France. The etymology of this word has been variously given. The inventor appears to have derived it from the verb ἀνέρομαι, "I inquire," but the books commonly give it as from ἀ, privative (*i. e.* signifying negation), νηρὸς, "wet," and εἶδος, "form;" understanding from the combination "a form without liquid," which seems to be an interpretation sufficiently far-fetched. A third derivation is presented by Prof. De Morgan ("Budget of Paradoxes," p. 385) from ἀ (or ἀν), privative, and ἀεροειδής, "like the air," or "having to do with the air;" so that anaëroid, or aneroid, would seem to mean an instrument which has nothing to do with the air, or one which has been named, like the grove in Latin, *lucus a non lucendo*.

The instrument itself consists essentially of a flat cylindrical box formed of thin corrugated metal, from the interior of which the air has been entirely, or nearly,* exhausted; the immediate effect being to bring the top and bottom into contact with each other by atmospheric pressure. The touching surfaces are then separated by means of a strong spring attached to the centre of the upper surface, while the lower is held down, the whole being placed within a larger box properly adapted to receive it. With the varying pressure of the atmosphere the separation of the surfaces is greater or less, or the spring is more or less bent, and the movements thus occasioned are transmitted by proper multiplying-apparatus to an index which traverses a dial like that of a watch. (Fig. 5.) Aneroid barometers often perform very well, and perform well for long periods; but in time, the spring is liable to lose its elasticity, so as to render the indications untrustworthy. These instruments should therefore be occasionally compared with standard mercurial barometers. They are very convenient for transportation, being constructed of various

FIG. 5.



Aneroid Mountain Barometer.

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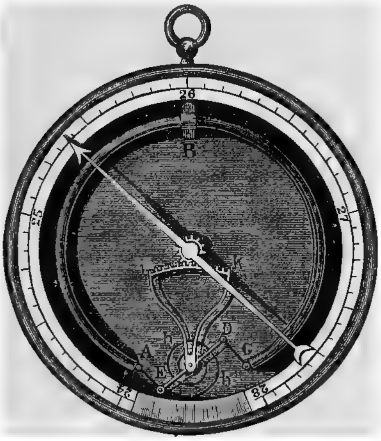
* Not altogether. In recent constructions, a small portion of air is left within the box, as a means of compensating for variations of temperature; this air gaining as the spring loses in elasticity by elevation of temperature, and *vice versâ.*

dimensions, from eight or ten inches in external diameter down to two, and are often graduated to serve as mountain-barometers for heights as great as 12,000 or 16,000 feet.

Another form of barometer without liquid, and in external appearance resembling the aneroid, is Bourdon's Metallic Barometer, now greatly improved by M. Richard of Paris, and constructed almost or quite exclusively by him. In this, a broad and nearly flat tube of thin metal, bent into the form of a horse-shoe, having been exhausted of air, is secured by the middle part to the box enclosing it, while the ends, left free, are connected by delicate chains or wires with the apparatus controlling the index. (Fig. 6.) The effect of increased atmospheric pressure upon an exhausted tube of this form is to bring the extremities nearer together, and that of diminished pressure to cause them to recede; and these changes are shown by the index on the dial. M. Richard's principal improvement consists in the introduction within the tube of a steel spring having the curved form of the tube, but nowhere touching its walls; giving to it greater rigidity, and much greater uniformity of action, than belonged to the instrument as originally constructed.

FIG. 6.



Long-continued observations of the barometer have demonstrated that there are certain fluctuations of atmospheric pressure which are periodical and regular, though not large; while such as are noticeable for their magnitude are subject to no obvious law. Of periodical fluctuations there is a semi-diurnal inequality having its maximum at about 10 o'clock morning and afternoon, and its minimum at 4, afternoon and morning. Its magnitude varies with the latitude, being greatest (0.104 in.) at the equator. In lat. 40° it is 0.05 in., and in lat. 70° only 0.003 in. There is also an inequality dependent on the seasons, which in some parts of the earth is large, and in others almost or quite imperceptible. Where it is noticed, the highest reading occurs in January, and the lowest in July, or a little later. At Pekin, in China, the mean pressure for the first of these months is three-fourths of an inch greater than that for the second. A large part of Asia is similarly affected. At Havana the fluctuation is hardly a quarter of an inch, the minimum seems not to be reached before the month of August, and the decline of the monthly means is not regular. At Boston and at London the monthly means throughout the year scarcely differ from each other by the tenth of an inch, and an annual inequality can hardly be said to exist. The position of the moon seems to have a slight influence on atmospheric pressure, but this, even where most observable, is little more than half a hundredth of an inch.

The non-periodic fluctuations of pressure are very much greater than the periodic. If we call the difference between the greatest and least readings of the barometer within any month the *monthly oscillation*, and combine the observations of many years for the same month, we shall obtain the mean monthly oscillation. This is least near the equator, and increases towards the poles. At the equator it hardly exceeds 0.1 inch; in lat. 30° it is 0.4 in.; in lat. 45°, over the Atlantic, it is 1 inch; in lat. 65° it is 1½ in. During the three winter months the mean is about one-third greater. On the continents bordering the Atlantic the means are usually less than over the intervening ocean. The *extreme* fluctuations of the barometer, however, very much exceed these means. In Boston the greatest height observed in thirty-seven years is 31.125 in., and the least, 28.47 in.—difference 2.655 in. The greatest observed range at London is 3 in.; at St. Petersburg, 3.5 in. Within the tropics the range is small. At Christiansborg, near the equator, the greatest range observed in five years was 0.47. (*Loomis's Meteorology.*)

The barometer is often spoken of as a weather-glass; and the scale of the instrument is often inscribed with words indicative of the weather which may be expected when the head of the column stands opposite them. This is, however, apt to convey very erroneous notions; for neither the actual nor the approaching weather can be correctly inferred from a knowledge of only a single one of the conditions which determine meteorological phenomena. The indications of the thermometer, the anemometer, and the hygrometer, and the progressive changes denoted by those instruments, are quite as important to the prediction of the weather as those of the barometer. Moreover, the prognostications derived from these instruments which would be justified in one part of the world, would not be at all so in another where the physical conditions are different. One remark, however, is true generally. Inasmuch as there can be no considerable change in the condition of the atmosphere as to heat or moisture or movement which is not accompanied or immediately preceded or followed by a change of pressure, therefore when the barometer continues steady, whether it be high or low, the actual state of the weather, whatever it may be, is likely to last. It may be added that a rapid movement of the barometer upward or downward, say three-fourths of an inch in twenty-four hours, is of unfavorable augury. Also that a very rapid fall will probably be followed by a violent wind. A slow movement upward gives assurance generally of fair weather. On the Atlantic coast of the U. S., however, according to Loomis, the approach of a violent N. E. storm is generally indicated by a rise of the barometer above its mean height; the wind veers to the N. E., and the atmosphere becomes hazy. Rain or snow follows, and afterwards the barometer begins to fall. When it reaches the lowest point, the wind changes to N. or N. W., and the barometer rises. If a gale sets in from the E. or S. E., and the wind veers by the S., the barometer will fall till the wind becomes S. W. A lull may then occur, followed by a renewal of the gale with the wind from the N. W., and a simultaneous fall of the thermometer and rise of the barometer. When a storm of rain or snow follows, as it usually will, a rapid fall of the barometer, the wind will be N. if the thermometer is low, and S. if it is high. If the barometer falls with a rising thermometer and increased dampness, wind and rain are likely to follow from the S. The result of all rapid changes in the weather, or in the indications of meteorological instruments, is of brief duration, while that of gradual changes is generally lasting. (See METEOROLOGICAL INSTRUMENTS.)

While observation enables us, thus, in some manner, to connect the fluctuations of the barometer with the varying conditions or aspects of the weather, it is not easy in all cases to assign satisfactory causes for the fluctuations themselves. The low state of the column which is commonly observed to accompany the formation of heavy clouds and the fall of rain or snow, shows that the popular language, which speaks of the atmosphere at such times as "heavy," is scientifically incorrect. Many hypotheses, among them some which, in the present state of science, would be pronounced absurd on the face of them, have been proposed to account for the phenomena; but the true reason of at least the more conspicuous variations of atmospheric pressure must be looked for in rarefaction by heat, of which the ultimate source is the sun. Different portions of the earth's surface become unequally heated by the solar radiation. The heat thus acquired is imparted by the earth to the atmosphere above it, of which the portions most heated are also most dilated, and, in consequence of their diminished specific gravity, tend to rise. In rising they are further dilated by diminished pressure, and their temperature consequently falls until their contained vapor is condensed to cloud, with evolution of its latent heat. The heat evolved increases the rarefaction, and the upward movement continues. The rarefied column is not changed in weight by the mere fact of its rarefaction; but as its altitude is increased it necessarily overflows at top upon the surrounding air, of which the pressure is thus augmented, while its own is correspondingly diminished. As a necessary consequence, the barometer below it falls; and as rain naturally follows the precipitation of vapor, the rain-area will usually be found to correspond with the area of low barometer. Of periodical oscillations, the diurnal are in like manner traceable to heat. Those of longer period depend on causes less easy to ascertain.

(For more full information as to the barometer and its uses, see "Smithsonian Miscellaneous Collections," vol. I., pp. 693, by PROF. GUYOT and J. W. C. COFFIN, 1862; also "Manual of the Barometer," by J. W. BELVILLE, London, 1849; also the "Smithsonian Annual Reports" of the years 1855, 1856, 1859, and 1867. The report of 1856 has a detailed description of the construction of Green's Standard Barometer; that of 1867 contains an important memoir by Marshal VAILLANT on the horary variations. LOOMIS's "Meteorology," and REID's "Law of Storms" may also be consulted with advantage.) F. A. P. BARNARD.

Barometric Light. When an upright barometer is moved gently backward and forward from the vertical to an oblique position, so as to make the mercury oscillate in the tube through a range of a few inches, the Torricellian vacuum becomes lighted up, so as to be visible in the dark. This is called the *barometric light*, and is due to electricity arising from the friction of the mercury against the inner surface of the tube. The phenomenon may be exhibited on a large scale in the vacuum of an air-pump. The chief precaution is, that the mercury and the glass apparatus be quite dry; hence the experiment succeeds best in frosty weather.

Bar'ometz, sometimes called **Tartarian** (or **Scythian**) **Lamb,** the prostrate stem (rhizome) of a fern (*Aspidium Barometz*) which grows in salt plains near the Caspian Sea. It is covered with a shaggy, silky down, and has some resemblance to an animal. It was anciently believed to be half plant, half animal. It was also known as baranetz.

Bar'on, the title of the lowest degree of hereditary nobility in Great Britain and Ireland, is the next below that of viscount. The word was formerly used to include the whole English nobility, because all noblemen were barons. The distinction between the greater and lesser barons seems to have been made at an early period in most of the countries of Europe. The greater barons, who were the king's chief tenants, held their lands directly, or *in capite*, of the Crown; while the lesser held of the greater by the tenure of military service. The greater barons had a perpetual summons to attend the parliament or great councils of the nation. The practice of conferring the rank of baron by letters-patent, and as a mere title of honor apart from the possession of land, originated in 1387. Barons are sometimes created by writ, but this mode is nearly obsolete, and creation by patent is the surest way of ensuring the hereditary character of the peerage. On great occasions a baron wears a coronet adorned with six pearls set at equal distances on the chaplet. He is addressed as "my lord" or "your lordship," and is styled "right honorable." In France and Germany and in many other countries a baron is a nobleman next in rank to a count. Formerly in Scotland a baron was not necessarily a nobleman, but was a holder of land in what was called baronial right. There are at present several classes of barons: (1) barons of England; (2) barons of Great Britain; (3) barons of the United Kingdom (all the members of these classes have seats in the House of Lords); (4) barons of Scotland; and (5) barons of Ireland; the members of the two latter classes having no seat in the House of Lords unless chosen as representative peers. The life peerage, rarely conferred, does not entitle to a seat in the House of Lords. Certain judges of the exchequer courts of England and Ireland are called barons of the exchequer.

Baron (BERNARD), a distinguished French engraver, born at Paris in 1700, was a pupil of Nicolas Henri Tardieu, and resided for a number of years in England, where he died at London in 1762. He engraved several plates for J. A. Crozat's collection of prints. His style is coarse in mechanical execution, but his merits are acknowledged to be great. His works should not be confounded with those of John Baron (or Baronius) of Toulouse (hence called *Tolosano*), who was born in 1631, and lived at Rome, where he engraved historical scenes and portraits.

Baron, originally **Bayron** (MICHAEL), one of the greatest of French actors, was born at Paris Oct. 8, 1653. His father, a leather-merchant, having fallen in with a very beautiful travelling actress, left his business and entered the same troupe. The actress became the mother of Michael Baron. Going to Paris in after years, Michael, a very handsome young man, attracted the attention of the great Molière, who became his friend and instructor. Baron rose rapidly to the first rank of his profession, and was as eminent in tragedy as in comedy. He was with justice called "the honor and the marvel of the French stage." As a writer of plays he was very prolific. His beauty and talents caused his name to be mixed up with much of the gross scandal of the time. His personal vanity was very great. He used to say, "Every century might produce a Cæsar, but it took ten thousand years to produce one Baron." It is commonly reported that he died upon the stage, but in reality, though stricken with apoplexy on the stage, he lived after that event more than two months. He died at Paris Dec. 3, 1729.

Baron (PIERRE), called **Peter Baro,** a native of Etampes, in France, became a Protestant, and escaped to England in Queen Elizabeth's time. In 1575 he was appointed Lady Margaret professor of divinity at Cambridge, an office which he held till 1596, notwithstanding the strong opposition which his doctrinal teachings encountered. He was an opponent of Calvinism, then strongly maintained at the university and by the archbishop of Canterbury—Dr. John Whitgift. Baron was therefore subject to many vexatious annoyances, and was openly accused of heresy and of endeavoring to carry the university back to Romanism. He held to his course with great persistency, and even had the courage to preach against the famous Lambeth Articles, which had been drawn up to oppose him and his party. He was consequently forbidden to engage in polemics, and was made so uncomfortable that he was obliged to resign his position (1596) and retire to London, where he soon after died, leaving a number of Latin treatises, since published in English.

Baron and Femme, in heraldry, is the term used to designate the bearing by which the arms of husband and wife are carried per pale, or marshalled side by side on the same shield. The husband's arms are always carried on the dexter side.

Bar'onet, a diminutive of baron, is a title of honor which is hereditary. A baronet is the next lower than a baron, compared with whom, however, he is very inferior in rank. Baronets were first created in 1611 by James I., whose object was to raise money. The creation of baronets is limited only by the will of the sovereign, who confers the rank either by patent or by writ. A baronet is entitled to the prefix *Sir* to his name, and has precedence of all knights except bannerets, knights of the Garter, and privy councillors. Baronets are of four classes—those of Ulster, England, Nova Scotia (or Scotland), and the United Kingdom.

Baro'nius (CESAR), a Roman Catholic church historian, born Oct. 30, 1538, was a disciple of Saint Philip of Neri. He became cardinal and librarian of the Vatican. His celebrated "Ecclesiastical Annals" from the birth of Christ to 1198 A. D. (Rome, 1588–93, 12 vols. fol.; Antwerp, 1589–1603; Mayence, 1601–05, rev. ed.) was the result of twenty-seven years' labor. The annals of Baronius are continued by Raynolds to 1565, by Caderchi to 1571, and by Theiner to 1584 (in 1856). In 1864, Theiner began a new edition of the annals, but died suddenly in 1874. He was a brilliant dialectician and stylist, but has been charged with many blunders, owing to his ignorance of Greek. Notwithstanding these errors and his strong partisan spirit, the "Annals" of Baronius are conceded to possess very great learning and value. They were written in reply to the Magdeburg Centuries. He published a number of other works, characterized by the same faults and the same great learning as marked his "Annals." Died June 30, 1607.

Bar'ony, the lordship, honor, or fee of a baron. In England, manors were formerly called baronies, and a barony was a manorial and hereditary right arising out of land known to the law both of England and Scotland. In the Scottish law a right of barony is a right in relation to lands which have been erected or confirmed by a clause in crown charters, making the grant in *liberam baroniam*. It involved civil and criminal jurisdiction, but the clause in crown charters erecting baronies has become obsolete.

Baro'zzo, or **Barozzio** (JACOPO), an illustrious Italian architect, was born at Vignola, near Modena, in 1507, from which fact he is often called **Vignola.** He studied painting at Bologna, but was so fascinated by the study of perspective that he abandoned painting for architecture, in which art he attained a great reputation. He was employed by an association of antiquaries in Rome to take measurements and execute models of the remains of the ancient statuary of Rome. These models were afterwards cast in bronze. In 1541 he went to Paris to superintend the casting of his copies, and while there was engaged in architectural pursuits. In 1550 he became architect to Pope Julius III. He designed the splendid palace of Cardinal Farnese (Caprarola), in which were placed some of his own pictures. He was engaged upon this work from 1555 to 1573. Meanwhile, upon the death of Michael Angelo in 1564, he succeeded the latter as architect of St. Peter's church. He published several valuable works on architecture, among which the best known is "Regole de' cinque ordini d'architettura" (1563), illustrated by engravings. This was long the standard authority in classic architecture. He was one of the designers of the Escorial Palace in Spain. Died July 7, 1573.

Barquesime'to, a province of Venezuela, is bounded on the N. by Coro, on the E. by Carabobo, on the S. by Barinas and Trujillo, and on the W. by Trujillo and Maracaybo. The province of Yaracuy has lately been detached from this province, but nothing definite being known of the boundaries, etc. of Yuracuy, we treat of the two as one. Area, 9350 square miles. The southern part of the province is mountainous, while the N. is level. The largest river of the province is the Tocuyo, which, however, does not become navigable until it enters the province of Coro. The soil is poor, but the climate, with the exception of one or two districts, healthy. The chief occupation of the inhabitants is agriculture, and the chief products are tropical fruits, wheat, coffee, cacao, indigo, and sugar. Chief town, Barquesimeto. Pop. 176,079.

Barquesimeto, a city of Venezuela, capital of the above province, and situated on a river of its own name, 175 miles W. S. W. of Caracas. It was almost destroyed by an earthquake in 1812, previous to which it had about 15,000 inhabitants. It has a college, and is situated in a fertile and well-cultivated district. Present pop. 28,918.

Barr, a town of Germany, in Lower Alsace, 23½ miles by rail S. W. of Strasburg, situated on the E. slope of the Vosges, at the mouth of the Uhlrichthal, has numerous vineyards, distilleries, manufactures of leather, arms, etc., and three annual fairs. Pop. in 1880, 5857.

Bar′ra, a town of Italy, 3 miles E. of Naples, of which it is a pleasant suburb. It has many fine residences or country villas. Pop. 7656.

Bar′racks, buildings for the habitation of troops. The word is sometimes applied to any collection of buildings densely occupied by human beings.

The experience of the civil war in the U. S. has demonstrated that ventilation, abundance of pure air, is more important to the health of man than complete protection from cold and heat. While soldiers camped in small and crowded tents, kept closed to exclude the cold, suffered from typhoid fevers, the sick and wounded in hospital tents and in the light and open wooden barracks established as general hospitals, recovered more rapidly and certainly than those in what are called better buildings, closer and more substantial.

There are few large masonry barracks in the U. S., such as are found on the continent of Europe in almost every large town. Most of the military posts are beyond the frontier which separates the country of civilization and cultivation from the region occupied, or rather traversed, by the nomadic Indian tribes, and the scarcely less nomadic white miner and hunter. A very few of these posts built on the open prairies, where timber is scarce and costly, have been constructed of stone or brick; more are of sun-dried bricks, called by the Mexicans *adobes.* But the greater part of them are of wood—log houses in the timbered country, light frames covered with boards in the prairies. The open joints of the board wall-coverings and roofs and floors make it impossible to exclude fresh air, and they ensure a circulation of air, notwithstanding the efforts of the occupants of the building to close all ventilating openings.

The principal and more permanent barracks of the U. S. are Madison Barracks, Sackett's Harbor, N. Y.; the Citadel at Charleston; the barracks at Pensacola; Jackson Barracks, New Orleans, La.; Jefferson Barracks, St. Louis, Mo., now used as an arsenal; Baton Rouge Arsenal, and Mount Vernon Arsenal, Mississippi, now used as barracks for the army; Oglethorpe Barracks, Savannah; Benicia Barracks, California; Carlisle Barracks, Pa.; Omaha Barracks, Omaha; Fort Leavenworth, Kan.; Mobile Barracks, Mobile; Newport Barracks, Ky.; Presidio of San Francisco, Cal.; Ringgold Barracks, and Fort Brown, on the Rio Grande, Tex.; and Plattsburg Barracks, Lake Champlain. In the official list of the quartermaster's department there are 231 military posts, at all of which there are barracks, either owned or rented by the U. S. The army occupies about 5000 buildings.

At most of the U. S. navy-yards there are barracks for the marines, generally of masonry. Among them are the marine barracks of Washington, Charlestown, Brooklyn, Pensacola, and Benicia.

Since the Revolution, Paris has been enriched with very fine buildings as barracks. Those of the Prince Eugène, the Napoleon Barracks, and the new barracks on the Ile de la Cité, are noble and beautiful buildings. But it seems impossible to so arrange these great buildings as to secure thorough and satisfactory ventilation, and without fresh air, and disturbed by the movement which must take place night and day among large bodies of men occupying large rooms, these palaces are not believed to have as low rate of mortality as the temporary cheap structures in which the U. S. army lives on the frontier.

There are large barracks in all the great European capitals. Stuttgart, St. Petersburg, Paris, Naples, Rome, are noted for the beauty and extent of their barracks. The Museo Borbonico at Naples was built for a cavalry barrack; in it are now collected the many remains of Roman and Greek art unearthed at Pompeii and Herculaneum.

The Romans, who conquered the known world and held it by military occupation, built strong barracks wherever they established a permanent post. They had no firearms, and a small garrison depended upon the strength of their walls to resist the attacks of barbarians. The remains of such barracks, nearly perfect, have been found of late years at ancient Roman stations in the wilderness of Syria and Palestine. While the Roman legionary was trained and practised at hard work, he did not hesitate to use in all such constructions the forced labor of his captives of whatever rank or station. Our troops are obliged generally to build their own barracks, and, armed with rifles of long range, they depend upon superior knowledge and discipline, and seldom fight the savages from behind their barrack-walls.

There are two uses to which barracks are put: one is protection during a siege and bombardment from the missiles of the enemy; the other, and far more constant use, is protection mainly from the weather.

Many of the sea-coast forts of the U. S. make ample provision in vaulted casemates for the garrison during a siege, but such barracks in the climate of the coasts of the U. S. should never be occupied in time of peace. They are dark, damp, ill-ventilated, and unhealthy, and provision should be made for shelter outside the ramparts for the peace garrison in all cases. In the climate of Spain and Italy, of the West Indies, and of Mexico, it is probable that the custom of the tropics of living in rooms roofed with earth or masonry has not such disadvantages as farther N.

European practice allows from 420 to 1200 cubic feet of space per man in barracks and hospitals; and the latter is better than the former; but in practice the air-space is limited by the appropriations which the government grants for barracks and quarters for troops. Thorough drainage of the buildings and of the sites is essential to health. Temporary cantonments should never remain long in one place. The troops should remove to fresh ground, and the old site should not be reoccupied until time and frost have thoroughly destroyed the effete animal and vegetable matter which collects about any large body of men.

All barracks are liable, on any temporary increase of the garrison, to overcrowding. The "Regulations" of the U. S. army give to every six soldiers from 225 to 256 square feet of floor as the post is N. or S. of the 38th degree of latitude. This area, with a height of roof to average twelve feet, gives to each man 450 to 512 cubic feet of air-space. In a room intended to be occupied by thirty men, at least 60,000 cubic feet of fresh air per hour should be admitted from the outside, and as much more as can be borne without inconvenience. But all ventilating arrangements are liable to be obstructed by those for whose benefit they are intended, unless made on the most extensive and elaborate scale, and placed entirely beyond their control. A man feels the cold sensation from a draught more distinctly than the headache or oppression resulting from too close and impure an atmosphere. He knows that if he stops the ventilating inlet near him he will get rid of the draught. He does not realize that at a future time his health may break down as a consequence of this interference with ventilation. Practically, therefore, the most efficient barrack ventilation, except in the palaces of masonry built in Europe and ventilated by steam-power, is that inseparable from the imperfect construction of the building itself. These defects, beyond the skill and power of the soldier to remedy, save his health by supplying him continually with fresh air against his will.

The War Department has of late years adopted an iron barrack-bunk to be occupied by a single man, but which can be piled three tiers in height, so as to give space for circulation during the day, and has abolished the use of the two-story double wooden bunks in which soldiers formerly slept.

Books of reference: "Reports of the British Barrack Commission," London, 1861; "Circular Nos. 3 and 4 of the Surgeon-General of the United States;" "Reports on Barracks and Hospitals;" "Outline Description of Military Posts and Stations," published in 1871 by the quartermaster's department. M. C. Meigs.

Bar′rackpore, or **Barrackpoor,** a town and military cantonment of British India, on the left (or E.) bank of the Hoogly, about 15 miles above Calcutta. It contains the country residence of the governor-general of India, and many elegant mansions of the European citizens of Calcutta, who are attracted by the salubrity of the place. The adjacent country is covered with beautiful forests and a luxuriant tropical vegetation. Here is a noble park of 250 acres, which exhibits an admirable specimen of landscape-gardening. Barrackpore was called the cradle of the Sepoy mutiny of 1857. Several regiments of native troops were stationed here. They objected to biting off the ends of the cartridges for the Enfield rifle, believing the paper to be polluted with animal fat. A Sepoy named Mungal Pandy wounded an officer (in Feb., 1857), whose blood was the first that was shed by the mutineers.

Barracu′da, or **Barracou′da,** a kind of fish (*Sphyrona Barracuda*) of the Atlantic Ocean. It is from six to ten feet in length, and very voracious. Its flesh is eatable, except at certain seasons, when, from some unknown cause, it becomes poisonous. It is common about the Bahama Islands.

Barrafran′ca, a town of Sicily, in the province of Caltanisetta, 11 miles S. E. of Caltanisetta. Pop. 8706.

Barras, de (Paul François Jean Nicolas), Count, a French Jacobin and regicide, born in Provence June 30, 1755. He was chosen a deputy to the States-General in 1789, and a member of the National Convention in 1792. He acted with the party called the Mountain, voted for the death of the king, and joined the enemies of Robespierre on the 9th Thermidor, 1794, in which crisis he was commander of the national guard. On the 13th Vendemiaire (Oct. 5, 1795), he was again appointed commander of the troops by the Convention. With the aid of Bonaparte he defeated the royalist insurgents of Paris on that day. He was one of the first five members of the Directory appointed in Nov., 1795, and acted a prominent part in the conflict of the 18th Fructidor, 1797, after which he was perhaps the most powerful of the Directors. He was venal and dissolute, and abused his power. His political career was ended by the ascendency of Bonaparte in 1799. Died Jan. 29, 1829. (See Thiers, "History of the French Revolution;" C. Doris, "Amours et Aventures du Vicomte de Barras," 4 vols., 1816.)

Bar′ratry [from the Old Fr. *barater*, to "deceive"], in law, used in various branches with different significations:

1. *Marine Insurance.*—An act committed by the master or mariners of a ship for some unlawful or fraudulent purpose, contrary to their duty to the owners, whereby an injury is sustained. Under this definition an act of negligence would not be barratry, and such is the rule in England. The French writers use the word in a broader sense, and include in it gross negligence, without reference to the motive. Some of the American cases follow this view. The general rule is, that fraud is an element in an act of barratry, though the word *fraud* is employed in a broad sense to include acts done in opposition to the owner's instructions, and yet intended for his benefit, such as sailing out of port without payment of the duties, disregard of an embargo, or breach of a blockade. Insurance is frequently made specifically to include losses occasioned by acts of barratry, and sometimes with the exception that the master is not the owner of the vessel. Barratrous acts of a serious kind are declared to be crimes by the laws of Congress. Instances are the act of piratically or feloniously seizing or running away with the vessel or cargo, or voluntarily delivering the vessel into the hands of pirates. These are capital offences.

2. *In Criminal Law.*—The act of stirring up suits and quarrels. A person practising such acts is called a "common barrator," or, in the language of Lord Coke, a common mover and maintainer of suits in disturbance of the peace, etc. A person cannot be a barrator in respect of one act only. It must appear that he is a *common* barrator. The subject is usually regulated by statute.

3. In Scotch law, barratry is the crime of a judge who is induced by bribery to render a judgment. T. W. Dwight.

Bar′re, on R. R. and Ware River, Worcester co., Mass. (see map of Massachusetts, ref. 3–F, for location of county), 21 miles N. W. of Worcester, has an institute for feeble-minded children, several large mills and shops, and important manufactures. It was named in honor of Colonel Isaac Barré. Principal business, farming and dairying. Pop. of tp. in 1870, 2572; in 1880, 2419; in 1885, 2093.

Barre, on R. R., Washington co., Vt. (see map of Vermont, ref. 4–C, for location of county), 6 miles S. E. of Montpelier. It has an academy, is the seat of Goddard Seminary, and has manufactures of agricultural tools, castings, etc. Pop. of tp. in 1870, 1882; in 1880, 2060.

Barré (Col. Isaac), born in Dublin, Ireland, in 1726, of French parents, entered the British army, where he served with great distinction, receiving a wound at Wolfe's victory at Quebec (1759), in consequence of which he ultimately became blind. He entered the British Parliament in 1761, where for years he nobly defended the rights of the American colonists. Died in London July 20, 1802.

Barre, de la (Antoine le Fèvre), a French naval officer; governor of Guiana in 1663; retook Cayenne from the Dutch in 1667; was made lieutenant-general in 1667, and was governor of Canada 1682–85. Died May 4, 1688.

Barréges, or **Baréges,** a celebrated watering-place of France, in the department of Hautes-Pyrénèes, 23 miles S. of Tarbes, is 3240 feet above the level of the sea. Here are warm sulphurous springs having a temperature of about 104° to 122° F., which are esteemed efficacious in cases of scrofula, gout, etc.

Bar′rel, a large wooden vessel for holding liquids or solids, is bound with hoops, and formed of staves, which are wider in the middle than at the ends, and have bevelled edges, which render the joints tight. Each end of the barrel is closed by a circular head. The arched arrangement of the staves enables it to resist pressure from without. The term is also applied to the quantity contained by a barrel, which varies for different substances. A barrel of flour in the U. S. is equal to 196 pounds, and a barrel of pork or beef contains 200 pounds. In wine measure, 31½ gallons make a barrel. A barrel of beer in England is equal to 36½ imperial gallons.

Bar′rel Or′gan, a musical machine in which the music is produced by a barrel or cylinder set with pins or staples, which, when driven round by the hand, open the valves for admitting the wind to the pipes. The number of tunes which a single barrel organ can play is small. Barrel organs are portable, and are mostly used by performers in the streets, called organ-grinders. A street organ usually costs from $150 to $240.

Barren Island, a sandy tract of land at the entrance to Jamaica Bay, on the S. shore of Long Island, is a part of Gravesend township, Kings co., N. Y. It has fat-rendering establishments for utilizing the offal of New York City and Brooklyn.

Barr′head′, a manufacturing town of Scotland, in Renfrewshire, 7 miles S. W. of Glasgow. It has cotton-mills, a machine-shop, print-works, bleaching-works, etc. P. 6209.

Barricade, a military barrier or defensive work, employed to obstruct the passage of an enemy through a road or a street of a city, or to protect troops against the fire of the enemy. Such works are formed of trees, wagons, paving-stones, chains, palisades, etc. They have been often used in popular revolts and street-fights, especially by the insurgents of Paris. In 1588 the Roman Catholic faction raised barricades in Paris against Henry III., who was compelled to save himself by flight. A great number of barricades were erected in Paris by the popular party in the revolution of July, 1830, when Charles X. was dethroned. In June, 1848, the streets of Paris were again obstructed by barricades, and a bloody battle was fought between the government of Cavaignac and the Socialists or Communists, who were defeated. In order to counteract such operations, Napoleon III. widened and macadamized the principal streets of his capital, but barricades were again employed by the Communist insurgents in the spring of 1871.

Bar′rie, the capital of Simcoe co., Ontario (Canada), is at the W. extremity of Lake Simcoe, and on the Northern Railway, 65 miles N. N. W. of Toronto and 30 miles S. E. of Collingwood. It has excellent schools, a large trade, manufactures of woollen goods, and three weekly papers. Steamboats ply on the lake. Pop. in 1881, 4854.

Barrier Act, the common name of an act passed by the General Assembly of the Church of Scotland Jan. 8, 1697, intended as a barrier against innovations and an obstruction to precipitate legislation.

Barrier Reef, The Great, is a vast coral-reef situated off the N. E. coast of Australia, and extending from lat. 24° 30′ S., lon. 158° 20′ E., to Bristow Island, on the coast of the island of Papua, lat. 9° 15′ S., lon. 143° 20′ E., nearly 1300 miles. It is at a distance varying from 10 miles to over 100 miles from the coast, and rises, generally precipitously, from a great depth. It has a number of breaks or passages.

Bar′rier Treat′ies, the name given to several treaties between England and foreign powers; the first between England and the Netherlands, negotiated by Lord Townsend in 1709. The Dutch pledged themselves to maintain the queen of England's title and the Protestant succession, while the English engaged to assist the Dutch in preserving their barrier-towns. The second was concluded between the same powers at Utrecht in 1713. The third was signed at Antwerp in 1715, between England, the Netherlands, and the emperor Charles VII.

Bar′ringer (Daniel Moreau), an American politician, born in North Carolina in 1807, graduated at the State University in 1826, and became a lawyer. He was several years in the State legislature, represented the State in Congress for six years (1843–49), and was American minister to Spain from 1849 to 1853. He was a delegate to the Peace Congress of 1861, and to the national union convention at Philadelphia in 1866. Died Sept. 1, 1873.

Bar′ring Out, a practice formerly common in English schools, consisted of the scholars taking possession of the building and fastening the doors against the master. It seems to have been a rule that if the scholars could sustain a siege for three days, they were entitled to dictate terms regarding the holidays, hours of recreation, etc. for the ensuing year. If the master succeeded in forcing an entry, the insurgents were at his mercy. The masters, in most cases, appear to have acquiesced good-humoredly, but some exerted all their strength and ingenuity to storm the garrison. It is a singular fact that the scholars of Witton school, in Cheshire, were in 1558 directed by the statutes drawn up by the founder, Sir John Deane, to observe the practice: "To the end that the schollars have not any evil opinion of the schoolmaster, nor the schoolmaster should not mistake the schollars for requiring of customs and orders, I will that upon Thursdays and Saturdays in the afternoons, and upon holydays, they refresh themselves; and a week before Christmas and Easter, according to the old custom, they bar and keep forth the school the schoolmaster, in such sort as other schollars do in great schools."

Bar′rington, a post-village of Barrington township, Shelburne co., Nova Scotia, on the Atlantic coast, has thriving fisheries, shipbuilding and coasting trade.—BARRINGTON PASSAGE, another village of the same township, has extensive fisheries, and is connected with Cape Sable Island by ferry. Pop. of Barrington sub-district in 1881, 1662.

Barrington (Hon. DAINES), a famous English jurist and naturalist, was born in 1727. He published "Observations upon the Statutes, chiefly the More Ancient, from Magna Charta to the 21 Jac. I. c. 27" (1766), a standard work, and wrote a "Dissertation on the Linnæan System," and other works. Died in 1800.

Barringtonia′ceæ, a natural order of exogenous trees and shrubs, natives of tropical countries, have generally very beautiful flowers and foliage. The stamens are numerous and conspicuous. Some species bear an edible fruit, as the *Careya arborea*, an East Indian tree, and *Gustavia speciosa*, which grows in America. The *Barringtonia speciosa*, or *moordilla*, is a remarkable tree of Ceylon, having dark glossy leaves, and delicate white flowers with crimson tips. Each flower has nearly one hundred stamens.

Bar′rister, in law, a person admitted to plead at the bar, and to take upon him the protection and defence of clients. Such persons are admitted in England by voluntary societies existing for several centuries, called Inns of Court. A barrister differs from an attorney principally in this respect, that an attorney prepares a cause for hearing, and a barrister conducts the trial in court. In England, a barrister can maintain no action for his fees. His services are deemed to be honorary. He may, however, receive a retainer. In the U. S., the distinction corresponding to that in England of "attorney and barrister" is attorney and counsellor-at-law. The common practice is to admit the same person to both degrees in the legal profession. A counsellor may maintain an action for his fees, as well as an attorney. Both are under the control of the courts, and may be removed for misconduct. In order to encourage freedom of speech, counsellors are not answerable for matter spoken in a cause and pertinent to the subject under discussion, even though it may reflect upon the reputation of another and be false; though it would be otherwise if the false charge was not pertinent. In England, some of the barristers and sergeants-at-law are selected to be KING'S or QUEEN'S COUNSEL (which see). Barristers were anciently called in England apprentices of the law. In that country every barrister must be a member of one of the ancient societies called Inns of Court, of which there are four—viz. Lincoln's Inn, Inner and Middle Temples, and Gray's Inn.

Barron, capital of Barron co., Wis. (see map of Wisconsin, ref. 3–B, for location of county), on Vermilion River, 121 miles N. N. W. of La Crosse. Pop. of tp. in 1885, 851.

Barron (JAMES), an American naval officer, born in Virginia in 1768, served in the navy under his father, who was a "commodore of all the armed vessels of the Commonwealth of Virginia," was commissioned lieutenant in the U. S. navy in 1798, and in 1799 was promoted to be a captain. He was employed on sea-service in the Mediterranean and other waters until 1807, and had acquired a high reputation for seamanship and discipline when the affair of the Chesapeake cast a shadow over his life. On the 22d of June, 1807, the Chesapeake, bearing the pennant of Com. Barron, sailed from Hampton Roads for the Mediterranean. The English war-vessel Leopard preceded the Chesapeake several miles, keeping in sight until about 3 o'clock in the afternoon, when the former bore down upon and hailed the latter, informing Com. Barron she had a despatch for him. A boat being sent alongside, the message proved to be the instructions of Admiral Berkeley of the British navy to search the Chesapeake for deserters. This Com. Barron indignantly refused to permit, and he wrote to Captain Humphreys, commanding, that he knew of no deserters on the Chesapeake, and that his orders would not permit his men to be mustered by any other than their own officers. The lieutenant who had brought this despatch to Com. Barron returned to the Leopard, and shortly after this vessel opened fire on the Chesapeake, which proved to be entirely unprepared for battle. Her decks were covered with various objects, and it was with great difficulty her batteries could be got ready; and when ready everything necessary to serve them was found to be wanting. But one gun was discharged from the Chesapeake before she struck her colors. Three deserters were found on board, and taken to the Leopard, Com. Barron being permitted to retain his ship, with which he at once returned to Norfolk. This outrage caused the greatest excitement throughout the nation. Barron was court-martialed for neglect of duty, found guilty, and suspended from the service for five years. Although restored to his rank and placed in responsible positions ashore, he never again did sea-service. A long correspondence with Com. Decatur on the Chesapeake affair terminated in a duel between them at Bladensburg, Md., in 1820, in which both were severely wounded, Decatur mortally. Barron died at Norfolk, Va., April 21, 1851, being at the time of his death the senior officer in the U. S. navy.

Barron (SAMUEL), a commodore, a brother of the preceding, was born at Hampton, Va., Sept. 25, 1765. He commanded a squadron of ten vessels which waged war against Tripoli in 1805. Died Oct. 29, 1810.

Barron (SAMUEL), a native of Virginia, entered the U. S. navy in 1812, and received the regular promotions, becoming a captain in 1855. In 1861 he entered the navy of the Confederacy, and became an admiral. He was made prisoner at the capture of Forts Clark and Hatteras, Aug. 27, 1861.

Barros, de (JOÃO), one of the most eminent of Portuguese historians, born at Viseu in 1496. He was appointed governor of the Portuguese possessions in Guinea in 1522. His greatest work is entitled "Asia, or the History of the Discoveries and Conquests of the Portuguese in the East Indies" (1552–62). He wrote only three decades of this work, which was continued by Diego de Couto to the twelfth decade. This history is admired for elegance of style and other merits. Died Oct. 20, 1570. (See MANOEL SEVERIM DE FARIA, "Vida de João de Barras," 1624.)

Barrot (CAMILLE HYACINTHE ODILON), a French statesman and advocate, born at Villefort in Lozère July 19, 1791. He practised law with distinction in Paris, and acted with the popular party in the revolution of 1830. About the end of that year he was elected to the Chamber of Deputies, in which he was a leader of the opposition, and advocated electoral reform. During the revolution of 1848 he supported the proposition to appoint the duchess of Orleans as regent. He was minister of justice in the first cabinet of Louis Napoleon in 1848–49. Died Aug. 6, 1873.—His brother, VICTORIN-FERDINAND, born Jan. 10, 1806, practised law with success. He was minister of the interior from Oct., 1849, to Mar., 1850, and became a senator in 1853. He was afterward life senator. Died Nov., 1883.

Bar′row, a river of Ireland, rises in Queen's county, on the N. E. slope of the Slieve Bloom Mountain. It flows in a general southward direction, passes by Carlow and New Ross, divides the counties of Kildare, Carlow, and Wexford from the counties of Queen's and Kilkenny, and, after uniting with the Suir, enters the sea through Waterford harbor. It is about 100 miles long, and is next in importance to the Shannon among Irish rivers. It is navigable for ships of 300 tons to New Ross, 25 miles from its mouth.

Barrow [from the Anglo-Saxon *beorg*, a "hill or mound," allied to the Ger. *Berg*, a "hill"], a name of the artificial mounds which are found in many countries, and which were erected in ancient times in honor of eminent persons or for monumental purposes. They are formed of earth or stones, and contain in some cases human bones, with armor and utensils. In Great Britain there are numerous barrows, which are supposed to have been raised before the island was conquered by the Romans. One of the largest barrows in Europe is Silbury Hill, in Wiltshire, which has a vertical height of 170 feet and covers 5 acres. Many artificial mounds occur in the U. S., as at Grave Creek, W. Va., and near Marietta, O.; also in Central America.

Barrow (ISAAC), D. D., F. R. S., an eminent English pulpit orator and mathematician, born in London Oct., 1630. He graduated at Cambridge as M. A. in 1652, and became professor of Greek in that place in 1660. He was appointed Lucasian professor of mathematics in 1663, but he resigned that chair in favor of his pupil, the illustrious Newton, in 1669. In 1672 he was appointed master of Trinity College, Cambridge. He published, besides other able works, "Lectiones Opticæ" (1669) and "Lectiones Geometricæ" (1670). His reputation as a theologian rests chiefly on his sermons, which were edited by Dr. Tillotson (3 vols., 1685). They are very remarkable specimens of clear and exhaustive argument. "The sermons of Barrow," says Hallam, "display a strength of mind, a comprehensiveness, and fertility which have rarely been equalled." Died May 4, 1677. His personal character was noble. (See Arthur Hill, "Life of Barrow," prefixed to his collected works, 1685; Ward, "Lives of the Professors of Gresham College.")

Barrow (Sir John), Bart., F. R. S., an English traveller, born in Lancashire June 19, 1764. As secretary to Lord Macartney he went to China in 1792, and to the Cape of Good Hope in 1797. He was secretary to the admiralty for nearly forty years, and rendered many services to geographical science by promoting scientific expeditions. He was the chief founder of the Geographical Society. Among his works are "Travels in Southern Africa" (2 vols., 1801–03), and a "History of Voyages in the Arctic Regions" (1818). Died Nov. 23, 1848. (See his "Autobiographical Memoir," 1847.)

Barrow (Washington) was born in Tennessee about 1817; became a lawyer; was for several years editor of the "Nashville Banner," and was a leader of the Whig party; State senator in 1861; in 1841 he was appointed *chargé d'affaires* to Portugal, and was a Representative from Tennessee in Congress 1847–49. During the civil war he was arrested for alleged disloyalty, but was released soon after by order of President Lincoln. Died Oct. 19, 1866.

Barrowe (Henry), an English nonconformist, was called to the bar in 1576. He was converted, and attracted to John Greenwood, who interested him in Church reform. Robert Brown influenced them in favor of independency, and Barrowe was illegally arrested Nov. 19, 1586. He was charged with publishing seditious books against the queen and government, and spent the rest of his life in Fleet prison. He was condemned with John Greenwood, and they were hanged Apr. 6, 1593. Barrowe wrote "A Brief Discovery of the False Church."

Bar'row-in-Fur'ness, a seaport and important town of England, in Lancashire and on the Irish Sea, 18 miles W. N. W. of Lancaster. It is on the peninsula of Furness, and is the western terminus of a railway which extends to Dalton, and connects Barrow with the whole railway-system of England. It is separated by a narrow channel from Barrow Island, and has a good harbor, formed by the island of Walney, which is 8 miles long. This place, which about 1845 was only a small fishing-village, derives its prosperity from rich mines of iron ore (red hematite) and manufactures of iron and steel, and it has recently increased with great rapidity. In 1867 the Barrow Hematite Steel Company had eleven blast furnaces in operation, and the quantity of ore taken from the mines was estimated for that year at 400,000 tons. This ore yields about 57 per cent. of iron. The steel-works of Barrow are said to be the largest Bessemer steel-works in Britain. Nearly 20,000 tons of slate are annually quarried in the vicinity. Barrow has a town-hall, a public library, and numerous churches. Large sums of money have been expended in converting the channel between the town and Barrow Island into docks, and it is probable that Barrow will become an important commercial city. Pop. in 1881, 47,111.

Barrow Strait, the passage leading from Baffin's Bay into Melville Sound. Its average width is about 30 miles.

Bar'rows (Elijah Porter), D. D., born at Mansfield, Conn., Jan. 5, 1805, graduated at Yale in 1826, taught school in Hartford 1826–31, was ordained in 1832, pastor of the first Free Presbyterian church, New York City, 1835–37, professor of sacred literature in Western Reserve College 1837–52, and of Hebrew language and literature at Andover Theological Seminary 1853–66. In 1872 he entered the same professorship in Oberlin Theological Seminary. He has published a "Memoir of Evertin Judson" (1852), "Companion to the Bible" (1869), "Sacred Geography and Antiquities" (1872). He was one of the authors and editors of the "Bible with Notes" (American Tract Society), and has published twenty-five articles in the "Bibliotheca Sacra."

Barrun'dia (José Francisco), a statesman, born in Honduras in 1779, raised the standard of revolt against the Spanish government, and was chosen in 1829 president of the republic. As a member of the first Republican assembly, in 1824, he had introduced and carried a decree for the abolition of slavery. In 1854 he was minister to the U. S., and died Aug. 4, 1854, in New York City.

Barry, city, on R. R., Pike co., Ill. (see map of Illinois, ref. 7-B, for location of county). Pork-packing is an important industry. Pop. in 1880, 1392.

Bar'ry (James), an historical painter, born at Cork, Ireland, Oct. 11, 1741, was patronized by Edmund Burke. He passed about five years at Rome, and became a member of the Royal Academy of London, but he was expelled from the same in 1797 on account of his irritable temper. His masterpiece is "The Victors at Olympia." Died Feb. 22, 1806. (See Cunningham, "Lives of Painters and Sculptors;" "Edinburgh Review" for Aug., 1810.)

Barry (John), Commodore, an American naval officer, born in Ireland in 1745, emigrated to America about 1760. He became commander of a U. S. frigate in 1776, and captured the English vessel Atlanta in May, 1781. After the reorganization of the U. S. navy he was appointed senior officer and selected to command the frigate United States. Died Sept. 13, 1803.

Barry (John S.) was born in Vermont in 1802. He studied law, but became a merchant of Constantine, Mich., where he removed in 1832. He became a prominent Democratic politician, and was governor of Michigan (1842–46 and 1850–52). Died Jan. 15, 1870.

Barry (Martin), M. D., F. R. S., an English physiologist, born in Hampshire in Mar., 1802. He graduated as M. D. in Edinburgh in 1833, and was chosen a fellow of the Royal Society in 1840. His most important work is "Researches in Embryology," for which he received the gold medal of the Royal Society of London. Died April 27, 1855.

Barry (Sir Charles), a distinguished English architect, born at Westminster in May, 1795. He visited Italy, Greece, and Egypt about 1818. He designed the Manchester Athenæum and the grammar-school of Edward VI. at Birmingham. In 1841 he became a royal academician. His design for the new Houses of Parliament was preferred to those of his competitors, and the work was commenced in 1840. He died in 1860. (See a "Memoir of Sir Charles Barry," by his son, the Rev. Alfred Barry, 1867.)

Barry (Patrick), born near Belfast, Ireland, May, 1816, received a good English education, and devoted some years to teaching in one of the national schools. He arrived in New York May, 1836, and became clerk for Prince & Sons, nurserymen of Flushing. He removed to Rochester, N. Y., in 1840, and entered into the nursery business in partnership with George Ellwanger. The nurseries of Ellwanger & Barry are now the most extensive in the world. From 1844 to 1852 Mr. Barry edited the "Genesee Farmer;" from 1852–54, "The Horticulturist." In 1852 he published "The Fruit Garden," still a standard authority on pomological matters.

Barry (William Farquhar), a distinguished American officer, colonel of the Second Artillery and brevet brigadier-general U. S. army, born Aug. 18, 1818, in New York City, graduated at West Point in 1838. His first active services were in the war against the Indians in Florida, 1852–53, when he was advanced to a captaincy. In the Mexican war he acted as aide-de-camp to Maj.-Gen. Worth. He served in the difficulties with the Indians in Dakota in 1856, and took part in the Utah expedition, 1858. When the civil war broke out he was appointed chief of artillery of the Army of the Potomac, with the rank of major and brigadier-general of volunteers. His gallant and meritorious conduct in the capture of Atlanta won him the brevet titles of colonel U. S. army and major-general of volunteers, Sept. 1, 1864. Mar. 13, 1865, he was brevetted brigadier-general U. S. A. for gallant services in the campaign terminating in the surrender of the army under Gen. J. E. Johnston, and was made brevet major-general U. S. A. in 1865. Gen. Barry organized the entire artillery of the Army of the Potomac, and served in the field with that army as chief of artillery from Mar., 1862, to Sept., 1862, participating in the siege of Yorktown and the Seven Days' battles ending with Malvern Hill. He subsequently commanded the artillery serving in the defences of Washington 1861–63, and served as chief of artillery in the armies commanded by Gen. Sherman. He has been a member of various boards, and after the war was assigned to the command of the northern (lake) frontier for the preservation of the national neutrality; and in 1867 appointed to command the U. S. Artillery School at Fortress Monroe. Gen. Barry was the author of "Engineer and Artillery Operations of the Army of the Potomac, A. D. 1861–62," in conjunction with the writer, and "A System of Tactics for the Field Artillery of the U. S.," in conjunction with Maj.-Gens. W. H. French and H. J. Hunt. D. July 18, 1879. J. G. Barnard.

Barry (William Taylor), born in Lunenburg, Va., Feb. 5, 1784, graduated at William and Mary College in 1803, became a lawyer, was member of Congress from Kentucky (1810–11), served in the war of 1812, was U. S. Senator (1814–16), was in turn a judge, lieutenant-governor, State secretary, and chief-justice of Kentucky; postmaster-general under Jackson (1828–35), and died in Liverpool Aug. 30, 1835, while on his way to Spain as U. S. minister.

Barry, du (Marie Jeanne Gomart de Vaubernier), Countess, a mistress of Louis XV. of France, born Aug. 9, 1746, had a great influence in public affairs. She was guillotined during the Reign of Terror, Dec. 3, 1793. (See "Histoire de France pendant le dix-huitième Siècle," by de Lacretelle.)

Bars, a county of Northern Hungary. Area, 1032 square miles. With the exception of a small part in the S., the country is mountainous, and is traversed by the Gran and the Zsitva. The soil of the plain in the southern part is very fertile, and produces chiefly grain. Pop. in 1880, 135,392. Chief town, Kremnitz.

Bar-sur-Aube [Lat. *Bar'rum ad Al'bulam*], an ancient town of France, in the department of Aube, on the river Aube, 33 miles by rail E. S. E. of Troyes. It has a trade in wine, hemp, grain, and wool. The allied sovereigns held a council here Feb., 1814, and here, in the same year, occurred two battles between the allies and the French. Pop. 4809.

Bar-sur-Seine [Lat. *Bar'rum ad Seq'uanum*], a town of France, in the department of Aube, on the river Seine, 17 miles S. E. of Troyes, was important in the Middle Ages. The allies defeated the French here in 1814. Pop. 2798.

Bart, or **Barth** (Jean), a French naval hero, was born at Dunkirk in 1651. He became the captain of a privateer, and fought against the Dutch. Having performed several bold and successful exploits, he was appointed a captain of the royal navy, and obtained command of a squadron in 1697. Died April 27, 1702. (See A. Richer, "Vie de Jean Bart," 1780; Vanderest, "Histoire de Jean Bart," 1841.)

Bart'enstein, a town of Prussia, in the province of Prussia, 35 miles S. W. of Königsberg. It has considerable manufactures. Pop. in 1880, 7132.

Bar'ter, the exchange of one commodity for another, is a method of trading sometimes practised by barbarous people and others who have no money or credit. Ships sailing to uncivilized countries often carry weapons, tools, or ornaments to be used in barter with savages. Farmers in the U. S. also take produce to country stores, and receive goods in exchange without the intervention of money. In law, barter or exchange is a contract for transferring property, the consideration being some other commodity.

Bart'fa, or **Bart'feld,** an old town of North Hungary, in the county of Saros, on the river Tepla, 20 miles N. of Eperies. It has hot baths, which are much frequented, and a considerable commerce in wine, brandy, linen, etc. Pop. 5303.

Barth, or **Bardt,** a seaport-town of Prussia, in the province of Pomerania, on the Binnensee, 15 miles W. N. W. of Stralsund. It has shipbuilding docks, and a trade in grain and wool. Pop. in 1880, 5792.

Barth (Heinrich), an enterprising German explorer, born at Hamburg Feb. 16, 1821. He travelled in Northern Africa in 1845, after which he extended his explorations to Palestine, Arabia, and Asia Minor, and published "Wanderings along the Shores of the Mediterranean" (1849). He joined Richardson and Overweg in an expedition to Central Africa, but they died in 1851, and he explored that country alone for about five years. In 1863 he became professor of geography in Berlin. He published "Travels and Discoveries in Central Africa" (5 vols., 1857), which is a very valuable work. Died Nov. 25, 1866. (See "Edinburgh Review" for Jan. to April, 1859.)

Barthélemy (Auguste Marseille), a French satiric poet, born at Marseilles in 1796. He published a number of satires which had great success. Among them are the "Villéliade," directed against the ministry of Villèle (1826), "Napoleon in Egypt" (1828), and "La Némésis" (1831). The last named was the first of a series issued weekly for one year. Died Aug. 23, 1867.

Barthélemy (Jean Jacques), an eminent French antiquary, born near Aubagne, in Provence, July 20, 1716, was an uncle of the preceding. He learned the Greek, Hebrew, Arabic, and Chaldee languages, and became keeper of the royal cabinet of medals in 1753, after which he travelled in Italy and collected many medals. He wrote several treatises on numismatics and ancient inscriptions. His principal and most popular work is "Travels of Anacharsis the Younger in Greece" ("Voyage du jeune Anacharsis en Grèce," 4 vols., 1788), which is a very agreeable production. It has been translated into many languages. He was admitted into the French Academy in 1789. Died April 30, 1795. (See Mancini-Nivernais, "Essai sur la vie de J. J. Barthélemy," 1795; Villenave, "Notice sur les ouvrage de J. J. Barthélemy," 1821.)

Barthélemy Saint-Hilaire (Jules), a French scholar and journalist, born in Paris Aug. 19, 1805. He was an editor of the "National" and other liberal journals. In 1838 he became professor of Greek and Latin philosophy in the College of France in Paris. He translated into French the works of Aristotle (4 vols., 1839–44), and wrote several works, among which is "Du Bouddhisme" (1855). He was elected a member of the National Assembly in 1848. He was secretary to President Thiers in 1872–73.

Barthez, or **Barthès** (Paul Joseph), M. D., LL.D., an eminent French physician and writer, born at Montpellier Dec. 11, 1734. He became professor of medicine at that city in 1759, and removed to Paris in 1780, after which he was consulting physician to the king and a member of the council of state. He wrote, besides other works, "New Elements of the Science of Man" (1778). Died Oct. 15, 1806. (See Lordat, "Mémoires sur la vie de P. J. Barthez," 1818.)

Bartholdi (Frédéric Auguste). See Appendix.

Bartholin (Casper) was born at Malmö, Sweden, in 1585. He was famous for his precocity and learning; entered the University of Copenhagen when about eighteen, and afterward studied at Rostock and Wittemburg; was prof. of medicine in University of Copenhagen 1613 to 1624. He afterward became prof. of divinity; wrote about fifty works, mostly on medical subjects. Died July 13, 1630.

Bar'tholin (Thomas), M. D., one of the most eminent physicians of his time, was born at Copenhagen Oct. 20, 1616. He became in 1648 professor of anatomy at Copenhagen, and wrote, among other works in Latin, one on the lymphatic vessels (the discovery of which he claimed), a treatise on the functions of the liver, and "Anatomia" (1641), which passed through many editions and obtained a high reputation as a text-book. The Bartholin family produced many eminent physicians. Died Dec. 4, 1680.

Barthol'omew, a bayou in Arkansas and Louisiana, rises in Jefferson county in the former State, flows nearly southward into Louisiana, and enters the Washita River at Washita City. It is navigable for steamboats for 250 miles.

Bartholomew, St., an island of the West Indies. See Saint Bartholomew.

Bartholomew [Gr. Βαρθολομαῖος; Lat. *Bartholomæ'us*], Saint, one of the twelve apostles, supposed to be the same as the Nathanael mentioned in John i. 45–49. We have no authentic information respecting his labors or his death. According to tradition, he preached the gospel in India.

Bartholomew (Edward Sheffield), an American sculptor, was born at Colchester, Conn., in 1822. He practised dentistry for a time, and then learned painting, but afterwards became distinguished as a sculptor. From 1845 to 1848 he was in Hartford, and after two years spent in New York he went to Italy, where he died, at Naples, May 2, 1858. Some of his works are greatly admired. Among them are—"The Shepherd Boy," "Youth and Age," a monument to Charles Carroll, "Ganymede and the Eagle," etc.

Bartholomew Fair, a great English market held annually in West Smithfield, London, on the festival of St. Bartholomew (Aug. 24, old style). The charter of this fair was granted by Henry I. in 1133. It was originally connected with the Church, under whose auspices miracle-plays, mysteries, and moralities were represented at the fair. In the first centuries of its existence this was the chief cloth-fair of the kingdom. Leather, pewter, and live cattle were also sold here. Crowds of people were attracted to it by a variety of popular amusements and the exhibitions of acrobats, tumblers, mountebanks, mummers, and merry-andrews. Having ceased to be a place of traffic and become a nuisance, it was abolished in 1855. (See Henry Morley, "Memoirs of Bartholomew Fair," 1859.)

Bartholomew's Hospital, London, was founded in 1102 by Rahere, the king's ministrel, and was at first connected with a priory established by the same person. It was made a sanctuary by Edward II., but hospital and priory were both dissolved by Henry VIII., who founded the hospital anew, giving 500 marks yearly for its maintenance, on condition the city should give the like sum. There is a medical school attached to it, and the hospital relieves 70,000 patients annually.

Bartholomew, St., Massacre of, the massacre of French Protestants which commenced at Paris in the night between the 23d and 24th of Aug., 1572. During the minority of Charles IX. and the regency of his mother Catherine de Médicis, a long civil war raged in France between the Catholics and Huguenots, whose leaders were the prince of Condé and Admiral Coligny. In 1570 the court made to the Huguenots overtures which resulted in a treaty of peace. Charles invited Coligny and other leaders of that party to court, and received them with warm demonstrations of friendship, which were probably perfidious. The false security of the Huguenots was increased by a marriage between Henry of Navarre and Margaret, who was a sister of Charles IX. Many Huguenots came to Paris to attend the wedding in Aug., 1572. Among the principal instigators of the massacre were Catherine de Médicis and her sons. Admiral Coligny was wounded by a shot from a window of the royal palace on the 22d. The general massacre commenced at two o'clock on Sunday morning, Aug. 24th, and continued for several days. The provinces followed the example of the capital, with some exceptions. In regard to the number of victims there is no certainty. Estimates have varied from 1000 to 10,000 for Paris, and from 2000 to 100,000 for the whole of France. (See Sismondi, "History of France;" H. Martin, "History of France;" De Thou, "Historia sui Temporis;" "The Massacre of St. Bartholomew," by Henry White, 1868.)

Bar'tizan, in Norman castles, a projecting balcony or small stone closet placed on corbels over doorways and on other parts, generally for defence, and designed to command some assailable point with the fire of its crossbow-bolts. It had perforated battlements for the defence of the archers and crossbowmen.

Bartlett (Elisha), M. D., an American physician, born in Smithfield, R. I., Oct. 6, 1804. He was the first mayor of Lowell, Mass., and afterward delivered many medical lectures; became professor of medicine in the University of Maryland in 1844, and took the same position in the University of New York in 1850, which he left in 1852 to become professor of materia medica and medical jurisprudence in the College of Physicians and Surgeons of the same city. He was popular as a teacher, and wrote, among other medical works, one entitled "Essay on the Philosophy of Medical Science." Died July 19, 1855.

Bartlett (Henry A.), U. S. M. C., born Aug. 19, 1838, in Patuxent, R. I., appointed a second lieutenant in the marine corps Oct. 16, 1861, became a first lieutenant Nov. 26, 1861, and a captain Nov. 29, 1867. From July, 1862, to Aug., 1864, he served on board the iron-clad New Ironsides during her numerous engagements with the forts and batteries of Charleston harbor.

Foxhall A. Parker.

Bartlett (Ichabod), an eminent American lawyer, born at Salisbury, N. H., July 24, 1786, and graduated at Dartmouth in 1808. He was a member of Congress from 1833 to 1839. Died Oct. 19, 1853.

Bartlett (John R.), U. S. N., born Sept. 26, 1843, in the State of New York, became an ensign in 1863, a lieutenant in 1864, and a lieutenant-commander in 1866. He served in the steamer Mississippi at the passage of Forts Jackson and St. Philip and capture of New Orleans, April 24, 1862. While attached to the steam-sloop Susquehanna he took part in both attacks on Fort Fisher, and was one of the assaulting party of Jan. 15, 1865. Commodore Godon, who commanded the Susquehanna, makes honorable mention of Bartlett in his official despatch of Jan. 17, 1865, and Lieutenant-Commander Blake, who led the men of the Susquehanna in the assault on the fort, refers to his conduct on that occasion in the following terms: "Lieutenant Bartlett, belonging to my command, remained at the 'palisades' until nightfall, and I beg to call your attention to his personal gallantry." Foxhall A. Parker.

Bartlett (John Russell), an American writer, born at Providence, R. I., Oct. 23, 1805, was one of the founders of the American Ethnological Society. He was appointed in 1850 commissioner to determine the boundary between Mexico and the U. S. He published, besides other works, a "Narrative of Explorations and Incidents in Texas and New Mexico" (2 vols., 1854); "Progress of Ethnology" (1847); "Dictionary of Americanisms" (1848); "Bibliotheca Americana" (4 vols., 1865–70), etc. Secretary of state Rhode Island 1855–72. D. May 28, 1886.

Bartlett (John Sherren), M. D., an English journalist, born in 1790. He founded in New York in 1822 the "Albion," a journal which he edited with much ability until 1848. He was afterwards connected with other newspapers. Died Aug. 24, 1863.

Bartlett (Joseph), a satiric poet, born in Plymouth, Mass., June 10, 1762, graduated at Harvard in 1782, and after many vicissitudes of fortune became a lawyer. He wrote a poem on physiognomy, and one entitled "The New Vicar of Bray." Died Oct. 20, 1827.

Bartlett (Josiah), M. D., an American patriot, born at Amesbury, Mass., Nov. 21, 1729. He signed the Declaration of Independence, and was a member of the Continental Congress in 1776–78. He became president of New Hampshire in 1790, and governor of that State under the new constitution in 1793. Died May 19, 1795.

Bartlett (Samuel Colcord), D. D., LL.D., born in Salisbury, N. H., Nov. 25, 1817, graduated in 1836 at Dartmouth College, where he was afterwards tutor, and at the Andover Theological Seminary in 1842. In 1843 he was settled over the Congregational church in Monson, Mass., in 1846 became professor of intellectual and moral philosophy in Western Reserve College, in 1852 took charge of the Franklin street church, Manchester, N. H., in 1857 became pastor of the New England church, Chicago, Ill., and in 1858 was made professor of biblical literature in the Chicago (Congregational) Theological Seminary. In 1873 he had leave of absence for a year to travel in the East. He has published "Life and Death Eternal" and "Sketches of Missions of the American Board," besides a goodly number of sermons, orations, addresses, and articles in the leading reviews. He contributed to the American edition of Smith's "Dictionary of the Bible." He was elected president of Dartmouth College in 1877.

Bartlett (William), born in Newburyport, Mass., Jan. 31, 1748. He acquired great wealth in mercantile pursuits, which he used liberally in promoting education, temperance, missions, and the cause of religion and morals. He gave $30,000 to found the Andover Theological Seminary, and added to this gift various benefactions, amounting in the aggregate to about $250,000. He also bestowed large sums upon other benevolent enterprises. Died Feb. 8, 1841.

Bartlett (William Francis), an American officer of volunteers, born in Haverhill, Mass., June 6, 1840, graduated at Harvard University in 1861. On the outbreak of the civil war he entered the service as a private soldier, and was appointed captain in the Twentieth Massachusetts July, 1861; at the siege of Yorktown, April, 1862, he lost a leg; was commissioned colonel of the Forty-ninth Massachusetts Infantry, which regiment he led in the assault on Port Hudson, La., May 27, 1863, where he was wounded in the leg and arm. On this occasion he displayed such daring, and was so conspicuous a mark, being mounted, that the Confederate officers gave orders not to shoot at him. Colonel of the Fifty-seventh Massachusetts Veteran Regiment, Aug., 1863, wounded in the battle of the Wilderness, and brigadier-general of volunteers June 22, 1864, for conspicuous gallantry. He led the assaulting column at the explosion of the mine near Petersburg July 30, 1864, and was wounded and taken prisoner. Brevetted major-general U. S. volunteers. Died Dec. 17, 1876.

Bartlett (William Henry), an English artist and writer, born in London in 1809. He travelled in many parts of Europe and America, and visited Egypt and Palestine. He published numerous popular works, illustrated with engravings designed by himself. Among his works are "Walks in and about Jerusalem" (1844), and "The Nile-Boat, or Glimpses of the Land of Egypt" (1849). He died at sea in 1854.

Bartlett (William H. C.), LL.D., an American officer and scientist, born in 1804 in Lancaster co., Pa., graduated at West Point in 1826. He served, while lieutenant of engineers, as assistant professor at the Military Academy 1827–29, in the construction of Fort Monroe, Va., and Fort Adams, R. I., 1828–32, as assistant to the chief engineer at Washington, D. C., 1832–34, and as acting professor of natural and experimental philosophy at the Military Academy 1834–36. On resigning his lieutenancy, April 20, 1836, he was appointed full professor of philosophy, continuing as such till retired from active service, Feb. 14, 1871. He is author of a "Treatise on Optics," 1839, of "Synthetical Mechanics," 1850–58, of "Acoustics and Optics," 1852–59, of "Analytical Mechanics," 1853–59, and of "Spherical Astronomy," 1855–58. He is a member of several scientific associations, corporator of the National Academy of Sciences from its formation, and became in 1871 actuary of the Mutual Life Insurance Company of New York City.

George W. Cullum.

Bart'ley (Mordecai) was born in Fayette co., Pa., Dec. 16, 1783. He removed to Ohio in 1809, and settled in Mansfield, Richland co. He served as a captain in the war of 1812, was a State senator (1817–18), register of the land-office (1818–23), member of Congress (1823–31), and governor of Ohio (1844–46). Died Oct. 10, 1870. (See his Life, by A. T. Goodman.)

Bar'tol (Cyrus Augustus), D. D., a Unitarian divine and author, born at Freeport, Me., April 30, 1813. He graduated at Bowdoin College in 1832, at the Cambridge Divinity School in 1835; settled as colleague pastor of West church, Boston, in 1837. His principal writings are "Discourses on the Christian Spirit and Life" (1850), "Discourses on the Christian Body and Form" (1854), "Pictures of Europe" (1855), "Radical Problems" (1872), and "The Rising Faith" (1873). His contributions to periodical literature are numerous and valuable, being characterized by fine literary taste and deep religious feeling.

Bartoli'ni (Lorenzo), an eminent Italian sculptor, born in Tuscany in 1777. He studied and worked in Paris, and was patronized by Napoleon, who in 1808 directed him to found a school of sculpture at Carrara. In 1815 he removed to Florence, where he worked for many years. Among his masterpieces are a colossal bust of Napoleon I., the group of "Hercules and Lycus," and a group called "Charity." His works are characterized by a classic repose and simplicity. He is ranked by the Italians as second only to Canova. Died Jan. 20, 1850.

Bartolomeo (Fra). See Appendix.

Bartoloz'zi (Francesco), an Italian engraver, born in 1725, was a scholar of Ferreti and Joseph Wagner. He lived many years in London. He exerted a bad influence by spreading the stippled manner. His works are very numerous. Died in 1819.

Barton, on R. R., Orleans co., Vt. (see map of Vermont, ref. 2–D, for location of county). The fertile soil and abundant water-power of the township make agricultural and manufacturing business profitable. The chief article of manufacture is lumber. It has graded schools, an academy, and a library. Pop. of township in 1870, 1911; in 1880, 2364. Pop. of village in 1880, 742.

Barton (Benjamin Smith), M. D., born at Lancaster, Pa., Feb. 10, 1766, was educated at Pennsylvania College and in Europe, graduating as M. D. at Göttingen. In 1789 he became professor of natural history and botany in the College of Philadelphia, and in 1813 professor of materia medica. He published various works on natural science, materia medica, and other subjects, of which the best known is his "Elements of Botany" (1804 and 1812). Died Dec. 19, 1815.

Barton (Bernard), known as the "Quaker poet," born in London Jan. 31, 1784, was a member of the Society of Friends. He became a clerk in a bank at Woodbridge. He published "Poems" (1820), "Napoleon, and other Poems" (1822), "Devotional Verses" (1826), "The Reliquary" (1836), "Household Verses" (1845), and other works. Sir Robert Peel procured for him a pension of £100. His works are pervaded by pious sentiment and tenderness. Died Feb. 19, 1849. (See "Memoirs and Letters of Bernard Barton," edited by his daughter.)

Barton (Clara). See Appendix.

Barton (David) was one of the earliest emigrants to Missouri Territory; president of the convention in 1820 to form a State constitution; Senator in Congress from Missouri 1821–31, and was chairman of the committee on public lands. Died Sept. 28, 1837.

Barton (Elizabeth). See Holy Maid of Kent.

Barton (Richard W.), born in Virginia, was a Representative from that State in Congress 1841–43. He was also a member of the State legislature, and the first president of the Valley Agricultural Society. Died Mar. 15, 1859.

Barton (William), a Revolutionary general, born in Providence, R. I., in 1747. As lieutenant-colonel of the Rhode Island militia he captured Gen. Prescott July 10, 1777. He was wounded and disabled in 1778 at Bristol Ferry. Congress gave him a colonel's commission and a sword, and he received a grant of land in Vermont. He was many years imprisoned in Vermont for debt, but was liberated in 1825 by La Fayette, who paid the demand against him. Died at Providence Oct. 22, 1831.

Barton (William P. C.), M. D., a botanist, nephew of Dr. B. S. Barton, graduated at Princeton in 1805, and received his degree of M. D. at the University of Pennsylvania in 1808. He published "Floræ Philadelphicæ" (1815–25), "Flora of North America" (3 vols., 1821–23), "Materia Medica," "Medical Botany," "Plan for Marine Hospitals" (1817), and several other works. He was professor of botany in the University of Pennsylvania. Died in 1855.

Barton Beds, a group of strata of clay and sand forming part of the middle eocene formation, included in the Bagshot Beds (which see).

Barton-on-Humber, a market-town of North Lincolnshire, England, situated on the S. side of the Humber River, 6 miles S. W. of Hull, with which it has important steam-communication. It is a very ancient place, and was one of the principal ports of the Humber River before Hull was settled. It was once surrounded by a rampart and ditch to protect it against the attacks of the Danes and Saxons, and has manufactures of ropes, sacking, bricks, pottery, and whiting, also quarries of chalk and oolite. St. Mary's church is a fine building, erected in the fourteenth century. The ruins of Thornton Abbey, founded in 1139, are about 3 miles to the S. E. Pop. 4332.

Barton's Buttons (called also **Iris Ornaments**). By means of a dividing-engine, Mr. John Barton succeeded in engraving lines on steel and other surfaces not more than from the two-thousandth to the ten-thousandth of an inch apart. These, owing to the action of grooved surfaces on light, shine in the light of candles or lamps with all the colors of the spectrum. From steel dies thus prepared impressions were stamped upon buttons and other articles, forming ornaments rivalling in colors the brilliant flashes of the diamond.

Bartow, capital of Polk co., Fla. (see map of Florida, ref. 4–E, for location of county). Pop. in 1880, 77.

Bartow (Francis Stebbins), born in Savannah, Ga., Sept. 6, 1816, graduated at Franklin College, Ga., 1835, studied law at the law school, New Haven, Conn., became a prominent member of the Savannah bar, was a member of the Georgia legislature, of the senate, and of the Confederate Congress. During the civil war he entered the army as captain of the Oglethorpe Light Infantry, was appointed colonel of Eighth Georgia Infantry, and brigadier-general C. S. A. Killed at Manassas July 21, 1861.

Bar'tram (John), an American botanist, born in Darby, Chester co., Pa., in 1701. He planted a botanical garden on the Schuylkill near Philadelphia, made extensive excursions in the unsettled parts of North America, and sent specimens to Linnæus, who pronounced him "the greatest natural botanist in the world." He wrote a "Journal of a Tour to East Florida in 1766," and other works. Died Sept. 22, 1777. (See William Darlington, "Memorials of John Bartram and Humphrey Marshall," 1849.)

Bartram (William), a botanist, a son of the preceding, was born at Kingsessing, Pa., Feb. 9, 1739. He explored the animals, plants, etc. of several Southern States, and published "Travels through North and South Carolina, Georgia, and Florida" (1791). Died July 22, 1823.

Bartsch (Johann Adam Bernhard), a German engraver and writer, born at Vienna Aug. 17, 1757; principal work, "The Painter-Engraver." Died Aug. 21, 1821.

Ba'ruch, a Hebrew scribe, was a friend and companion of the prophet Jeremiah, whom he served as amanuensis. Shortly after 586 B. C. he accompanied Jeremiah to Egypt. His subsequent history is unknown. The book of Baruch, which the Catholics admit into the canon of the Holy Scripture, is considered apocryphal by Protestants and Jews. It is not without literary merit. In what language or by what hand it was first written is unknown. Its sixth chapter, the so-called "epistle of Jeremiah," is of later, though very ancient, date. The "Apocalypse of Baruch" was published in a Latin translation from the Syriac by Ceriani in 1866, and the Syriac itself (by Ceriani) in 1871. Kneucker's edition appeared in 1879. The book was written originally in Greek. There is a pseudepigraphic "epistle of Baruch" in the Syriac language, probably a monastic forgery, and certainly worthless.

Bar'wood, or **Camwood,** a red dyewood from the western coast of Africa. It is the wood of *Baphia nitida*, a leguminous tree. Its coloring principle is slightly soluble in boiling water, freely in alcohol and alkaline solutions.

Barycentric. See Appendix.

Barye (Antoine Louis). See Appendix.

Bary'ta, or **Bary'tes** [Gr. βαρύς, "heavy," alluding to "heavy spar," its sulphate], (symbol BaO), the oxide of barium, is an alkaline earth and a virulent poison. It is an ingredient in sulphate of baryta, or heavy spar, from which it is obtained, but it is not useful for any purpose except chemical analysis. A solution of baric hydrate is used by the chemist as the best test of the presence of carbonic acid. Sulphate of baryta, or heavy spar, is a common crystallized mineral which is mixed with white lead and used as a pigment under the name of *permanent white*. Several mixtures of sulphate of baryta and white lead are manufactured and are known in commerce. *Venice white* contains 1 part sulphate of baryta and 1 part white lead. *Hamburg white* contains 2 parts sulphate of baryta and 1 part white lead. *Dutch white* contains 3 parts sulphate of baryta and 1 part white lead. The native sulphate of baryta was employed by the celebrated potter Wedgwood in the manufacture of jasper ware and for the formation of white figures, etc. on colored jars and vessels. It is also extensively used for adulterating white lead and for giving weight to paper. Baryta abounds in N. C.

Bar'ytone, written also **Baritone** [from the Gr. βαρύς, "heavy," and τόνος, "tone"], signifies the tone of a man's voice, about halfway between the bass and tenor.

It generally extends in compass from B flat to F, and occupies the same position as the *mezzo soprano* of the female voice. In Greek grammar, words with an unaccented final syllable are called barytones.

Basalt′ [Lat. *basal′tes*], a rock of volcanic formation, is considered a variety of trap-rock, and is composed of felspar and augite or hornblende. It has a compact texture, a dark-green, dark-gray, or black color, and a conchoidal fracture. The most remarkable characteristic of basalt is the columnar structure which it often assumes. The columns have a regular prismatic form, which appears to be the result of a tendency or effort towards crystallization, but many theorists deny that it is at all analogous to crystallization. They generally have five or six sides, and are often divided transversely by joints at nearly equal distances. Beautiful specimens of vertical columns of basalt are found at the Giants' Causeway in the north of Ireland, and Fingal's Cave in the Scottish island of Staffa.

Bas′com (Henry Bidleman), D. D., LL.D., a bishop of the Methodist Episcopal Church South, was born at Hancock, Delaware co., N. Y., May 27, 1796. He was licensed to preach in 1813, and in 1823 was chosen chaplain to Congress; was president of Madison College, Pa. (1827–29), professor of morals, Augusta College, Ky., in 1832, and in 1842 president of Transylvania University, Ky. From 1846 to 1850 he was editor of the "Quarterly Review" of his Church. In 1850 he was made a bishop; died Sept. 8, 1850. In one of his earlier years he preached 400 times, and received a salary of twelve dollars and ten cents. Bishop Bascom was an extremely popular speaker. His complete writings were published in 1856.

Bascom (John), LL.D., born at Genoa, N. Y., May 1, 1827, and graduated at Williams College in 1849, studied law and theology, the latter at Auburn Seminary. In 1855 he became professor of rhetoric in Williams College. He has published "Political Economy" (1861), "Æsthetics" (1862), "Rhetoric" (1865), "Elements of Psychology" (1869), "Science, Philosophy, and Religion" (1871), "The Philosophy of Religion," "The Philosophy of English Literature," also "Problems in Philosophy" (1886), and other works. He was president of Wisconsin University 1873–86.

Base [Lat. *ba′sis*, from the Gr. *βάσις*, a "foundation"], a term having important applications in architecture, chemistry, geometry, heraldry, and music (It. *basso*). Base in general signifies the bottom of anything considered as its support, as the base of a mountain, the base of a pillar.

Base, in architecture, is the lower part of a pillar—*i. e.* the part between the lower end of the shaft and the top of the pedestal. The Doric column had no base. The base is composed of two parts—the *plinth*, which is a flat, square block; and the *moulding*, which is usually circular and rests upon the plinth. In botany, the base of a leaf is the part next to the petiole. The base of a fruit is the part next to the root, or the end to which the stem, peduncle, or pedicel is attached. The stem-end of a pear is called the base, although it is smaller and usually higher in position than the apex.

Base, in chemistry, is a compound body, generally consisting of a metal united with oxygen. For example, potassium (K) combines with oxygen (O), and thus forms the base potash (K_2O); sodium (Na) and oxygen, the base soda (Na_2O); lead (Pb) and oxygen, the base lead monoxide or litharge (PbO). Every oxygen base unites with oxygen acids to form oxy-salts. Thus, the base potash (K_2O) combines with sulphuric acid (SO_3) to make the salt sulphate of potash (K_2O,SO_3); potash with nitric acid (NO_5) to form the salt nitrate of potash or nitre (K_2O,NO_5). Occasionally sulphur or some other element replaces the oxygen in a base. Thus, the metal potassium (K) unites with sulphur (S) to form the *sulphur* base sulphide of potassium (K_2S), which can unite with a sulphur acid like sulpharsenious acid or orpiment (As_2S_3) to make the salt sulpharsenite of potash (K_2S,As_2S_3). The metal half of a base need not be a simple element, but may be a compound body which, for the time, plays the part of a simple substance. Thus, the compound ethyl (C_2H_5) can combine with oxygen to form ordinary ether ($(C_2H_5)_2O$; and the base thus produced can, in its turn, combine with acids to form salts. In the new chemistry, while the basic properties of certain oxides are necessarily recognized, a different statement is made in regard to their relations to acids. Thus, it is said that, 1. In some cases, basic oxides form salts by direct combination with acids; as when vapor of sulphuric anhydride (SO_3) is passed over red-hot barium oxide (BaO), barium sulphate (BaO,SO_3 or $BaSO_4$) is formed. 2. Mostly, however, metallic salts are formed by the substitution of a metal for hydrogen in the acid. Thus, nitric acid, or hydrogen nitrate (HNO_3) + potassium hydrate (KOH) = potassium nitrate (KNO_3) + water (H_2O). In geometry, the base of a solid is the lowest part, or the side on which it stands, as the base of a cone or plane. Revised by C. F. Chandler.

Base (of operations), a military term denoting, in contradistinction to the *line* of operations, the (usually) contiguous and well-guarded (by our own or allied forces) region upon which an army depends for its supplies, reinforcements, etc., to which it sends back its sick and wounded, and upon which it (generally) would fall back in case of reverse and retreat. Much pedantry is expended upon these phrases in what were recognized as standard military treatises. The *essential* thing is, that an army *have* a base, though it may temporarily abandon one to acquire another; or in rare cases it may so thoroughly control the hostile region in which it operates as to use *it* for most of the purposes of a base.

Revised by J. G. Barnard.

Base, in heraldry, is the lower portion of the shield. There is a dexter base, a middle base, and a sinister base.

Base, in music. See Bass.

Base-Ball. See Appendix.

Ba′sedow (Johann Bernhard), originally Johann Berend Bassedau, a German educational reformer, born at Hamburg Sept. 11, 1723. He aimed to realize Rousseau's ideas of education, for which he founded at Dessau, in 1774, a model school called Philanthropin, and published a school-book entitled "Orbis Pictus" (1774), which was illustrated with 100 copper-plate engravings, and became very popular. His influence at one time was very great. He sought to render science and learning attractive and interesting by pictures and natural objects, instead of filling the memory with abstractions. Died July 25, 1790.

Basedow's Disease, called also **Graves' Disease** and **Exophthalmic Goitre,** is a disease more common among women than men, and characterized by prominent eyeballs, slightly enlarged thyroid gland, palpitation of the heart, and generally by anæmia. Basedow's disease frequently, though not always, ends in recovery. Its cause is stated by Niemeyer to be probably a paralysis of the vaso-motor nerves. It is best treated by good food, chalybeates, gentle exercise, and hygienic measures.

Basel, Switzerland. See Bâle.

Basel′la, a genus of tropical plants of the order Chenopodiaceæ. The *Basella alba* and *rubra* have twining stems, and are commonly used as potherbs in the East Indies. In the vicinity of Paris they are raised in hot-beds, transplanted to borders, and used as a substitute for spinach. The *Basella rubra* yields a rich purple dye.

Ba′shan [Heb. בָּשָׁן, of disputed significance], a district in Palestine E. of the Jordan, most of it high table-land, extending from Mount Hermon in the N. to Gilead in the S., the Yarmuk (Hieromax), which enters the Jordan just below the Sea of Galilee, being the boundary between Bashan and Gilead. At the time of the Exodus it was occupied by Amorites ("highlanders"), whose king, Og, was slain in battle with the Israelites, his people overpowered, and the whole territory assigned to the half-tribe of Manasseh. After the Captivity, Bashan consisted of four provinces: (1) Golan (modern Jaûlan); (2) Argob, or Trachonitis (modern Lejah); (3) Hauran (name unchanged); (4) Batanæa (modern Bethanyeh). Iturea (now Jedur) in the N. W. was not strictly a part of Bashan, though taken by the Israelites. The whole district was, and still is, exceedingly fertile, and was famous for its oaks and its cattle. Remarkable ruins of ancient cities are found there. (See Porter's "Damascus," 1855; Wetzstein's "Reisebericht über Hauran und die Trachonen," 1860; Porter's "Giant Cities of Bashan," 1865, and Selah Merrill's "East of the Jordan," 1881.)

Bashaw. See Pasha.

Bashford (Coles), born in Wayne co., N. Y., in 1816; was admitted to the bar, and was for one term dist. atty. of the co. Removed to the West, and settled in Algoma, now a part of Oshkosh, Wis.; was member of Whig State convention in 1851, and in 1852 was elected as a Whig to the State senate, and re-elected in 1854; was the first Republican gov. of Wis. in 1856, but declined a renomination in 1857. Resumed the practice of law, and resided in Oshkosh until 1863, when he removed to Tucson, Ariz. Ter. In 1864 he was pres. of the Territorial council, and atty.-gen. of the Ter. in 1866, and in same year was delegate to 40th Congress, and served one term. He was afterward sec. of the Ter., but resigned in 1876. D. April 25, 1878.

Ba′shi-Bazooks′, the name of certain irregular troopers in the service of the Turkish sultan. They are wild, turbulent men much addicted to plundering.

Ba′sil (*Oç′imum*), a genus of herbs and shrubs of the natural order Labiatæ. They are natives of tropical and other warm regions, and generally have an aromatic smell and taste. The *Ocimum basilicum* (sweet basil) is an annual plant, a native of the East Indies, and is cultivated in Europe, where it is used to season food. The *Ocimum minimum*, or bush basil, another East Indian plant, is cultivated for the same use. The *Ocimum Campeachianum* is a native of Florida and of tropical America. Basil is also a common name for *Pycnanthemum*, a North American genus with numerous species, all erect, rigid herbs; also of the *Calamintha clinopodium* of Europe and North America, and other labiate herbs.

Ba'sil, or **Basil'ius** [Gr. Βασίλειος or Βασίλιος], Saint, surnamed the Great, an eminent Greek Father of the Church, was born at Cæsarea, in Cappadocia, about 329 A. D. He was older by about two years than his brother, Gregory of Nyssa, and was an intimate friend of Gregory Nazianzen. From 351 to 355 he was a student at Athens. Then he travelled extensively. Then he spent some seven years in monastic retirement in Pontus. In 370 he succeeded Eusebius as bishop of Cæsarea, and he died Jan. 1, 379, worn out by his ascetic habits. His works (in 3 vols., Garnier's ed., 1721–30) consist of treatises, homilies, and letters. He excelled as a letter-writer. He was the author of monastic rules and of a liturgy which still bears his name, and which is still used in the Russian Church. (See G. Hermant, "Vie de Saint Basile," 1674; J. E. Feisser, "Dissertatio de Vita Basilii Magni," 1828; Klose, "Basilius der Grosse nach seinem Leben," 1835; Scholl, "Die Lehre des heil. Basil von der Gnade," 1881.)

Basil I. [Lat. *Basilius*], surnamed the Macedonian, emperor of the East, was born in Macedonia in 820 A. D. His origin was obscure. He gained the favor of the emperor Michael III., who appointed Basil his own colleague in the empire in 866. After Michael was assassinated, in 867, Basil became emperor. He obtained Asia Minor by conquest from the Saracens, whom he also drove out of Italy. He was an able ruler. He died in 886 A. D., and left the throne to his son, Leo VI. (See G. Impaccianti, "Basilio il Macedone," 2 vols., 1809.)

Basil II., emperor of the East, a son of Romanus II., was born in 958 A. D. He began to reign, in conjunction with his brother Constantine, in 975. He was an able commander, and waged war with success against the calif of Bagdad and the Bulgarians. He completed the conquest of Bulgaria in 1018. Died in 1025.

Basile'an Man'uscript [Lat. *Co'dex Basilen'sis*, from *Basile'a*, the Lat. name of Bâle], the name of two very valuable manuscripts of the Greek New Testament, now in the library of Bâle: 1. A nearly complete uncial copy of the Gospels. It is believed to belong to the eighth century, and to have been written at Constantinople. 2. A beautiful cursive manuscript of the whole New Testament except the Apocalypse. It dates from the tenth century.

Basil'ian Man'uscript (*Co'dex Basilia'nus*), an important uncial manuscript of the Apocalypse, now in the Vatican library. It takes its name from the Basilian monastery at Rome, to which it once belonged. It is referred to the eighth century.

Basil'ian Monks, or **Monks of St. Basil,** a religious monastic order founded by Saint Basil the Great in 363 A. D. He composed a system of monastic discipline which was approved by the pope, and was practised by great numbers of monks both in the churches of the East and the Latin or Western Church. Spain, Italy, Asia Minor, and many other countries contain monasteries of this order at the present time. Those of Italy are chiefly of the Greek rite, and those of Spain, etc. of the Latin rite. In Asia Minor the United Melchite Greeks have many Basilian monks. There are convents of Basilians in Toronto and Sandwich, Canada. The monks of the Russo-Greek Church nearly all follow the rule of Saint Basil, variously modified, even the so-called monks of Saint Anthony following what is substantially the Basilian rule. The Armenian Church has also an order of Basilian monks.

Basil'ica [Gr. βασιλική, the fem. of βασιλικός, "royal," from βασιλεύς, a "king;" *i. e.* a "royal hall"], a name given by the ancient Greeks and Romans to a public hall or court-house in which princes and magistrates administered justice. Among the Romans it attained the greatest importance, and became, besides a court of justice, a market-place and exchange. The first basilica mentioned in Roman history was the Basilica Porcia, built about 182 B. C. Great numbers were subsequently erected in Rome, and each provincial town had its basilica, which was usually adjacent to the forum. The most ancient basilicas were open to the external air, and surrounded by a peristyle of columns, for which an external wall was afterwards substituted. After the reign of Constantine I. some basilicas were converted into Christian churches. The term basilica is still applied to the five great patriarchal churches in Rome and to several smaller ones.

Basilica, a code of laws, the compilation of which was commenced by Basil I., emperor of the East (867–886 A. D.), and completed by his son Leo. It is considered valuable for the interpretation of the Roman *corpus juris*, but a portion of it is lost. The "Basilica" was published by Heimbach (5 vols., 1833–50).

Basilica'ta (the ancient *Luca'nia*), a province of Italy, bounded on the N. by Capitanata, on the N. E. and E. by Bari and Otranto, on the S. E. by the Gulf of Taranto, on the S. by Calabria Citra, and on the W. by Principato Ultra and Citra. Area, 4122 square miles. The surface is mountainous. It contains a large fertile plain next to the Gulf of Taranto. Wine, grain, tobacco, and hemp are the staple products. Capital, Potenza. Pop. in 1881, 524,836.

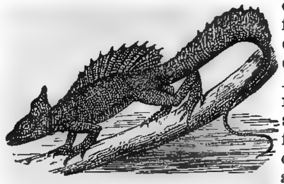
Basil'icon Do'ron ("royal gift"), two Greek words composing the title of a work which James I. of England wrote for the instruction of his son Henry (1599). It is interesting chiefly as a literary curiosity.

Basil'icon Oint'ment, sometimes written **Basil'icum** [from the Gr. βασιλικός, "royal," so named on account of its great virtues], the *Cera'tum resi'næ* of the Pharmacopœias, is composed of five parts of resin, eight of lard, and two of yellow wax. It is much used as a stimulating application to ulcers, burns, etc.

Basili'des [Gr. Βασιλείδης], a Gnostic and founder of a sect called Basilidians, lived in Egypt in the reigns of Trajan and Hadrian, about 100–140 A. D. The events of his life are not known. According to the recently-discovered "Philosophumena" of Hippolytus, Basilides was not strictly a Dualist. He made God the absolute Creator of the germ of the universe.

Basilis'cus [Gr. Βασιλίσκος], emperor of the East, was a brother of Verina, the wife of Leo I. In 468 A. D. he commanded a large armament which Leo sent against Genseric the Vandal, by whom he was totally defeated. He usurped the throne in 474, but was defeated and deposed by Zeno in 476. Died in 477 A. D. (See Gibbon, "Decline and Fall of the Roman Empire.")

Bas'ilisk [Lat. *basilis'cus*; Gr. βασιλίσκος, the diminutive of βασιλεύς, a "king," so called because the protuberance on its head was thought to resemble a crown], a genus of saurian reptiles of the family Iguanidæ, sub-order Pachyglossæ, natives of the tropical parts of America. They are characterized by a thin triangular fold of skin rising from the occiput and inclined backward. They also have an elevated crest along the back and tail, capable of being erected or depressed at pleasure. They are well adapted for swimming and for climbing trees, and are innocuous and inoffensive animals. The tail is much longer than the body. The *Basiliscus mitratus* (or *Americanus*) is from twenty-five to thirty inches long, including the tail. The term basilisk was also applied to a fabulous monster by ancient and mediæval writers, who supposed that it had the form of a snake or lizard, that it infested the deserts of Africa, and that it was hatched by a toad or serpent from an egg laid by a cock. According to popular opinion, its breath poisoned the air and burned up vegetation, and the glance of its eye was fatal to men and other animals. It was sometimes called cockatrice and the king of dragons. The only creature who could face the basilisk and live was believed to be the cock; and travellers were advised to carry loud-crowing cocks with them, for the basilisk was believed to stand in great dread of his near relative, the cock, and the crowing of the cock was considered the only means of driving him away.


Basilisk.

Ba'sin [Fr. *bassin*], in geography, is a great natural depression or concavity on the earth's surface, without reference to the stratification. The basin of a river is the whole tract of land drained by that river and its tributaries. The basin of the Mississippi, for example, is coextensive with all the country between the Rocky Mountains and the Appalachian chain. The area of this is estimated at 1,244,000 square miles. The basin of a lake includes, besides the space occupied by the lake, the land drained by the rivers that flow into it. The highest line between two basins is the *watershed*, or line of separation between the waters.

Basin, in geology, is applied to depressions in the strata in which beds of a later age have been deposited. Thus, the site of the city of London, called the London basin, consisting of tertiary sands and clays, occupies a hollow in the chalk, which is bounded by the North Downs on the S.

and by the chalk-hills of Berks, Wilts, and Bucks on the N. The term is also applied to synclinal depressions of strata, especially in the coal-fields.

Ba'singstoke, a town of England, in Hampshire, on the South-western Railway, 46 miles W. S. W. of London. It has considerable commerce in grain, malt, coal, and timber, facilitated by the Basingstoke Canal. Here is a church built at the time of Henry VIII. Basingstoke has been a market-town ever since the Norman Conquest, and was anciently of more importance than at present. Pop. in 1881, 6681.

Bas'kerville (John), a celebrated English printer and letter-founder, born in Worcestershire in 1706. He made great improvements in typography. From his press came editions highly prized of Vergil (1756), Milton, and the New Testament (1763), besides many other beautifully printed works. Died Jan. 8, 1775.

Bas'ket [Lat. *cor'bis* or *fis'cus;* Welsh, *basgawd,* "a weaving of splinters"], a vessel made of willows, twigs, or splints interwoven. Baskets have been in use from very early ages. The monuments of ancient Egypt abound in representations of baskets. They are frequently mentioned in the Bible. The ancient Britons were remarkably expert in the manufacture of baskets, which were much prized by the Romans for their neatness and elegance. The process of basket-making is very simple, and appears to be well known among the rudest peoples—even among the aborigines of Van Dieman's Land—and many tribes of American Indians display great skill and taste in making and ornamenting them. Willow, oak, and ash are chiefly made use of in the manufacture of baskets. In the U. S. the rattan, oak, willow, and black ash are employed extensively. The Chinese export many beautiful baskets made of finely split bamboo.

Basking-Shark (*Cetorhinus maximus*), the largest of the sharks. and the type of a peculiar family (Cetorhinidæ). It attains a length of nearly 40 feet, but its teeth are very small, and it feeds on small animals and is harmless to man. A large specimen will yield six or more barrels of oil from the liver. It is also known as bone-shark, elephant-shark, etc.

Basnage de Beauval (Jaques), an eminent French scholar and theologian, born at Rouen in 1653. In 1676 he became a Protestant minister at Rouen, whence he emigrated to Holland in 1685. Among his works is a "History of the Jews from Jesus Christ to the Present Time." Died Dec. 22, 1722.

Basque Provinces [Sp. *Vasconga'das*], a part of Spain, bounded on the N. by the Bay of Biscay, comprises the four provinces, Navarre, Biscay, Guipuzcoa, and Alava. These coincided with the ancient *Cantabria.* Area, 6827 square miles. Pop. in 1877, 754,536. The surface is mountainous and presents much picturesque scenery. The tops of the hills are mostly covered with forests of oak, chestnut, beech, etc. Among the mineral resources are copper, tin, iron, marble, and porphyry. The chief towns are Bilbao, Tolosa, and Vittoria. The Basques are celebrated for their bravery, vivacity, and love of independence. They speak a peculiar language, whose relation to other tongues is still in question. Some have found a relationship, real or fancied, to the Tartar and Ugrian tongues; others find a slight resemblance to the Coptic. It is called *Euscara* by the Basques, who call their country *Euscaleria.* They have never been subdued, and retain a separate constitution, which secures to them political privileges not enjoyed by the other Spanish subjects. The origin of the Basques is doubtful. W. von Humboldt considered them descendants of the ancient Iberi. Others have conjectured that they are descendants of the pre-historic races of Europe. The total number of Basques in France and Spain is estimated at about 785,000. (See Ford's "Handbook of Spain;" Karl Wilhelm von Humboldt, "Researches on the Aborigines of Spain by means of the Basque Language," 1821; F. Michel, "Le Pays Basque, sa Population, sa Langue, etc.," 1857, and Marvin R. Vincent, "In the Shadow of the Pyrenees," 1883.)

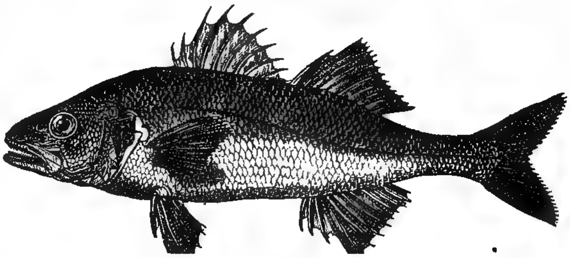
Bas-Relief [It. *basso-rilievo, i. e.* "low relief"], in sculpture, a term applied to figures which do not project or stand out far from the ground or plane on which they are formed. It is distinguished from haut-relief (alto-rilievo), in which the figures stand sometimes almost entirely free from the ground. Assyrian and Egyptian bas-reliefs were colored. Phidias in the Parthenon brought this style to a high degree of art.

Bas-Rhin ("Lower Rhine"), a former department of France, in the northern part of Alsace, which was annexed to Germany in 1871. (See Elsass.)

Bass, or **Base** [from the It. *bas'so,* "low"], in music, is the deepest or lowest part. In respect to harmony the bass is the most important part in music, containing more frequently the fundamental notes of the chords, while on it is formed that important and effective figure in music called "organ-point." The term is also applied to the deepest and gravest quality of the human voice, the usual compass of which is from G or F below the bass staff to D or E above it. The bass voice is mostly confined to adult males.

Bass [from the Anglo-Saxon *bæst;* Danish and Ger. *bast,* the "inner bark" of a tree, especially the linden tree], or **Basswood,** is the American name of a tree (*Til'ia America'na*), also called **Linden** or **Lime Tree.** It is common in the U. S., has serrate leaves, which are more or less heart-shaped, and bears a woody globular nut one-celled and one or two-seeded. The wood is light, soft, and not of much value for fuel. It is used in carriage-building. Several species of *Tilia* are found in the U. S., one of which, the *Tilia heterophylla,* or white basswood, is found in the West and South, and sometimes grows to an immense size and height. The flowers of the basswood abound in honey of excellent quality, and are eagerly sought by bees. The European linden (*Tilia Europæa*) is planted as an ornamental tree in many cities of Europe and the U. S. This species yields the bark which is made into Russia matting. (See Linden and Bast.)

Bass, the name of many species of fish of various genera, but appropriately belonging to the genus *Labrax,* of the perch family, and other closely allied genera. The typical species is a European sea-fish, which is prized as food (*Labrax lupus*). It ascends streams, and has become landlocked in fresh water without injury. The striped bass of the U. S. (*Labrax lineatus*), often called rock-fish, affords a valuable supply of food. It ascends rivers, and is caught in both salt and fresh water. The white bass or perch of the great lakes (*Labrax albidus*), the ruddy bass (*Labrax rufus*) of the coast, the white perch (*Labrax pallidus*), the little black bass (*Labrax nigricans*), the spotted bass of the St. Lawrence (*Grystes notatus*), the *Grystes multilineatus* of Western lakes, the *Grystes chrysops* of the lakes, the *Grystes nigricans* (the black bass of the West), the *Centrarchus hexacanthus,* or grass bass, the *Centrarchus aëneus,* or rock bass of New York State and the West, are the best known of the very numerous American fishes of the true bass family, most of which are of great value as food. The stone bass (*Polyprion cernium*) of the Atlantic and the black sea-bass (*Centropristis nigricans*) of our Eastern coast are both highly prized. The so-called Otsego bass (*Coregonus Otsego*) is a fine fish of the salmon family. The "bass" of Charleston, S. C., is the red-fish (*Corvina ocellata*), a valuable sea-fish.



European Bass.

Bass (Edward), D. D., the first Protestant Episcopal bishop of Massachusetts, was born at Dorchester, Mass., Nov. 23, 1726, and graduated at Harvard in 1744. He was ordained in England in 1752 by Bishop Sherlock. He was consecrated bishop of Massachusetts May 7, 1797, and his episcopal authority was afterwards extended over Rhode Island and New Hampshire. Died Sept. 10, 1803.

Bassa'no, a town of Northern Italy, in the province of Venice, on the river Brenta, 19 miles N. E. of Vicenza. It stands on an eminence near the foot of the Alps, in a country which produces excellent wine and fruits. It is well built, has many churches and several fine palaces, also a theatre, a picture-gallery, a botanic garden, and the celebrated old printing-establishment of Remondini. Bonaparte here defeated the Austrian general Wurmser, Sept. 8, 1796. Pop. in 1881, 14,524.

Bassano (or da Ponte, Giacomo), a Venetian painter, born in 1510, was the pupil of Bonifazio Venetiano, and painted at Venice and Bassano. He excelled in the representation of familiar scenes and natural objects. His coloring is good, and his works are marked by a bold naturalistic tendency, and have some of the characteristics of modern genre-painting. Died Feb. 19, 1592.

Bas'saris [Gr. *βασσαρίς*, a "fox"], a genus of North American Bassaridæ, representing the true civets of the Old World. The *Bassaris astuta*, known as civet-cat or cacomixtle, and also very incorrectly called the raccoon, is found in Mexico, Texas, California, etc. These animals are about the size of a common cat, and very playful and easily tamed. When wild they live in trees. They catch rats, mice, and birds. The tail is bushy, and marked with rings like that of the raccoon.

The Ring-tailed Bassaris.

Bassein', a city of British Burmah, on an arm of the Irrawaddy, which joins the Bay of Bengal S. of Cape Negrais. It is 90 miles from the sea, and large ships ascend to the city. Much rice is exported hence. Pop. 20,000.

Basses-Alpes (*i. e.* "Lower Alps"), a department in the S. E. part of France, is bounded on the N. by Hautes-Alpes, on the E. by Italy and Alpes-Maritimes, on the S. by Var, and on the W. by Vaucluse. Area, 2685 square miles. The surface is mostly mountainous, with some fertile valleys. It is drained by the river Durance. Pop. in 1881, 131,918. Capital, Digne.

Basses-Pyrénées (*i. e.* "Lower Pyrenees"), a frontier department of France, is bounded on the N. by Landes, on the E. by Hautes-Pyrénées, on the S. by Spain, on the W. by the Atlantic. Area, 2945 square miles. It is intersected by the river Gave-de-Pau, an affluent of the Adour, which forms its N. W. boundary. The surface is partly mountainous; the soil of the lowlands is fertile. Copper, iron, and marble are found here. The chief towns are Bayonne and Pau. Pop. in 1881, 434,366.

Basse-Terre (*i. e.* "low land"), a seaport, capital of the French island of Guadeloupe, on the S. W. coast; lat. 15° 57′ N., lon. 61° 44′ W. It is the residence of a bishop, and has a botanic garden. It has no harbor. Pop. 8790.

Basse-Terre, a town of the British West Indies, capital of St. Christopher (or St. Kitts), on the W. coast. It has a harbor and an active trade. Pop. about 6500.

Bas'sett (Richard), a statesman of Delaware, was a member of Congress in 1787, and of the convention of the same year which framed the U. S. Constitution. He was U. S. Senator (1789–93), governor of the State (1798–1801), and U. S. district judge (1801–02). He was the father-in-law of Hon. James A. Bayard. Died in Sept., 1815.

Bas'set Horn [It. *cor'no di basset'to*], the richest and softest of all wind instruments, was invented in Passau in 1770, and afterwards improved. It is similar to a clarionet in tone and fingering, and its compass is two and a half octaves.

Bas'sia, a genus of plants of the order Sapotaceæ, comprises several species of trees, natives of tropical or sub-tropical countries. It produces flowers remarkable for their fleshy corolla, and a pulpy fruit enclosing three or four seeds, which contain an abundance of oil or butyraceous fat, which is used as food and for other purposes. The *Bassia latifolia*, an East Indian tree called madhuca or mahowa, is valuable for timber, and bears seeds from which oil is obtained. The Galam butter or Shea butter, an important article of commerce in Central Africa, which is procured from the seeds of *Bassia Parkii*, is more solid and more palatable than the butter of cow's milk. It is asserted that it will keep for a year without salt.

Bassi'ni (Carlo), born in Cuneo, Italy, in 1812, became celebrated as a violinist, musical director, and composer. He was long a successful music-teacher in New York. He published the "Art of Singing" (1857), "Melodic Exercises" (1865), "Method for the Tenor" (1866), "Method for the Barytone" (1868), and other valuable works. Died Nov. 26, 1870.

Bassompierre, de (François), Baron, a French general, born at Harnel, in Lorraine, 1579. He was an accomplished courtier, greatly addicted to intrigues, and gained the favor of Louis XIII., who raised him to the rank of marshal of France in 1622, and sent him on embassies to Spain and England. He fought against the Huguenots at La Rochelle. Having offended Cardinal Richelieu, he was confined in the Bastile about twelve years (1631–42). He died Oct. 12, 1646, leaving interesting "Mémoires" (2 vols., 1665), which were written in the Bastile, and are commended as attractive in style. (See Puymaigre, "Vie de Bassompierre," 1848.)

Bassoon' [Fr. *basson;* It. *fagot'to*], a wind instrument which consists of a perforated tube of wood in several pieces, which are fastened together, so as to bring the holes and keys within the reach of the fingers. At the end is attached a small tapering, crooked brass tube, at the termination of which is placed a reed to produce the tone. It has a compass of three octaves, from double B flat to B flat in alt.

Bas'sora, Bas'sorah, Bas'ra, or **Bus'sorah,** a city of Asiatic Turkey, in the province of Irak-Arabi, on the Euphrates (here called Shat-el-Arab), 70 miles from its mouth. It is surrounded by a brick wall nearly eight miles in circuit, which encloses gardens, rice-fields, and groves of the date-palm. The houses are mean and the place is unhealthy. About half of the inhabitants are Arabs. Bassora has an extensive trade, being an entrepôt for the exchange of the productions of Turkey and Persia for the commodities of India. The river is navigable to this point for ships of 500 tons. Among the exports are horses, dates, raw silk, and precious metals. Bassora was founded by the calif Omăr about 636 A. D., and was once a rich and populous city. Pop. about 4000.

Bassora Gum, a whitish or yellowish opaque substance resembling gum-arabic, but differing from it by being mostly insoluble in water. It was introduced into commerce from the vicinity of Bassora, on the Persian Gulf.

Basso-Rilievo, a term used in sculpture. See Bas-Relief.

Bass's Strait separates Australia from Tasmania, and is about 140 miles wide. It was first explored by George Bass in 1798. The navigation of this strait is obstructed by small islands and coral reefs.

Bast, or **Bass** [Lat. *liber* or *endophlœ'um*], the fibrous inner bark of exogenous plants, consists mostly of sap-vessels or laticiferous vessels. It is most conspicuous in exogenous trees as the substance interposed between the true bark and the wood. It is sometimes valuable for medicinal purposes, and is often used in the fabrication of cloths, ropes, mats, sacks, etc. The Russians apply the name bast especially to the inner bark of the linden tree (*Tilia Europæa*), which is extensively used for making ropes, mats, and shoes. The trees are cut down in spring when the sap abounds. This matting is extensively imported, and used in packing furniture and other articles, covering tender plants in gardens, etc.

Bas'tard [Old Fr.], in law, a person born of parents not married to each other. It includes several distinct cases, as where the mother is unmarried, or she is a married woman, or where she was married at the time of conception, but not married at the time of birth—*e. g.*, being then divorced from the bonds of matrimony or a widow. By the rules of the common law the fact of the marriage of the parents at the time of birth is the test of legitimacy, even though such marriage may have immediately preceded the birth. By the civil or Roman law, intermarriage after birth has a retroactive effect, and makes the child legitimate. This rule prevails in Scotland. This difference presents frequently an interesting question in private international law. Thus, if a person owning both land and personal property in England should become domiciled in Scotland, and there marry the mother of his bastard child, the marriage would make the child legitimate, so that he could succeed to the personal property in England, but he would not inherit the land there situated. Some of the States in this country follow the common-law rule, while others by statute have adopted the Scotch, so that the same point may arise in our inter-State jurisprudence. In the case where the mother is a married woman, and it is claimed that a child is the offspring of an adulterous connection, it will not be enough that the adulterer may have been the father. It must be proved that the husband could not have been, either by absence from the country or other sufficient reason. The presumptions of law favor legitimacy, and public policy requires that these should only be overcome by the most satisfactory proof. (The details of this branch of the law can be found in the work of Mr. Nicholas on the "Law of Adulterine Bastardy.") Public policy also requires that the mother should not be allowed, for the purpose of bastardizing the issue, to be a witness to prove want of access on the part of the husband. In the special case where the mother is at the time of the child's birth a widow, a question may arise as to the effect of the time intervening between the death of the husband and the birth of the child in raising a presumption of illegitimacy. No precise time is fixed by law, and the testimony of experts must be resorted to. Statutes sometimes fix a period after which the presumption of illegitimacy will arise. A similar question may arise after a divorce from the bonds of matrimony for the husband's fault. In the case of a divorce from bed and board, where a child subsequently comes into existence it is presumed to be illegitimate, as it will be supposed that the parties have obeyed the decree of the court and have lived apart. This presumption may be rebutted by satisfactory evidence.

By the common law, a parent is not bound to sustain an illegitimate child. By a series of statutes in England, commencing in the reign of Queen Elizabeth, the duty of support is imposed on the supposed father as well as the mother. This legislation proceeds upon the theory that it is a criminal act to bring such a child into the world and to cast its support upon the public. Accordingly, an inquiry is had before magistrates into the facts of the case, and if parentage is established an order is made for a periodical allowance for the child's support. Should the parent abscond, his or her property may be sequestered. Due provision is made for a review of the order of the magistrates. These statutes are substantially re-enacted in this country. This class of children do not have the same civil rights in all respects as those who are legitimate. They cannot inherit land from either father, mother, or collateral relatives, or transmit land to them. Natural ties are, however, regarded, it being the same crime for bastard relatives to intermarry as for those who are legitimate. Such a child has no name except as it may acquire it by reputation. It is deemed to have its domicil of origin at the place of its birth. These disabilities in this country are to some extent modified by statutes in the respective States. Thus, in New York an illegitimate child may inherit from its mother, in default of legitimate descendants; so the mother may in like circumstances inherit from the child. A bastard child may be made legitimate by a special act of the legislature both in England and in this country. Such an act cannot, however, interfere with vested rights of others. It could not divest property which had been previously transmitted to legitimate relatives.

T. W. Dwight.

Basti'a, a fortified seaport of Corsica, on the N. E. coast, 75 miles N. E. of Ajaccio; lat. 42° 42′ N., lon. 9° 27′ E. It is the richest and most populous town in the island, of which it was formerly the capital. It is picturesquely situated on the slope of a hill which rises in the form of an amphitheatre. It has a harbor which admits small vessels, and has a considerable trade in leather, wine, oil, coral, etc. Here are numerous tanneries. Bastia dates from 1383. Pop. 21,535.

Bas'tian (Henry Charlton), M. D., F. R. S., born at Truro, England, April 26, 1837, is distinguished as an advocate of the doctrine of the spontaneous generation of living organisms. He early gained a brilliant fame as a pathologist. He has since his twenty-third year been officially connected with the London University, and in 1871 became professor of pathological anatomy in University College. He has published "Modes of Origin of Lowest Organisms" (1871) and "The Beginnings of Life" (1872).

Bastiat (Frédéric), an eminent French political economist and advocate of free trade, was born at Bayonne June 29, 1801. He wrote against the protective system in the "Journal des Économistes." During a visit to England he became acquainted with Cobden, and on his return (1845) he produced translations of the speeches of British free-traders; was chosen a member of Constituent and Legislative Assemblies of 1848 and 1849. His chief work is "Harmonies Economiques" (1849). Died Dec. 24, 1850.

Bastide (Jules), a French republican and journalist, was born in Paris Nov. 22, 1800. He became chief editor of the "National" about 1836, and founded the "Revue Nationale" in 1846. He was minister of foreign affairs under Cavaignac in 1848. He published important educational and historical works. D. Mar. 3, 1879.

Bastien-lepage (Jules). See Appendix.

Bastile, or **Bastille** [from *bâtir* or *bastir*, to "build"], a French word signifying "fortress," applied especially to the state prison and citadel of Paris, which was built about 1370 by Charles V. Additions were made to it by several successive kings, and it was surrounded by a wide ditch. Among its prominent features were eight large round towers five stories high, having walls twelve feet thick or more. In these towers were many cells for prisoners. The inmates of this prison were generally noblemen, authors, politicians, etc., who had not been legally convicted of crime, but were victims of royal jealousy, political despotism, court intrigue, or ecclesiastical persecution. The only formula used in condemning a man to the Bastile was the *lettre de cachet.* Among the eminent men confined here were Voltaire, Bassompierre, and the Man in the Iron Mask. The prisoners were left in ignorance of the cause and duration of their punishment, and were completely debarred from intercourse with their friends. The first violent symptom of the French Revolution was the destruction of the Bastile, which the populace took by storm July 14, 1789. They killed the governor, De Launay, and released the prisoners, who were only seven in number.

Bastina'do [It. *bastona'ta*, a "blow with a stick," from *basto'ne*, a "staff" or "stick"], a name given by Europeans to a form of punishment which is common in Turkey and several Oriental countries, and was practised by the ancient Egyptians. It consists of blows inflicted with a stick on the soles of the feet.

Bas'tion [from the Fr. *bâtir* (formerly spelled *bastir*), to "build"], a bulwark; a projecting tower erected to defend the wall of a town or fortification. An unbroken wall enveloping a city or other place, for its defence, would be unseen at its foot; hence during ancient times and the Middle Ages towers of various kinds projected at intervals, from which the intermediate portions of the wall could be observed and reached by defensive projectiles (*i. e.* "flanked"). The invention of gunpowder made it necessary to cover enveloping walls (the *enceinte*) by earth in the form of a glacis in front of the ditch, and to enlarge these flanking towers to receive artillery. Thus enlarged, their own walls would have been undefended had not their outline been so contrived that they should *flank* each other. Hence arises the *bastion*, the two faces of which, directed upon the inner extremities of the flanks of the adjoining bastions, are *flanked* (that is, defended) by them; hence a bastion has two faces and two flanks; the fifth side of the figure, called the *gorge* (between the extremities of the *curtain* and towards the interior of the place), is usually open. That portion of the enceinte which fills the interval between two bastions, uniting with the inner extremities of their flanks, is called the *curtain*. The *ensemble* of a curtain and two half bastions is called a *bastioned front.* (See Fortification, by O. H. Ernst, captain of engineers, U. S. Army.)

Bastrop, capital of Morehouse parish, La. (see map of Louisiana, ref. 6–D, for location of parish), on Bayou Bartholomew, 300 miles N. by W. of Baton Rouge. It has two academies, and is in one of the best cotton regions in the State. Pop. in 1870, 521; in 1880, 822.

Bastrop, capital of Bastrop co., Tex. (see map of Texas, ref. 5–H, for location of county), on the Colorado River, 35 miles E. S. E. of Austin City. Pop. in 1870, 1199; in 1880, 1546.

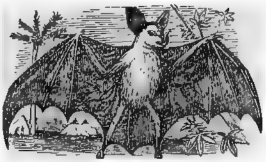
Bastwick (John) was born at Writtle in Essex co., England, in 1593. He was strongly opposed to the Roman Catholic ceremonial, and, as the English prelates considered themselves attacked in his writings, he was heavily fined and condemned to imprisonment for life; but Parliament in 1640 reversed the sentence and ordered reparation to be made to him. During his later years he opposed independency. Died Oct. 6, 1654.

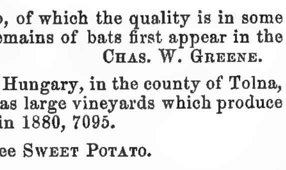
Bas'yle [from the Gr. *βάσις*, "base," and *ὕλη*, "timber," whether simple or compound, which can unite with oxygen to produce a base. Thus, all the metals are examples of simple basyles, while ammonium, ethyl, methyl, etc. are compound basyles.

Bat [Lat. *vespertilio*], the common name for animals belonging to the order Cheiroptera, mammals possessing a fold of skin which commences at the neck and extends on each side between the fore legs or arms and the posterior limbs, serving as wings which enable the animal to fly. Bats are the only mammals which have the power of flight. The anterior extremities and digits are usually very long, the eyes small, ears large, thumbs short and armed with a hook-like nail, as are each of the toes of the hind feet. The clavicle is generally long. Some species have a spur on the heel. Bats fly for the most part only in the night, living by day in hollow trees, caves, and dark buildings. Even when their eyes have been destroyed, they can fly through narrow and tortuous passages without hitting. This is probably owing to their delicate sense of hearing and touch. Except in tropical climates, they hibernate in cold weather.

Bats are divided into two groups: the so-called frugivorous and the insectivorous bats. The former are found only in the Old World tropical regions. They feed chiefly on fruits, but also eat birds, small mammals, etc. They number forty or more species, and include the rousettes, kalongs, "flying foxes," etc. Some of them can spread their wings five feet from tip to tip. The principal genus is *Pteropus*, and its species are remarkable as having only twenty-four vertebræ, a smaller number than any other known vertebrate possesses. The insectivorous bats are by far the most numerous, some 200 species being described. The most formidable of these are the vampires—tropical American bats of the genus *Phyllostoma*, having a leaf-like membrane on the end of the nose. They are famous for their habit of fastening upon sleeping animals and men for the purpose of sucking their blood. Such witnesses as D'Azara, Tschudi, Waterton, and Darwin confirm this disputed statement. The bats of the U. S. are not very numerous in species, though abundant in individuals. They are of the genera *Vespertilio, Molossus, Plecotus*, etc. Europe is much more rich in species, the "long-eared bat," *Plecotus communis*, being one of the most common. Bats are extremely useful in destroying insects, and their excrement so accumulates in certain caves, as in Farther India, in Tennessee, Arkansas, etc., as to promise to become an important source of guano, of which the quality is in some cases excellent. Fossil remains of bats first appear in the eocene. CHAS. W. GREENE.

Flying Fox Bat.


Vampire Bat.


Long-eared Bat.

Bat'aszek, a town of Hungary, in the county of Tolna, 70 miles W. of Szegedin, has large vineyards which produce an excellent wine. Pop. in 1880, 7095.

Batatas Edulis. See SWEET POTATO.

Bata'vi, an ancient German tribe or nation who inhabited the country now called Holland, especially an island called *Batavia* or *Insula Batavorum*, which was enclosed by the Rhine, the Waal (Vahalis), the Meuse (Mosa), and the ocean. They were conquered by Germanicus, and became loyal subjects of the Roman empire. They were exempted from the payment of taxes. The Batavian cavalry served in the Roman armies, and had a high reputation.

Bata'via, a city and seaport of Java, the capital of the Dutch possessions in the East Indies, is on the northern coast of the island and on the Java Sea; lat. 6° 8′ S., lon. 106° 50′ E. Its site is flat and marshy, and intersected by canals. The place was formerly very unhealthy, but has been improved by draining. The temperature continues about uniform throughout the year, the average being 78° F. Batavia, which has a good harbor, is the greatest commercial emporium of the Malay Archipelago. It has a stadthouse, an exchange, numerous churches, several Chinese temples, a bank, a school of arts and sciences, and a botanic garden. A telegraphic cable connects it with Singapore, about 600 miles distant. The chief articles of export are coffee, sugar, pepper, indigo, hides, cloves, nutmegs, mace, tin, rice, and rattans. Among the imports are various articles of European manufacture. Pop. 102,901. This city was founded by the Dutch in 1619.

Batavia, R. R. junction, Kane co., Ill. (see map of Illinois, ref. 2–F, for location of county), on Fox River, 38 miles W. of Chicago. It has two large schools, an institute for the insane, valuable quarries, and extensive manufactures. Pop. in 1880, 2639.

Batavia, R. R. centre and capital of Genesee co., N. Y. (see map of New York, ref. 4–D, for location of county), on the Tonawanda Creek, 36 m. E. of Buffalo and 32 m. W. of Rochester. It contains several important manufactories, union school, ladies' seminary, public library, and the State institution for the blind. Pop. in 1870, 3890; in 1880, 4845.

Batavia, on R. R., capital of Clermont co., O. (see map of Ohio, ref. 7–C, for location of county), on the East Fork of the Little Miami River, 21 miles E. of Cincinnati. It has some manufactures. Pop. in 1870, 827; in 1880, 1015.

Bata'vian Repub'lic. Holland having been conquered by the French in 1795, the prince of Orange was deposed and a new government was established with the title of the Batavian republic. This was an ally or tributary to the French republic, and as such was involved in a war against the British, who nearly ruined the Dutch navy. In June, 1806, this republic was converted into a kingdom, of which Louis Bonaparte became king.

Bat'chelder (SAMUEL), born in Jaffrey, N. H., June 8, 1784, began the cotton manufacture in New Ipswich, N. H., in 1808. He superintended the erection of cotton-mills in Lowell, Saco, etc., invented a dynamometer for mill-work, and published a "History of the Cotton Manufacture in the U. S."

Bat'cheller (OLIVER A.), U. S. N., born June 1, 1842, in the State of New York, graduated at the Naval Academy in 1861, became an ensign in 1862, a lieutenant in 1864, and a lieutenant-commander in 1866. He was attached to the steamer Mississippi at the attack on Port Hudson, Mar. 15, 1863, when that vessel was destroyed. In 1864 and 1865 he was attached to the Western Gulf blockading squadron, and served on the steamer Monongahela as executive officer in the battle of Mobile Bay, Aug. 5, 1864, and in the subsequent operations leading to the fall of Mobile. He was commended for gallantry by his commanding officer, Commander Strong, in his official report to Rear-Admiral Farragut of Aug. 6, 1864.
FOXHALL A. PARKER.

Bateman (CLIFFORD R.) was the son of Pres. Bateman of Knox College, Illinois. He graduated at Amherst in 1876, and from the Columbia College law school in 1878; spent the next three years in study at the universities of Berlin and Heidelberg, and at the École des Sciences Politiques in Paris. He returned to New York in 1882, and took the position of professor in the school of political science in Columbia College, to which, in the mean time, he had been elected. Died Feb. 6, 1883.

Bateman (EPHRAIM), born at Cumberland, N. J., in 1770, received a good education and entered the medical profession, in which he became noted; was many years a member of the State legislature; member of Congress 1815–23, and U. S. Senator 1826–29. Died Jan. 21, 1829.

Bateman (KATE JOSEPHINE), an actress, was born at Baltimore, Md., Oct. 7, 1842, and was the daughter of H. L. Bateman and Mrs. Bateman, both well known in theatrical circles; and her sister Ellen (Mrs. Greppo) was also an actress before her marriage. The sisters were brought up almost from infancy upon the stage. In 1862, Kate Bateman appeared at Boston as "Leah," her greatest character, and won great applause in the U. S. and Great Britain. In 1866 she was married to George Crowe, a former editor of the "London News."

Bateman (NEWTON), LL.D. See APPENDIX.

Bates (EDWARD), LL.D., an American statesman and lawyer, was born at Belmont, Goochland co., Va., Sept. 4, 1793, and emigrated to Missouri in his youth. He became a political friend of Henry Clay, and was elected a member of Congress in 1827. He presided at the national convention of the friends of internal improvement which met at Chicago in 1847, and opposed the repeal of the Missouri Compromise in 1854; Mar., 1861, he become attorney-general of U. S.; resigned in 1864. Died Mar. 25, 1869.

Bates (ISAAC C.), born at Granville, Mass., in 1780, graduated at Yale in 1802, became a lawyer at Northampton, Mass., was a Whig member of Congress (1827–35) and U. S. Senator (1842–45). Died Mar. 16, 1845.

Bates (Joshua), born in Weymouth, Mass., in 1788. He removed to London in 1826, and became a partner in the banking-house of Baring Brothers & Co. He was the principal founder of the Boston Free Library, to establish which he gave $50,000, on the condition that it should be "perfectly free to all, with no other restrictions than may be necessary for the preservation of the books." He afterwards contributed books to the value of $50,000. Died Sept. 24, 1864. (See "Memorial of Joshua Bates, from the city of Boston," 1865.)

Bates (Joshua), D. D., born at Cohasset, Mass., Mar. 20, 1776, graduated at Harvard in 1800, was ordained pastor of the Congregational church at Dedham, Mass., in 1803, was president of Middlebury College, Vt. (1818–39), was for a time chaplain of the U. S. Senate, and pastor in Dudley, Mass. (1843–54). He published various discourses, sermons, and other writings. Died Jan. 14, 1854.

Bates (Martin W.), born at Salisbury, Conn., Feb. 24, 1787, studied medicine, but became a lawyer of Delaware, from which State he was U. S. Senator (1857–59). Died at Dover, Del., Jan. 1, 1869.

Bates (Samuel Penniman), LL.D., born at Mendon, Mass., Jan. 29, 1827, graduated at Brown University in 1851, was principal of Meadville Academy, Pa. (1852–57), where he did much to stimulate the cause of education. In 1857 he became superintendent of schools in Crawford co., Pa.; in 1860 deputy State superintendent; in 1865 State historian of Pennsylvania. He has published various works, among which are a "History of Pennsylvania Volunteers" (5 vols.), "History of the Colleges of Pennsylvania," "School Laws of Pennsylvania. He also prepared Armor's "Lives of the Governors of Pennsylvania" (1873).

Bates (William), D.D., one of the most ornate and learned of the English nonconformist writers, was born in Nov., 1625, and died at Hackney, July 14, 1699. He assisted at the Savoy Conference for reviewing the Liturgy. Soon after the restoration of Charles II. he was made one of His Majesty's chaplains, and but for his nonconformity might have become a bishop. His contemporaries called him the "silver-tongued." In 1681 he published (anonymously) "Vitæ Selectorum Aliquot Virorum." His most valuable treatise is "The Harmony of the Divine Attributes in the Contrivance and Accomplishment of Man's Redemption." His collected works were published in 1700, again in 1723, and again in 1815, the last time by Farmer, in 4 vols. 8vo.

Batesville, capital of Independence co., Ark. (see map of Arkansas, ref. 2–E, for location of county), on R. R. and White River, 90 miles N. N. E. of Little Rock, and 115 miles W. N. W. of Memphis. It is the seat of Batesville Academy and of Soulesbury Institute. The river is navigable for small steamboats to this point, and part of the year for large ones. It has woollen manufactures and flouring-mills. Pop. in 1870, 881; in 1880, 1264.

Bat-Fish. See Bat-Malthæa.

Bath [Ger. *Bad*], the application to the body of water or other liquid, or of spray or vapor, for the purpose of cleansing the surface or of preserving or restoring health. Water, employed in the bath, is an important agent in the treatment and prevention of disease. In ancient Greece, Rome, Germany, and Judea, in Mohammedan lands (by religious precept), as in modern Finland and some other countries, bathing may be regarded as almost universal, though in desert countries the Moslems use sand instead of the water which is there so precious. Some of the American Indians, though not otherwise remarkably clean, practise bathing in water or steam even to excess. Surf-bathing is a nearly universal pastime on many islands of the Pacific. The ancient Romans had extensive public baths—institutions which of late have been revived in Europe and America on a smaller scale, but in a manner not liable to the serious abuses which disgraced the Roman baths.

The "hot" bath and vapor bath are above 99° F., the normal heat of the blood; warm, tepid, and cold baths being of lower temperature. The vapor bath of water or alcohol accelerates the heart's action, softens the skin, and produces profuse sweating, and is useful in various skin diseases, in chronic rheumatism, and in some diseases of the kidneys, etc. The hot bath is also stimulant. Locally applied, it relieves pain and allays inflammation. The hot bath is often employed in the convulsive diseases of children, but its effect may be a profound one; and the tepid or warm bath is much safer, since the skin of a child is extremely sensitive to heat and cold. The hot bath sometimes causes a sense as of choking, and a degree of giddiness or headache. When its action is favorable, profuse sweating results. The warm bath is a sedative, usually inclining one to inactivity or sleep. It is useful in feverish or restless conditions and in eruptive diseases, but is not to be recommended in acute diseases of the chest, which may be aggravated by it. The cold and tepid bath are those most generally to be employed. Cold bathing ought never to be practised while the person is exhausted or perspiring freely; and there are many nervous, thin, and sensitive persons who cannot safely endure the shock and loss of heat which it occasions. The application of cold water by the sponge or "pack" is an excellent measure in many cases of typhoid and other fevers. The "hydropathic pack" (in which the patient is wrapped in a wet sheet and closely covered with blankets), the hip bath, the douche or jet, and the shower bath have each their important uses in therapeutics. Various sulphur and other springs have a direct effect in skin diseases, and useful saline and other principles are no doubt capable of absorption into the system by the skin. Various drugs are used in vapor baths, and act upon the patient after absorption. Sea-bathing has a peculiar tonic effect upon some patients. Besides the above, the "Turkish" and "Russian" baths have been devised, which combine a thorough and direct detergent effect upon the skin with the various advantages of the warm and tepid bath, adding thereto the often invaluable results of manipulation or "kneading" the patient, a process the importance of which in selected cases can hardly be overestimated. "Wine baths," "mud baths," and other devices have been tried in different diseases, often with more or less benefit to the patient. Revised by Willard Parker.

Bath (anc. *Aquæ Solis*), a city of England, capital of Somersetshire, is beautifully situated in a valley on the river Avon, 20 miles from its mouth and 102 miles by rail W. S.W. of London; lat. 51° 23′ N., lon. 2° 22′ W. The houses are mostly built of white freestone, "Bath oolite," quarried in the vicinity. Bath presents perhaps a finer appearance than any other city of England, which is partly a consequence of the configuration of its site. This is in the form of an amphitheatre, on the declivity of which the finest streets extend in successive terraces. The principal public buildings are the Abbey church, in the latest Gothic style, 210 feet long; St. Michael's church, the guild-hall, an elegant theatre, a masonic temple, and the assembly and concert rooms. The beauty of the situation, the mildness of the climate, and the curative efficacy of its hot saline springs render Bath a very fashionable place of resort. The temperature of the springs, four in number, varies from 97° to 117° F. They rise on the bank of the river, and discharge 184,320 gallons daily. This water is recommended for scrofula, palsy, gout, cutaneous diseases, etc. This city sends two members to Parliament. The Romans erected baths at this place in the first century, and called it *Aquæ Solis*. Numerous Roman antiquities have been found in and near Bath. The Great Western Railway passes through Bath. Pop. in 1881, 51,790.

Bath, a port of entry, capital of Addington co., province of Ontario, Canada, is on the N. shore of the Bay of Quinté, in Ernestown township, 18 miles W. S. W. of Kingston. Pop. in 1881, 546.

Bath, city and R. R. centre, capital of Sagadahoc co., Me. (see map of Maine, ref. 10–C, for location of county), is on the right (W.) bank of the Kennebec River, 12 m. from the ocean, 30 m. S. of Augusta, and 36 m. N. E. of Portland. It is built on uneven ground, is lighted with gas, is advantageously situated for navigation, and has steamboat communication with Boston and Portland. The principal business of Bath is shipbuilding. There are also many extensive manufactories of lumber, a large manufactory of railroad cars, a large iron-foundry, brass-foundry, cordage-factory, and machine and boiler shops. Bath has long been noted for the excellence of its schools. Pop. in 1870, 7371; in 1880, 7874.

Bath, R. R. junction and semi-capital of Steuben co., N. Y. (see map of New York, ref. 6–E, for location of county), is on the Cohocton Creek, 74 miles S. S. E. of Rochester and 310 miles from New York. It has a jail and court-house, factories, mills, a soldiers' home, and an orphan asylum. Pop. in 1880, 3183.

Bath (or **Berk'ley Springs**), the capital of Morgan co., W. Va. (see map of West Virginia, ref. 3–G, for location of county), is situated 2½ miles S. of the Potomac River and the Baltimore and Ohio R. R., at Sir John's Run, 128 miles W. N. W. of Baltimore. Here are medicinal springs, which are much frequented, and have a temperature of 74° F. They are useful in rheumatic, calculous, nervous, and catarrhal diseases. It has a large tannery. Pop. in 1870, 407; in 1880, 534.

Bath Alum Springs, a post-village of Bath co., Va.

(see map of Virginia, ref. 5–E, for location of county), 5 miles E. of Bath Court-house and 45 miles W. of Staunton. Here are several aluminous and chalybeate springs, which are much frequented by patients who require tonic and moderately astringent medication.

Bath Court-house, or **Warm Springs,** a post-village, capital of Bath co., Va. (see map of Virginia, ref. 5–E, for location of county), 50 miles W. of Staunton and 5 miles N. E. of Hot Springs. It has warm saline, chalybeate springs, which have a reputation for the cure of scrofula, rheumatism, and anemia. Pop. of district in 1870, 890; in 1880, 1075.

Bath, Knights of the, a military order in Great Britain, deriving its name from the ceremony of bathing which was performed at the initiation of the knights. The earliest authentic instance of this ceremony was at the coronation of Henry IV. (1399). The last occasion on which this ceremony was used was the coronation of Charles II. in 1660, after which the order fell into oblivion until it was revived by George I. in 1725. It is now the second in rank among the orders of England, the order of the Garter being the highest.

Bath Stone, a building-stone extensively used in England, is procured from quarries in the lower oolite in Somersetshire, near Bath. It is fine-grained, of a rich cream color, is easily wrought, and hardens on exposure to the air, but is not very durable. It contains about 94 per cent. of carbonate of lime and 2½ of carbonate of magnesia.

Bath'urst, a thriving town of New South Wales, capital of Bathurst county, is on the Macquarie River, 98 miles W. N. W. of Sydney. It is connected with Sydney by a fine road leading over the mountains. It is the centre of the mining district of New South Wales. Pop. about 5000.

Bathurst, a port of entry, capital of Gloucester co., New Brunswick, on the Bay of Chaleurs, 175 miles N. by E. of St. John, has a good harbor and an extensive trade in lumber, trout, and salmon. Pop. in 1881, 4806.

Bathyb'ius [from the Gr. βαθύς, "deep," and βίος, "life"], a name given by some biologists to a formless expanse of matter of an albuminous or protoplasmic character, which is believed to cover large areas of the ocean's bed, and to manifest some characteristic evidences of possessing organic and perhaps animal life. Its existence is not universally admitted by savants.

Bat'iscan Bridge, a post-village of Champlain co., Quebec, Canada, on the N. shore of the St. Lawrence, 69 miles below Quebec, has two lighthouses and manufactures and exports of flour, lumber and leather.

Bat Malthæa (*Malthæa vespertilio*), a fish of the Atlantic Ocean, found from South America to Newfoundland, chiefly remarkable for the monstrosity of its shape. Other species of the genus are known, but they are not very frequently taken.

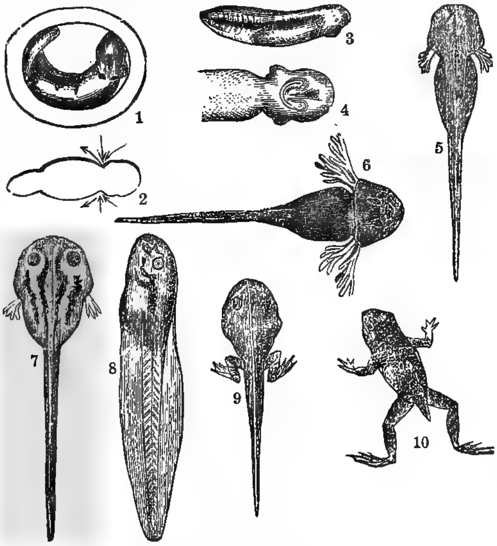
Baton Rouge, city on R. R., capital of La. and of the parish of East Baton Rouge (see map of Louisiana, ref. 10–E, for location of parish), is on the left (E.) bank of the Mississippi, 129 miles above New Orleans; lat. 30° 28′ N., lon. 91° 11′ W. It stands on a bluff which rises about 25 feet above the highest inundations. The river below the city is bordered by plantations of sugar-cane, groves of tropical fruit trees, and handsome villas and gardens. The seat of government was established here in 1847. The Capitol was completed in 1852 at a cost of $246,000. It contains a State-house (which was burned while occupied by Federal troops during the civil war, but rebuilt in 1882 and now occupied by the officers of the State government), a State university, a collegiate institute, a seminary for young ladies, public and private schools, an institute for the deaf and dumb, a school and industrial home for the blind, two orphans' homes, a Catholic academy for young ladies, and a penitentiary in which are about 800 convicts. The convention met here Jan. 21, 1861, and on the 26th adopted the ordinance of secession. The city was taken by the U. S. forces May 7, 1862. On August 5, 1862, a Confederate force, numbering 5000, under Gen. John C. Breckenridge, attacked the garrison under Gen. Thomas Williams, but was repulsed after a fierce contest of two hours' duration, in which Gen. Williams was killed. The place was shortly after evacuated by the Union forces, but about a month afterward was reoccupied, and held by Federal troops to the close of the war. The arsenal has been broken up. Pop. in 1870, 6498; in 1880, 7197.

Ed. "Capitolian-Advocate."

Ba'too (Batou or Batu) Khan, said to have been the grandson of Jengis Khan, became governor of Kapchak in 1223. He conquered Russia, which he held in subjection ten years, and made war on Poland and Hungary. Died in 1255.

Batoom, or **Batoum.** See Batum.

Batrachia, ba-tra'ke-a (plu.) [from the Gr. βάτραχος, a "frog"], called also **Batrachians** and **Amphibians,** one of the five great classes into which the vertebrate animals are usually divided, though some writers have reduced the class to the rank of an order of reptiles—a class with which they are popularly confounded. The Batrachia are cold-blooded and oviparous, and in most living species are without scales, and the blood is partly aërated through the skin. The young, for the most part, breathe by gills like those of fishes. They generally have limbs, but not always. The young assume a fish-like form (as the tadpole), and finally, when adult, with few exceptions, lose their gills and commence breathing by lungs.



Hatching and Progress of the Frog (from 1 to 10.)

Batrachidæ. See Toad-Fish.

Bat'rachomyoma'chia [from the Gr. βάτραχος, a "frog," μῦς, μυός, a "mouse," and μάχη, a "battle"], the name of a mock-heroic poem, the subject of which was the battles of the frogs and mice.

Batrachophrynidæ. See Toad.

Batshian, or **Batchian,** an island of the group of Moluccas, belonging to the Dutch. Area, about 900 square miles. It produces excellent cloves.

Battaks, called also **Battas,** a race of people living in that part of Sumatra called Batta, which lies between the equator and the parallel of 2° 30′ N. They speak a peculiar language, have an original alphabet or character, and write treatises on pieces of bamboo.

Battal'ion [Fr. *bataillon*], a tactical unit of infantry; a body of infantry amounting to nearly 1000 men. In the American cavalry and artillery service eight (in infantry ten) companies constitute a battalion. The full complement of a battalion of British troops is usually ten companies. The British infantry regiments in time of peace have each one battalion, but the regiment of the continental powers is mostly so large as to comprise several battalions. In the U. S. army an infantry regiment has one battalion, while regiments in the other arms of the service have two. A detachment of infantry of more than one company, and less than one regiment, is sometimes called a battalion.

Bat'tel [Fr. *bataille*], an ancient mode of trial by single combat, usually called "wager of battle." It had its origin among the German tribes, and was introduced into England by William the Conqueror at the time of the Norman conquest. It was used, however, in only three cases—in the court of chivalry, in appeals of felony, and in the issue joined in a writ of right to determine the title to real property. In criminal cases the accuser and the accused fought in person; in civil cases, by champions. The leading reason for requiring a champion in civil cases was that if the parties should engage in combat, and one of them should be killed, the proceeding would terminate by his death, and the object of the contest would be frustrated. This barbarous mode of trial, which was based on the idea that Heaven would give the victory to the injured or innocent party, though for a long time practically disused, continued to be recognized as part of the law of England till the year 1819, when it was abolished by statute. (The details of the method of proceeding in the case of a writ of right will be found in the third book of BLACKSTONE'S "Commentaries," p. 337.)

Battering-Ram [Lat. *a'ries*], an engine of war used by the ancient Greeks and Romans to make a breach in the wall of a town or fortress. It consisted of a heavy beam of wood nearly 100 feet long, one end of which was armed with a mass of iron or bronze in the form of a ram's head. It was suspended by a chain or rope from a crane or trivet, and was made to swing backward and forward in a direction nearly horizontal. Sometimes a huge mass of stone, armed with a ram's head and placed on wheels, was driven against the walls with great force. About 100 men were employed in impelling it against the wall. To protect these men a wooden roof (*testudo*) was constructed, and the whole machine was mounted on wheels. The blows of the ram were directed against the same point with gradually increasing momentum, which, if continued long, hardly any wall could resist. These engines continued to be used in the Middle Ages until superseded by cannon.

Battershall (JESSE PARK), Ph.D. See APPENDIX.

Bat'tery [Fr. *batterie*], a military term used in various senses. A battery employed in the defence of a fortress is a row of heavy guns mounted on an earthwork or other platform; any one of the lines of a fortress which is armed with siege-guns. If they have a bomb-proof cover, they are casemated batteries. A battery used in attacking a fortified place is a number of siege-guns or mortars placed in a line and covered with a parapet. These batteries receive various names, expressing their design, position, etc. In field operations a battery is a number of guns, with the necessary horses, gun-carriages, artillerymen, and officers to manage the guns. The Austrians and Italians have eight pieces to a battery, and so likewise do the Russians, except for their horse-batteries, in which six are used. All other nations have six pieces to a battery. In reference to the weight of the ordnance, they are divided into *heavy batteries* and *light batteries*. The term battery is also applied in a narrower sense to the *personnel* or complement of men and officers who serve a set of guns.

Battery, in law. See ASSAULT AND BATTERY.

Battery, Floating. See FLOATING BATTERY.

Battery, Galvanic. See ELECTRICITY.

Batteux' (CHARLES), born near Vouziers, France, in 1713, became professor of Greek and Latin philosophy in the College of France, and wrote, besides other works, "Treatise on the Fine Arts." He also made a translation of Horace; was member of the French Academy, and of the Academy of Inscriptions. Died 1780.

Battey (ROBERT), M. D. See APPENDIX.

Batthyányi, or **Bathyanyi,** the name of an ancient and celebrated family of Hungarian magnates.

Batthyányi (LOUIS), COUNT, a Hungarian patriot, born at Presburg in 1806. He favored the liberal cause, and was appointed president of the ministry formed in Mar., 1848. Finding his position untenable, he resigned about six months later. After his friends had been defeated in battle by the Austrians, he was tried by a court-martial, and, though his conduct had been moderate, he was shot Oct. 6, 1849. (See HORVATH, "Louis Batthyányi, ein politischer Martyrer," 1850.)

Battle. See GRAND TACTICS.

Battle, a town of England, in Sussex, about 7 miles N. W. of Hastings, is in a valley enclosed on three sides by wooded hills. It is noted for the manufacture of gunpowder. Pop. in 1881, 3319. It derived its name from the great battle (usually called the battle of Hastings) which was fought near it on the 14th of Oct., 1066, between William the Conqueror and the Saxon king Harold. The victorious Norman erected here a large abbey, called Battle Abbey, now in ruins.

Battle-Axe, a weapon much used by the early northern nations, Teutonic, Celtic, and Scandinavian, and requiring great strength in its use. The battle-axe had a longer handle and a broader, stronger, and sharper blade than the common axe. It was of various forms, which had different names, such as the bill and the gisarme. The halberd was the latest form of the battle-axe, a form which is even now scarcely obsolete, though used only on occasions of ceremony. Battle-axes were used on foot and on horseback.

Battle Creek, city and R. R. centre, Calhoun co., Mich. (see map of Michigan, ref. 8–I, for location of county), at the confluence of the Kalamazoo and Battle Creek rivers, 120 miles W. of Detroit. It contains Battle Creek College, and its manufactures are extensive, especially in the line of threshing-machines and farm implements. It has good water-power and several flouring-mills, etc. Pop. in 1870, 5838; in 1880, 7063; in 1884, 10,051.

Bat'tledoor, or **Battledore** [probably from Sp. *batidor*, an instrument of the same shape used in beating clothes in washing], an instrument with a handle and a flat board (or piece of leather stretched tightly on a frame), used to strike a ball or shuttlecock. Battledoor and shuttlecock, played with the above instrument, has been a favorite amusement in Europe since the fourteenth century or earlier.

Bat'tle-Ground, on R. R., Tippecanoe co., Ind. (see map of Indiana, ref. 5–C, for location of county), where the celebrated battle of Tippecanoe was fought between Gen. Harrison and the Indians under Tecumseh and his brother, the "Prophet," Nov. 7, 1811.

Bat'tlement, a notched or indented parapet sometimes used in fortification, and often employed for the purpose of ornament on the top of a house or castle. The rising parts are called cops or merlons; the spaces or openings between them are crenels, embrasures, or loops. The soldier shelters himself behind a merlon, while he shoots through the embrasure.

Battle-Pieces, paintings representing battles. Among the remarkable works in this department are Lebrun's "Battles of Alexander the Great" and Rubens's "Battle of the Amazons." Horace Vernet is the most eminent of modern painters of battles.

Battonya, a town of Hungary, in the county of Csanad, 16 miles N. E. of Arad. Pop. in 1880, 9195.

Bat'tue [from the French *battre*, to "beat"], a mode of hunting wild animals or killing game on a large scale. A number of men, arrayed at equal distances, by beating the bushes drive the animals toward a stationary party of hunters, who are waiting to shoot them. Sometimes the array of beaters is circular, and they drive the game from different parts of a large tract of forest to a common centre. Battues in Great Britain are chiefly practised in extensive preserves of pheasants, rabbits, and hares during the autumn and winter, when country gentlemen invite their friends to their mansions for this purpose.

Batum, Batoom, or **Batoum,** is an important seaport on the S. E. coast of the Black Sea, 110 miles N. E. of Trebizond, 4 miles N. of the mouth of the Tchoruk River. It formerly belonged to Asiatic Turkey, but by the treaty of Berlin, July 13, 1878, it became a free Russian port. It has considerable trade and the best harbor on the E. coast of the Black Sea. Pop. in 1882, 22,475.

Baudelocque (JEAN LOUIS), a skilful French surgeon, born in Picardy in 1746. He was selected by Napoleon to attend the empress Marie Louise as first accoucheur. He wrote an able work on the "Art des Accouchements" (2 vols., 1781). Died May 1, 1810.

Baudissin (WOLF HEINRICH FRIEDRICH KARL), COUNT, a German author, born Jan. 30, 1789. He translated, together with Tieck, a number of Shakspeare's works. Under the title of "Ben Jonson und seine Schule" (2 vols., 1836) he published translations of the works of other English authors. He also made translations of Moliére's comedies (1865–67). Died Apr. 4, 1878.

Bau'er (BRUNO), a German rationalistic theologian and biblical critic, born in Eisenberg in Saxe-Altenberg, Sept. 6, 1809, was the son of a painter on porcelain, and studied theology and philosophy in the University of Berlin. When only twenty-five years old he became a professor of theology at Bonn, and devoted many years thereafter to a critical study of the Bible. He advanced gradually in liberality of thought, until he was forbidden to lecture on theology. He was originally a pupil of Hegel, and started from the idea that science and revelation, philosophy and theology, could be brought into perfect harmony with each other. His "Kritische Darstellung der Religion des alten Testaments" (Berlin, 1838, 2 vols.) is still based on this view. But his critical studies of the Bible led rapidly to a rupture, as shown by his "Die evangelische Landeskirche Preussens und die Wissenschaft" (1840), "Kritik der evangelischen Geschichte Johannes" (1840), and "Kritik der evangelischen Synoptiker" (1840). Then followed an equally boisterous breaking away from Hegel: "Posaune des jüngsten Gerichts über Hegel, den Atheisten" (1841) and "Hegel's Lehre von Kunst und Religion" (1842). In 1843 he wrote "Das entdeckte Christenthum," which was suppressed before its publication, and published a general critical review of the German radicalism of the period. In connection with Jungwitz and his brother Edgar he published "Geschichte Deutchlands unter der Französischen Revolution und der Herrschaft Napoleon's." But after spending several years on political and historical researches—"Die bürgerliche Revolution" (Berlin, 1849), "Der Untergang des Frankfurter Parlements" (1849), etc.—he returned to the field of biblical criticism; if possible, still more antagonistic to the reigning views than formerly he had been. In his "Kritik der Paulinischen Briefe" (Berlin, 1850) he attempted to show that the four leading Epistles, which had never before been questioned, were the production of the second century. Died Apr. 18, 1882.

Bauer (Georg Lorenz), a German theologian and linguist, born Aug. 14, 1755. He became professor of Oriental languages at Altdorf in 1789, and in Heidelberg in 1805. Among his works are "Hermeneutica Sacra Veteris Testamenti" (1797) and "Biblische Theologie des neuen Testaments" (4 vols., 1800–02). He was a rationalist, and maintained that the Bible should be interpreted by grammatical and historical principles, as the ancient classics are. Died Jan. 12, 1806.

Bauer (Wilhelm), a German inventor, born at Dillingen Dec. 23, 1822. He constructed a diving-boat for submarine operations, with which several successful experiments have been made. He has also made improvements in torpedoes for the destruction of ships and in the firing of guns under water. Bauer served with distinction in the Sleswick-Holstein war of 1850, and afterward engaged in the service of Russia. D. June 18, 1875.

Bau′erle (Adolf), a German comic author, born April 9, 1786, gained considerable popularity from his grotesque representations of Viennese life. He wrote "Die falsche Primadonna," "Die moderne Wirthschaft," "Der Tausendsasa," and other comedies. He also published "The Comic Theatre," and in his later life numerous novels. Died Sept. 19, 1869.

Bau′ernfeld′, von (Edward), a distinguished German dramatist, born at Vienna Jan. 3, 1802, has published numerous popular comedies, among which may be named "Die Bekentnisse" (1834), "Bürgerlich und Romantisch" (1825), and "Grossjährig" ("Of Age"), (1846).

Bau′gher (Henry L.), D. D., a Lutheran divine, born at Abbotstown, Pa., about 1803, graduated at Dickinson College in 1825, studied theology at Gettysburg and Princeton, became pastor of a church at Boonsboro′, Md., in 1829, was a teacher at Gettysburg, Pa. (1830–32), professor of Greek and belles-lettres (1832–50) at Pennsylvania College, Gettysburg, and was afterwards its president (1850–68). Died April 14, 1868.

Bauhin (Gaspard), an eminent botanist and anatomist, born at Bâle in 1550. He studied at Padua, became professor of anatomy and botany in his native city in 1588, was made rector of the university, and received other distinctions. He wrote valuable medical and botanical works, among which were "Pinax Theatri Botanici" (1596) and "Prodromus Theatri Botanici" (1620). The genus *Bauhinia* was named in his honor by Plumier. Died in 1624.

Bauhin (Jean), a Swiss botanist and physician, born at Bâle in 1541, the brother of the preceding. He became physician to the duke of Würtemberg at Montbéliard in 1570. He wrote in Latin a "New Universal History of Plants" (3 vols., 1650–51). Died in 1613.

Baumé (Antoine), an eminent French chemist, born at Senlis Feb. 26, 1728. He improved the manufacture of porcelain, made several inventions, and simplified several processes in the useful arts. Baumé's hydrometer is in general use among chemists. Among his works is a "Manual of Chemistry" (1763). Died Oct. 15, 1804. (See Cadet de Gassicourt, "Éloge de Baumé," 1806.)

Baum′garten (Alexander Gottlieb), a German philosopher, born in Berlin July 17, 1714, was a disciple of Wolf. He became professor of philosophy at Frankfort-on-the-Oder in 1740. He did much for the science of æsthetics. He published, besides other works, "Metaphysica" (1739) and "Æsthetica" (2 vols., 1750, unfinished). Died May 26, 1762. (See Meyer, "Leben A. G. Baumgarten's," 1763.)

Baumgarten (Michael), a German theologian, born Mar. 25, 1812, became professor of theology in Rostock in 1850. He has published many books and periodicals in opposition to the State Church of Mecklenburg, for which he has been imprisoned and fined. He has been a prominent member of the Protestantenverein since its establishment, and an earnest advocate of disestablishment. He has published "Schleiermacher as Theologian," an "Apostolic History," and many polemical writings and popular appeals in behalf of a people's Church.

Baumgarten-Crusius (Ludwig Friedrich Otto), a learned German theologian, born at Merseburg July 31, 1788, studied theology at Leipsic. He became professor of theology at Jena in 1817. Among his works is the "Handbuch der Christl. Sittenlehre" (1827), which is highly commended. Died May 31, 1843.

Baum′gartner, von (Andreas), a German savant and minister of state, born at Friedberg, in Bohemia, Nov. 23, 1793. He became professor of physics at Vienna in 1823, and Austrian minister of trade and public works in 1851. About this date he was chosen president of the Academy of Sciences in Vienna. He published a work called "Naturlehre" (1823). Died July 29, 1865.

Baum′gartner (Gallus Jacob), a Swiss politician of the liberal party, born Oct. 18, 1797. He took part in the revision of the constitution of St. Gall, and promoted the separation of Bâle country from Bâle city. He founded in Oct., 1842, "Neue Schweizer Zeitung." He published, among other works, "Die Schweizin ihren Kämpfen und Umgestaltengen, 1830–50" (4 vols., 1853). Died in July, 1869.

Baur (Ferdinand Christian), born at Schneider, Würtemberg, June 21, 1792, died at Tübingen Dec. 2, 1860, was appointed professor of church history in the University of Tübingen in 1826, and became the founder and head of the famous Tübingen school of theology (Strauss, Schwegler, etc.). Of his historical works has been translated his "Christianity and the Church in the first three Centuries" (London, 1878–79, 2 vols.); of his critical works, his "Paul" (London, 1873–75). Of his works not translated the most remarkable are "Dagmengeschichte" (1865–67, 3 vols.), "Lehre von der Dreieinigkeit" (1843–47, 3 vols.), "Apolonius of Tyana," "Sokrates und Christus," "Seneka und Paulus," etc. His principal hypothesis is the supposed controversy between Peter and Paul, which he makes almost the sole motive-power in the life of the Church of the apostolic and post-apostolic ages.

Bautain (Louis Eugéne Marie), a French philosopher and theologian, born in Paris Feb. 17, 1796. He published several works, among which are "The Philosophy of Christianity" (1835) and "Moral Philosophy" (1842). He was a popular preacher at Paris, and became director of the College of Juilly in 1849. He died Oct. 18, 1867.

Baut′zen, or **Bu′dissin,** a town of Saxony, on the Spree, and on the railway from Dresden to Görlitz, 35 miles E. N. E. of Dresden. It has a royal palace, a cathedral, two public libraries; also manufactures of woollens, linens, leather, hosiery, paper, etc. Pop. in 1880, 17,509. Here occurred a great battle (May 20 and 21, 1813) between Napoleon and the allies, who finally retreated. The loss of the allies is estimated at 13,000, and that of Napoleon at 20,000 men.

Bavanistye, a town of the Austro-Hungarian monarchy, on the Military Frontier. Pop. in 1880, 5613.

Bava′ria [Lat. *Bava′ria* or *Baioa′ria, i. e.* the "country of the *Boi′i* or *Boia′rii*;" Ger. *Bay′ern* or *Bai′ern*], a kingdom forming part of the German empire. It is, next to Prussia, the largest German state. It consists of two isolated portions: the eastern and larger portion is bounded N. by Prussia, Saxe-Meiningen, Saxe-Coburg-Gotha, Reuss, and Saxony; E. and S. by Austria; W. by Würtemberg, Baden, and Hesse-Darmstadt; the western and smaller portion, known as Rhenish Bavaria or the Palatinate, is bounded by Prussia, Alsace, Hesse-Darmstadt, and Baden. Area, 29,292 square miles. The larger portion of the country is mountainous, the principal mountains being the Algäu and Bavarian Alps in the S., the former of which reach to an elevation of 9000 feet; the Bohemian and Bavarian Mountain forests on the eastern frontier; the Fichtel Mountains in the N. E.; the Franconia, Jura, and the Hardt. The main rivers are the Danube, which receives in Bavaria thirty-nine affluents, and the Main in the N. The Rhine forms part of the frontier of the Palatinate. The Danube and the Main are connected by the Ludwigs Canal. The number of lakes, most of which are alpine lakes, amounts to about fifty. The climate is, on the whole, temperate and healthy, but rough and severe in the mountains. The soil is fertile and rich in products, particularly in corn and cattle. There are celebrated mineral springs in Lower Franconia and Upper Bavaria (Kissingen and Brückenau). The total population, according to the census of Dec., 1880, was 5,284,778, of whom nearly three-fourths are Roman Catholics, and a little more than one-fourth Protestants. The Jews number 50,000. It is divided into eight provinces, which, according to the census of 1880, had the following population: Upper Bavaria, 951,977; Lower Bavaria, 646,947; Palatinate, 677,281; Upper Palatinate, 528,564; Upper Franconia, 575,357; Middle Franconia, 643,817; Lower Franconia, 626,305; Suabia, 634,530. As regards the descent of the inhabitants, about 1,750,000 are Bavarians (Old Bavarians or Bavarians proper), 2,250,000 Franconians, and 633,000 Suabians. Bavaria has 3 universities—at Munich, Würzburg, and Erlangen—9 lyceums, 28 gymnasia (colleges), 10 normal schools, polytechnical institutions at Munich and Nuremberg, and about 7200 public schools (school attendance is compulsory here from six to fourteen); also Latin, technical, and special schools. All the kings of Bavaria have been liberal patrons of science and art. There is an academy of science and an academy of plastic arts in Munich, which is also celebrated for its rich collections of works of art. The principal occupations of the inhabitants are agriculture and the breeding of cattle; the latter chiefly in the mountainous districts, the former in the plains. Among the chief products are cereals, fodder, potatoes, hops, tobacco, wine (in the Palatinate and in the region of the Main). No less than 10,567 square miles are covered with wood, one-half of which belongs either to the state or to the communities. The culture of the forests is well regulated and profitable. The most active industry is found in the provinces of Middle Franconia, Suabia, and the Palatinate. Prominent among the industrial cities are Augsburg, Kempten, Nuremberg, Fürth, Schwabach, Baireuth, Würzburg, Bamberg, Erlangen, and Hof. The most celebrated branch of Bavarian industry is the brewing of beer. For 1880 the number of breweries was upwards of 5400, which produced annually over 131,000,000 gallons, beer measure. Beer is an important article of export. Bavaria has also flourishing manufactures of linen, woollen, iron, and wooden ware, fifty-one glass-works, manufactories of paper, chinaware, and guns, and celebrated melting-houses at Oberzell. The manufactories of tobacco produce annually about 1200 hundredweight of tobacco and upwards of 30,000,000 cigars. The most important commercial cities are Nuremberg and Augsburg (bills of exchange), Hof, Bamberg, Schweinfurt, Würzburg, Speier, Munich, Ratisbon, Passau (navigation of the Danube). Bavaria had, in 1880, over 1500 m. of railroad and over 2000 m. of telegraph. The navigation of the Danube engaged fifteen steamers and 2000 sailing vessels; that of the Rhine, twelve steamers and 236 sailing vessels; that of the Inn, 2000 vessels. The chief articles of export are, besides beer, corn, wood, cattle, wine, hops; total value of exports, about 50,000,000 florins.

Bavaria is a constitutional monarchy, the fundamental law of the state bearing date of May 26, 1818, and the electoral law now in force having been adopted on June 4, 1848. The crown is hereditary in the male line only, according to the right of primogeniture. The king exercises the administrative power; the legislative he shares with a legislature consisting of two chambers. The upper chamber, or chamber of the Reichsräthe (counsellors of the empire), had, in 1880, 72 members, of whom 51 were entitled to a seat as being chiefs of noble families, and 8 by their office, while 13 were life-members appointed by the Crown. The lower chamber, or chamber of representatives, had, in 1880, 156 members, who are elected for a term of six years. The chambers must be convoked at least once every third year. There are eight courts of appeal, and one supreme court of appeal in Munich. The receipts and expenditures of the state amounted in 1884 to $47,000,000; the public debt to $270,000,000; the civil list and appanages to $1,300,000. The Bavarian army, according to the treaty of Nov. 23, 1870, forms two army corps of the imperial army of Germany under the independent military administration of the king of Bavaria, though under the chief command of the emperor. The capital is Munich; the most important towns next to it are Nuremberg, Augsburg, Wurzburg, Ratisbon, and Bamberg.

Old Bavaria, or Bavaria proper, was originally inhabited by the Boii, a Celtic tribe. Under Augustus it constituted the Roman province of Noricum. During the great migration of nations in the fourth and fifth centuries, the country was occupied by Germanic tribes, from which the confederation of the Boioari arose, which, though governed by its own princes, was dependent upon the kings of Austrasia. At the head of the confederation was the family of Agilolfingians, who are mentioned for the first time in 556, and were deprived of the ducal dignity by Charlemagne in 777. From this time until 911, when the Carlovingian house died out, Bavaria belonged to the Franconian empire. During the following 250 years Bavaria was disturbed by endless civil wars. In 1180 the count palatine, Otto von Wittelsbach, was invested with Bavaria. His descendants, with but short interruptions, have remained the rulers of the country to this day. Two of them were elected German emperors—Louis the Bavarian (as Emperor Louis IV., 1314–47) and the elector Charles (as Emperor Charles VII., 1742–45). From 1255 the country was generally divided between two lines—the counts of the Rhenish Palatinate and the dukes of Bavaria. The electoral dignity repeatedly passed from one branch to the other, until the peace of Westphalia (1648) conferred the fifth electoral dignity permanently upon the dukes of Bavaria, while an eighth electoral dignity was expressly created for the Palatine line. In 1777 the line of the electors of Bavaria became extinct, and the elector of the Rhenish Palatinate, Charles Theodore, became ruler of Bavaria. Austria, however, claimed a large portion of the country, and the weak elector was willing to concede this claim; but Frederick the Great supported the protest of the next agnate, the duke Charles of Zweibrücken, against this arrangement, and thus the bloodless "war of the Bavarian succession" arose, which was ended May 13, 1779, by the treaty of Teschen, which gave to Austria the region of the Inn, with the town of Braunau, and guaranteed the succession in the remainder of the dominions of Charles Theodore to the duke Charles of Zweibrücken. In 1784 the emperor Joseph I. made a new attempt to obtain the whole of Bavaria, by offering to the elector Charles Theodore, in exchange for Bavaria, the Austrian Netherlands, with the title of king; but again the plan was foiled by the opposition of the duke of Zweibrücken and Frederick the Great. Charles Theodore died Feb. 16, 1799, and, as in the mean while the duke Charles of Zweibrücken had died childless, his brother Maximilian IV. Joseph, duke of the Palatinate-Zweibrücken, became elector of Bavaria and the Palatinate. In the history of Germany the dukes of Bavaria are chiefly noted for the leading part which they took in the defence of the Catholic Church against the Reformation. Throughout the sixteenth, seventeenth, and eighteenth centuries they were the heads of the Catholic party among the princes and states of the empire. The elector Maximilian lost in the peace of Lunéville the Zweibrücken Palatinate, but in place of these districts received a number of secularized bishoprics, the change adding to his dominions 2100 square miles, with nearly 200,000 inhabitants. In the war of 1805 the elector joined France against the emperor of Germany, and received a further increase of about 8000 square miles and 800,000 inhabitants. On Jan. 1, 1806, the elector assumed the title of king, and in July of the same year he joined the Rhenish Confederation, which he left again in 1813, in order to unite with the allies against Napoleon. The peace of Paris and that of Vienna regulated the territory of Bavaria as it has remained since, with the exception of a very small district which in 1866 was ceded to Prussia. In 1818 the constitutional form of government was introduced. Louis I. (1825 to 1848), the successor of Maximilian, was a liberal patron of the arts, and at the same time greatly favored the interests of the Catholic Church. His relation to the notorious Lola Montez led in 1848 to disturbances, in consequence of which he abdicated. The support which he had given to the insurrection of the Greeks against the rule of the Turks had secured the election of his second son, Otho, as king of Greece. In Bavaria he was succeeded by his eldest son, Maximilian II. (1848–64), who, like his father, liberally patronized science and art, but in politics had throughout his reign anti-liberal cabinets. In the Sleswick-Holstein question the Bavarian government acted as an ardent champion of the cause of German nationality. Maximilian, who died Mar. 10, 1864, was succeeded by his son, Louis II., who in 1866, in the war between Austria and Prussia, sided with Austria, and at the conclusion of peace had to pay 30,000,000 florins as expenses of war, and to cede a small district to Prussia. At the same time an offensive and defensive alliance was concluded with Prussia. The Catholic party was greatly opposed to the foreign policy of the prime minister, Prince Hohenlohe (appointed at the close of 1866), and still more to the educational and other reforms which he endeavored to introduce. When the new elections in 1869 gave to the Catholic party (the "Patriots") a majority in the second chamber, Prince Hohenlohe resigned (Jan., 1870). The new prime minister, Bray, remained, however, faithful to the treaties with Prussia, and after the outbreak of the war between France and Prussia, Bavaria at once joined Prussia and placed two army corps under the command of the crown-prince of Prussia. In Nov., 1870, the Bavarian government concluded a treaty providing for the entrance of Bavaria into the German empire, and in Jan., 1871, the treaty was ratified by both chambers. King Louis II. died June 14, 1886. Prince Luitpold was made regent during the occupation of the throne by King Otto, the insane successor of Louis II. A. J. SCHEM.

Bawr, de (ALEXANDRINE SOPHIE GOURY DE CHAMPGRAND), BARONESS, a novelist of French extraction, born at Stuttgart in 1776. She became the wife of Saint-Simon, the famous Socialist, who obtained a divorce, although he had no cause for complaint, except that she was not an equal mate for "the foremost man in the world." She wrote several popular works. Died Jan. 1, 1861.

Baxley, on R. R., capital of Appling co., Ga. (see map of Georgia, ref. 6–J, for location of county). Pop. in 1880, 110.

Bax'ter (DE WITT CLINTON), an American officer of volunteers, born in Dorchester, Mass., Mar. 9, 1829, entered the army in 1861 as lieut., and passed through the successive grades to that of colonel of "Baxter's Fire Zouaves" (brevet brigadier-general U. S. volunteers). Wrote "Baxter's Manual and Company Tactics," and was naval officer of the port of Philadelphia 1869–71. D. May 9, 1881.

Baxter (Richard), an eminent divine, born at Rowdon, in Shropshire, England, Nov. 12, 1615. He was not educated at any college. Having been ordained in 1638, he became vicar of Kidderminster in 1640, and gained distinction as an eloquent preacher. He was neutral or moderate in the civil war, being friendly to the Puritans, but favorable to a monarchy. In 1650 he produced the "Saint's Everlasting Rest," which is highly esteemed. At the Restoration (1660) he was appointed one of the chaplains to Charles II., and refused the offer of a bishopric. In consequence of the passage of the Act of Uniformity, 1662, he seceded or was ejected from the Anglican Church. He became a resident of London in 1672, and preached there to a meeting of nonconformists. Among his numerous works are a "Call to the Unconverted" (1669), "Methodus Theologiæ" (1674), and "Catholic Theology." The notorious Judge Jeffries in 1685 fined him 500 marks on a charge of sedition, which was founded on a passage in his writings. For failure to pay the fine he was imprisoned nearly eighteen months. Died Dec. 8, 1691. He was a voluminous writer, having published 168 treatises. (See his "Autobiography," 1696; E. Calamy, "Life of Baxter," 1713; William Orme, "Life and Times of R. Baxter," 1830; August Neander, "R. Baxter, ein Mann der Wahrhaft rechten Mitte," 1833; Macaulay, "History of England," vol. i. chap. iv., and vol. iii. chap. xi.; "Miscellanies," by Wm. R. Williams.)

Baxte'rians, the term formerly applied to the adherents of Baxter's theological system, the doctrines of which were—1, that though Christ died in a special sense for the elect, yet he also died in a general sense for all; 2, the rejection of the dogma of reprobation; 3, that it is possible for even saints to fall away from saving grace. Dr. Isaac Watts and Dr. Philip Doddridge were noted Baxterians.

Baxter Springs, city, on R. R., Cherokee co., Kan. (see map of Kansas, ref. 8-K, for location of county), 159 miles S. of Kansas City, Mo., 1½ miles from the State line. It has lead-smelting works, and is a shipping dépôt for Texas cattle. The principal minerals are lead, zinc, and coal. On the 6th of Oct., 1863, Quantrell, with 600 guerillas, attacked a U. S. escort and encampment of three companies at this place. The escort was dispersed and all the wounded murdered; the attack on the encampment was repulsed. Pop. in 1880, 1177; in 1885, 1240.

Bay [Fr. *baie*], in geography, an inlet of the sea, or a portion of the sea extending into the land. The terms *bay* and *gulf* are vaguely and promiscuously applied to bodies of water of various forms and dimensions. Hudson's Bay, for example, might properly be called a gulf. The word *bay* is generally applied to smaller portions than *gulf*.

Bay, or **Bay Tree,** a name of the laurel tree (*Laurus nobilis*), which is sometimes called sweet bay. The *Prunus laurocerasus* is sometimes called bay laurel. Several other trees are popularly called *bay*. The "sweet bay" of the U. S. is the *Magnolia glauca*, which has fragrant flowers. The "red bay" of the South is the *Persea Caroliniensis*, an evergreen laurel tree with fine red timber. The "loblolly bay" (*Gordonia Lasianthus*) is a fine tree of the Southern States, with mahogany-colored wood. A smaller species (*Gordonia pubescens*) is cultivated at the North as a shrub, and has large and fragrant white blossoms. Some of the rhododendrons and azaleas are called rose bays. The leaves of the bay have long been subjects of popular superstition, and have been used with other evergreens to decorate churches at Christmas. *Bays* in the plural signifies an honorary garland or crown, bestowed as a prize for victory or meritorious action. It is not known what kind of tree is meant by the word in the Bible translated "bay tree."

Bay (Elihu Hall), born at York, Pa., in 1754, was attorney-general of South Carolina in the colonial times, and associate justice of the general sessions and court of common pleas from 1791 until his death. Author of "Reports of Superior Courts of South Carolina since the Revolution." Died at Charleston, S. C., Nov. 19, 1838.

Bay (William V. N.) was born in New York, and afterward became a citizen of Missouri. He was elected Representative from that State 1839–51.

Ba'ya (*Plo'ceus Philippi'nus*), a small East Indian bird of the family of Ploceidæ, and allied to the weaver-bird. It has been called *Loxia Philippina* by some ornithologists. It has a large conical beak. Its color is yellow, spotted with brown. It builds a curious nest, shaped like a Florence flask, and suspended from a small twig of a high branch. The entrance is in the lower part of the nest. The baya can be easily tamed and trained to obey commands.

Bayadere [from Port. *bailadeira*, a "dancer"], a name given by Europeans to the dancing-girls and singing-girls of India, also called nâtch- (or nautch-) girls. They are of two classes, the first of which are called *Dêvadâsî* ("servants of the gods"), and belong partly to the caste of Vaisyas and partly to that of Sudras. Having passed through a course of systematic physical training, and acquired great agility and suppleness of joints, they are employed to sing the praises of some god at festivals, and to dance before his image or in his temple. Those of the higher rank are not permitted to leave the enclosure of the temple, and are forbidden to marry, but they are permitted to accept a lover of one of the higher castes. Dêvadâsîs of the Sudra caste live outside of the temple and have more freedom. There is another distinct class of singing-girls who travel about the country in troops, perform at private feasts, and entertain the people at taverns, etc. by singing and dancing. Their dance is, however, more properly a pantomime.

Baya'mo, or **San Salvador,** a town in the E. part of Cuba, 60 miles N. W. of Santiago, is near the river Cauto. It has eight churches and four schools. Pop. 7411.

Bay'ard (Gen. George D.) was born in New York in 1835, and graduated at West Point in 1856. He entered the U. S. cavalry, and became, after the civil war broke out, colonel of the First Pennsylvania Cavalry. In 1862 he was made brigadier-general of volunteers. He served with the highest honor in the Army of the Potomac, and was killed at the battle of Fredericksburg Dec. 14, 1862, where he fought with the left wing, under Franklin.

Bayard (James Ashton), an American statesman and lawyer, born at Philadelphia July 28, 1767, graduated at Princeton in 1784. He began to practise law in Delaware, and in 1796 became a Federalist member of Congress, in which he attained eminence as an orator. The contest between Jefferson and Burr in 1801 was decided in favor of the former by the votes of Federalists acting under the influence of Mr. Bayard. He was elected U. S. Senator for Delaware in 1804, and remained in that body until 1813. He was one of the commissioners that negotiated the treaty of Ghent in 1814. Died Aug. 6, 1815.

Bayard (James Ashton, second), born in Wilmington, Del., Nov. 15, 1799, graduated at Princeton, was U. S. Senator from Del. (1851–64 and 1867–69), resigning twice this office, to which he was four times elected and once appointed to fill a vacancy. D. at Wilmington, Del., June 13, 1880.

Bayard (Jean François Alfred), a French *littérateur*, born at Charolles Mar. 17, 1796, wrote over 200 popular comedies and vaudevilles, among which were "La reine de seize ans," and "Les gamins de Paris," which was performed with great success 463 times in succession. Died Feb. 19, 1853.

Bayard (Pierre du Terrail), Chevalier, a heroic French knight, called "le chevalier sans peur et sans reproche" ("the knight without fear and without reproach"), was born at Castle Bayard, near Grenoble, in 1475. He was remarkable for his modesty, piety, magnanimity, and his various accomplishments. He served under Charles VIII. in his expedition against Naples in 1494, and distinguished himself at the battle of Tornovo. After the accession of Louis XII. of France, Bayard performed several remarkable exploits in war against the Spaniards and English. In the service of Francis I. he took Prosper Colonna prisoner, and gained a victory at Marignano in 1515. He defended Mézières with success against the invading army of the emperor Charles V. in 1522, and for this important service was saluted as the saviour of the country. He was killed in battle at the river Sesia April 30, 1524, having won the reputation of being a model of nearly every virtue. (See Symphorien Champier, "La Vie et les Gestes de Bayard," 1525; Guyard de Berville, "Histoire du Chevalier Bayard," 1760; Rev. Joseph Sterling, "Life of Chevalier Bayard," 1781; W. Gilmore Simms, "Life of Chevalier Bayard," New York, 1847.)

Bayard (Richard Bassett), son of James A. Bayard, was born at Wilmington, Del., in 1796, graduated at Princeton in 1814, became a lawyer, was U. S. Senator from Delaware (1836–39 and 1841–45), and U. S. chargé d'affaires at Brussels in 1850. Died Mar. 4, 1868.

Bayard (Thomas Francis), LL.D., born at Wilmington, Del., Oct. 29, 1828, in 1869 succeeded his father (J. A. Bayard) in the U. S. Senate, and was re-elected for a second and a third term. Was elected president *pro tem.* of U. S. Senate Oct., 1881. Became U. S. sec. of state Mar. 6, 1885.

Bayazid' (often called **Baj'azet**) **I.,** sultan of the Turks or Ottomans, surnamed Ilderim (*i. e.* "the lightning"), was born in 1347. He succeeded his father, Amurath I., in 1389, and soon conquered Bulgaria, the greater part of Asia Minor, and part of Greece. In 1396 he gained a victory at Nicopolis over Sigismund, king of Hungary, and his allies, the Poles and French. His career of conquest was arrested by Tamerlane (or Timur), who invaded Asia Minor, and defeated Bayazid near Angora in June, 1401. Bayazid was taken prisoner here, and confined until he died Mar. 9, 1403. (See Von Hammer, "Geschichte des Osmanischen Reichs.")

Bayazid II., sultan of the Turks, was born in 1447. He ascended the Ottoman throne on the death of his father, Mahomet II., in 1481. He built many mosques in Constantinople, his capital. He was involved in almost continual wars against the Hungarians, Poles, Persians, and Venetians. He died May 26, 1512.

Bay'berry, the fruit of the bay tree; also the fruit of the wax-myrtle (*Myri'ca cerif'era*), a shrub which produces a kind of wax, sometimes called "bayberry tallow," and used in pharmacy. It has also been employed in making candles. The bayberry grows chiefly along our Atlantic coast, becoming an evergreen tree in the South. It has active medicinal qualities. The wax is found on the outside of the berries, and is obtained by boiling.

Bayborough, N. C. See Appendix.

Bay Bulls, a port of entry and post-town of Newfoundland, 19 miles S. of St. John's; lat. 47° 18′ N., lon. 52° 47′ W. It has an excellent harbor, which is much frequented as a port of refuge. Fishing and agriculture are carried on. Pop. 734.

Bay City, an important R. R. centre, capital of Bay co., Mich. (see map of Michigan, ref. 5–J, for location of county), is on the right (E.) bank of the Saginaw River, 4 miles from its mouth and at the head of navigation. It deals principally in lumber and salt, immense quantities of which are produced. It has excellent schools, two parks, Holly waterworks, and important manufacturing interests. Several lines of steamers connect it with all lake points. The census of 1880 showed 80 manufactories; capital, $1,235,500; average number of hands employed, 2238; wages paid during the year, $802,488; value of products, $5,533,621. Pop. in 1880, 20,693; in 1884, 29,412.

Bay de Verds, an important post-village of Newfoundland, 38 miles N. of Carbonear. It has no harbor, but its codfisheries are among the best in the province, yielding $50,000 worth of fish annually. Pop. 650.

Bayer (Johann), born at Augsburg, Bavaria, about 1572, was a zealous Protestant pastor, but is chiefly noted as the author of the excellent work "Uranometria," containing fifty-one astronomical charts, and followed by explanations in his "Explicatio Caracterum Æneis Tabulis Insculptorum." He introduced the method of designating the stars of a constellation by means of letters, naming the largest star of the constellation by the first letter of the Greek alphabet, and the others, in the order of their brilliancy, by the succeeding letters. Died in 1660.

Bayeux (anc. *Baicas'sæ*), a city of France, in Normandy, and in the department of Calvados, is on the river Aure, 21 miles by rail W. N. W. of Caen. It has manufactures of porcelain, lace, damasks, calico, and leather. Pop. in 1881, 8357. Here is a majestic cathedral which is said to be the oldest in Normandy, in which was preserved for a long time the famous Bayeux Tapestry (which see).

Bayeux Tapestry, a web of canvas or linen cloth 214 feet long by 20 inches wide, on which is embroidered, with woollen threads of various colors, a representation of the invasion and conquest of England by the Normans. According to tradition, it was embroidered by Matilda, the wife of William the Conqueror. Some persons believe that she directed the work, which was performed by her maids or the ladies of her court. It is considered a valuable historical document, as it gives a correct and minute portraiture of the manners and customs of that age and of the Norman costumes. It contains the figures of about 625 men, 200 horses, 55 dogs, 40 ships and boats, and numerous quadrupeds, birds, etc. The tapestry was discovered in the cathedral of Bayeux about 1730, and is now preserved in the hôtel de ville of that place. (See Bruce, "Bayeux Tapestry Elucidated," London, 1855; Ducarel, "Anglo-Norman Antiquities," 1767.)

Bay'field, a port on Lake Huron, at the mouth of Bayfield River, Huron co., province of Ontario, Canada, has an extensive trade in grain and fish. Pop. in 1881, 679.

Bayfield, a post-village, the capital of Bayfield co., Wis. (see map of Wisconsin, ref. 2–C, for location of county), on R. R. and an arm of Lake Superior, 281 miles N. N. W. of Madison. It has an excellent harbor. Pop. of township in 1870, 344; in 1880, 564; in 1885, 735.

Bayfield (Henry Woolsey), a rear-admiral of the British navy, entered the service in 1806, served against the U. S. in 1814 on the great lakes, and surveyed the lakes, the St. Lawrence River and Gulf (1815–27), of which he published valuable charts. D. Feb. 12, 1885.

Bay Islands, a group of small islands in the Bay of Honduras. Ruatan, the largest, is about 30 miles from the N. coast of Honduras. The other islands are named Bonacca, Utila, Barbaretta, and Helena. This group became a British colony in 1854, but in consequence of a protest of the U. S. they were restored to Honduras in 1856.

Bayle (Pierre), a celebrated French philosopher and critic, born at Carlat, now in Ariège, Nov. 18, 1647, was a son of a Protestant preacher. He studied at the College of Toulouse, and was employed for some years as a private tutor at Geneva and Rouen. In 1675 he obtained the chair of philosophy in the Protestant College of Sedan, which was closed or suppressed by the government in 1681. He then became professor of philosophy and history at Rotterdam, and commenced in 1684 a critical monthly review called "Nouvelles de la République des Lettres," which he continued to edit until 1687. Instigated by Jurieu, who accused Bayle of heretical or unsound opinions, the magistrates of Rotterdam deprived him of his professorship in 1693. Bayle was a skeptic, an eloquent advocate of religious liberty, and a very independent thinker. His most important work is a "Historical and Critical Dictionary" ("Dictionnaire historique et critique," 2 vols. folio, 1696), which exercised a great influence over literature and philosophy, and had a European reputation. Bayle was fond of paradox, was a subtle reasoner, a witty writer, and an excellent dialectician. He was amiable, courageous, and disinterested. According to Warburton, he had "a soul superior to the sharpest attacks of fortune, and a heart practised to the best philosophy." Died Dec. 28, 1706.

Baylen', or **Bailen',** a town of Spain, in the province of Jaen, 22 miles N. N. E. of Jaen. It has manufactures of linen, glass, soap, bricks, etc. The Spanish general De Castaños here gained a victory in July, 1808, over the French general Dupont, and took 18,000 prisoners. Pop. 10,041.

Bay'ley (Most Rev. James Roosevelt), D. D., a grandson of Dr. Richard Bayley and nephew of Mother Seton (who founded the original American congregation of Sisters of Charity), was born in New York City Aug. 23, 1814, graduated at Trinity College, Hartford, Conn., in 1835, was for a time a clergyman of the Protestant Episcopal Church, but became a Roman Catholic, studied theology in Paris and Rome, and was ordained a priest in 1842. He became professor of belles lettres at St. John's College, Fordham, and was its president (1845–46). In 1853 he became bishop of Newark, N. J., and in 1872 archbishop of Baltimore, Md. He has published "Memoirs of Bishop Bruté" and other works. Died at Newark, N. J., Oct. 3, 1877.

Bayley (Richard), an American physician, born in Fairfield, Conn., in 1745, began the practice of medicine in 1772. He introduced a new method of treating the croup, which was extensively used. He became in 1793 professor of surgery in Columbia College, N. Y., and was the first health officer of New York. Died Aug. 17, 1801.

Baylies (Francis), born at Taunton, Mass., Oct. 16, 1783, received an academical education and practised law in his native town; was member of Congress 1821–27; member of Massachusetts legislature 1827–32 and 1835; register of probate 1812–20, and *chargé d'affaires* to Buenos Ayres 1832. He wrote a history of Plymouth colony. Died Oct. 28, 1852.

Baylies (Nicholas), born at Uxbridge, Mass., in 1772, graduated at Dartmouth in 1794; practised law at Woodstock and Montpelier, Vt., and was a judge of the Supreme Court of that State 1831–34. Died at Lyndon, Vt., Aug. 17, 1847.

Baylies (William), M. D., born at Uxbridge, Mass., Dec. 5, 1743, graduated at Harvard in 1760; practised medicine many years at Dighton, Mass., of which town he was a representative; member of the three provincial congresses of Massachusetts and of the State convention which adopted the federal Constitution; State senator 1783; was for a number of years a judge of the court of common pleas for Bristol co., Mass., and register of probate for that county; member of Congress 1805–09, member of Academy of Arts and Sciences, of Massachusetts Historical Society, and one of the founders of the Massachusetts Medical Society. Died at Dighton, Mass., June 17, 1826.

Baylies (William), son of the preceding, born at Dighton, Mass., Sept. 15, 1776, graduated at Brown University 1795; admitted to the bar 1799; member of Massachusetts legislature 1830–31; member of Congress 1813–17 and 1833–35. Died at Taunton, Mass., Sept. 27, 1865.

Baylor (Walker Keith), a native of Kentucky, settled in 1830 in Alabama, where he engaged in the practice of law. He entered the Senate in 1841, and in 1843 he was appointed judge of the third circuit, which position he held until the fall of 1845, when he was killed accidentally. He was very fond of astronomy.

Baylor University. This institution is situated at Independence, Washington co., Tex. It is 12 miles from the Brazos River, 12 miles from Brenham, on the western branch of the Houston and Texas Central R. R., and 18 miles from Navasota, on the main trunk of the same road. It is 4 miles from Clay, on Gulf Colorado and Santa Fé R. R., Montgomery branch, and 10 miles from Gay Hill, on its main trunk. The vicinity is beautifully diversified by prairie, hill, valley, and live-oak groves. The village of Independence is near the centre of population, wealth, commerce, and railroads in the State. The university was chartered by the republic of Texas in 1845. One-third of its trustees are annually chosen by the Baptist State convention of Texas. It owns nearly 700 acres of good land. The whole endowment will not exceed $16,000; value of buildings, $60,000; libraries, 3700 volumes. The course of study is modelled after that of the University of Virginia. It is complete and thoroughly prosecuted. Whole number of students entered since 1845, 2700; college graduates, 75; law graduates, 31; law professors, 2; college officers, 8; whole number of students, according to last catalogue, 126. Its presidents have been the Rev. Henry L. Graves, Rev. Rufus C. Burleson, D. D., Rev. George W. Baines, Rev. William Carey Crane, D. D., LL.D. The president at this time, Dr. Crane, has been in office since July, 1863. Efforts promising entire success are now in progress fully to endow all the chairs, and otherwise to promote the efficiency of the institution. At the recent Baptist State convention at San Antonio it was resolved to raise $100,000 immediately, and A. W. Dunn, Esq., of Colorado City, gave $10,000 of the sum. Hon. R. E. B. Baylor, LL.D., former member of Congress from Alabama, and for twenty-five years a judge in Texas, gave name to the university.

Bay′ly (Lewis), bishop of Bangor in Wales, is worthy of mention as the author of "The Practice of Piety," one of the most popular religious books ever written. It is mentioned by Bunyan as one of the books owned by his wife. In 1714 it had passed through fifty-one editions in England, besides several translations published in foreign lands. Bayly was born at Caermarthen, educated at Oxford, and consecrated as bishop in 1616. He died in 1632. He must not be confounded with Thomas Bayly, Anglican bishop of Killala in Ireland, who died in 1670.—Bishop Lewis Bayly had a son Thomas, who became a zealous Roman Catholic, and published "The End of Controversy" (Douai, 1654), besides other works.

Bayly (Thomas Haynes), an English *littérateur*, born in 1797 near Bath, was the son of a wealthy solicitor, and was educated at Oxford. He married in 1826, and in 1831 lost his fortune, and was thrown into poverty. He entered with the greatest industry upon a literary life, composing numerous plays, novels, and poems. He is best known by his very numerous songs, some of which will always be popular, though few are of a very high literary order. Among them are "Oh no, we Never Mention Her," "The Soldier's Tear," and "Why Don't the Men Propose?" He died Apr. 22, 1839.

Bayly (Thomas Henry), an American lawyer, born in Accomac co., Va., in 1810, graduated at the University of Virginia, and was a judge in the State courts. He became a member of Congress in 1844, and was chairman of the committee of ways and means in several sessions. Died June 22, 1856.

Bayn′am (William), an American surgeon and anatomist, born in Virginia in 1749, was educated in England, where he long resided. He performed many difficult operations with success. Died Dec. 10, 1814.

Baynes (Robert Hall), Anglican bishop of Madagascar, was born at Wellington, Somersetshire, England, Mar. 10, 1831. He was educated at Bath and at St. Edmond's Hall, Oxford, where he took his master's degree in 1859. He received a number of English church preferments, and in 1870 became bishop of Madagascar, now a Protestant Christian nation. He is the author of numerous religious works, among which are a "Book of Common Praise" (1863), "Lyra Anglicana," "Autumn Memories and other Verses" (1869), and "Sermons."

Bay of Islands, a large bay of the W. coast of Newfoundland. It abounds in islands, and its scenery is very fine. Good timber, gypsum, and marble abound. About 30,000 barrels of herring are annually taken here, besides cod and other fish. Agriculture is pursued to some extent. Pop. of settlements, 947.

Bay′onet [Fr. *baïonette*], so called, it is said, because invented or first used at Bayonne, in France, about the middle of the seventeenth century. It was originally a triangular-shaped blade, to be screwed into the muzzle of the musket, and used by infantry as an offensive or defensive weapon. Previous to its introduction pikemen formed a portion of an army, but, though retained in service to some extent till near the middle of the eighteenth century, the bayonet finally superseded them. By the original arrangement the musket could not be discharged while the bayonet was fixed; this contrivance was improved upon at a later day, and the bayonet was fitted exteriorly to the piece, thus permitting it to be fired without unfixing the bayonet. The French were undoubtedly the first to use the bayonet, and the first infantry charge made with this weapon was at the battle of Spire in 1703. Various modifications have been made in the mode of fastening the weapon, as well as in its shape. Among other forms is the "sabre" bayonet; the latest improvement being the "trowel" bayonet, capable of being used by infantry as a spade in throwing up earthworks, as well as in making or resisting a charge.

Bayonne, bå-yonn′ (anc. *Lapur′dum*), a fortified city of France, near its S. W. extremity, in the department of Basses-Pyrénées, on the river Adour, about 3 miles from the Bay of Biscay and 66 miles W. N. W. of Pau; lat. 43° 29′ N., lon. 1° 29′ W. It is pleasantly situated near the foot of the Pyrenees, at the mouth of the river Nive, and is well built. It has an old cathedral, a citadel built by Vauban, a mint, a theatre, and schools of commerce and navigation. Here are shipyards, glass-works, sugar-refineries, and distilleries. The chief articles of export are timber, tar, corks, liqueurs, hams, etc. Here occurred an interview between Charles IV. of Spain and Napoleon I., who extorted from the former and his son a renunciation of the crown in 1808. Pop. in 1881, 26,261.

Bayonne, N. J. See Appendix.

Bayou, bī′oo [supposed to be corrupted from the French word *boyau*, a "bowel" or "gut," and hence signifying "channel"], strictly means a stream which is not fed by springs, but flows from a lake or other stream. It is very often used in the Southern U. S. as synonymous with "creek," and for tidal channels.

Bayou Sara, La. See Appendix.

Bayr′hoffer (Karl Theodor), a German philosopher, born at Marburg in 1812, became in 1838 professor of philosophy in his native town, but in 1850 was forced to go to the U. S. He advocated the doctrines of Hegel, and wrote, among other works, "Idee des Christenthums" (1836) and "Idee und Geschichte der Philosophie" (1838).

Bay Rob′erts, a port of entry of Newfoundland, 8 miles S. of Harbor Grace, on Conception Bay. Its inhabitants are chiefly engaged in the Labrador fisheries. It is visited by regular lines of coasting steamers, and has considerable imports. Pop. about 1000.

Bay Rum (*Spiritus myrciæ*, U. S. P.), a fragrant liquid obtained by distilling with rum the leaves of the *Myrcia acris*, and probably of other trees of the genus. These are large trees growing in Jamaica and other West India islands, and belonging to the Myrtaceæ. Bay rum is imported in large quantities, and is used as a perfume and as a cosmetic.

Bay Saint Louis, city, on R. R. and Mississippi Sound, Gulf of Mexico, capital of Hancock co., Miss. (see map of Mississippi, ref. 10–G, for location of county). Pop. in 1880, 1978.

Bay Win′dow, sometimes corrupted into **Bow Window,** a window which projects outward from a room, and often occurs in Gothic architecture. The external walls of such windows are generally polygonal or semicircular. The lower end of bay windows is often nearly on a level with the floor of the room. They are frequently supplied with a seat called a *bay stall*.

Ba′za (anc. *Basti*), a city of Spain, in the province of Granada, about 52 miles N. E. of Granada, is in a fertile plain. It is famous for its red wine. In 1489 it was taken from the Moors by the Spaniards after a long siege. The French marshal Soult here defeated the Spaniards Aug. 10, 1810. The principal trade of the place at present is in hemp. Pop. 12,992.

Bazaar′, or **Bazar,** an Oriental market-place, either open or covered with a roof; an Oriental assemblage of shops in which goods of various kinds are exposed to sale. Each bazaar is occupied by a number of retail traders, and is often divided into streets or passages having on each side a row of small shops, stands, or counters. The term is also applied in European and Western cities to a hall or suite of rooms fitted up with counters or stands for the sale of goods (mostly fancy articles).

Bazaine (François Achille), born at Versailles Feb. 13, 1811, and, after passing through all the intermediate grades, marshal of France Sept. 5, 1864. The son of a prominent and wealthy officer, he could have readily obtained an officer's commission, but he declared it his pride to seek his marshal's bâton from the knapsack in which for "every French soldier" the proverb potentially places one; and that bâton, when found, bore the inscription "Simple soldat en 1831, Maréchal de France en 1864."

His campaigns are thus stated: Africa—Constantina and Oran, 1833, 1834, 1835 (first half). Spain—1835 (second half), 1836, 1837, 1838. Africa—Algiers and Oran, 1840, 1841, 1842, 1843, 1844, 1845, 1846, 1847, 1848, 1849, 1850, 1851, 1852, 1853, 1854 (first half). Crimea—1854 (second half), 1855, 1856. Africa—1857. Italy—1859, 1860. Mexico—1862, 1863, 1864, 1865, 1866, 1867 (first half). Army of the Rhine—1870. Total 35 years of active service, of which 32 in campaigns, in the course of which he received six wounds or contusions. In the Legion of Honor he was Knight (Nov. 22, 1835), Combat of La Macta (Africa); Officer (Nov. 5, 1845), Combat of Sidy Kafir; Commander (Aug. 16, 1856), Taking of Kinburn (Crimea); Grand Officer (June 20, 1859), Combat of Marignan (Italy); Grand Cross (July 2, 1863), Battle of San Lorenzo (Mexico); Military Medal (April 28, 1865), Storming of Oajaca (Mexico); Medals of the Crimea, Italy, and Mexico.

On the breaking out of the war with Prussia Marshal Bazaine, who had expected the command of one of two powerful armies destined to the invasion of Prussia, in accordance with plans which had been prepared by the late Marshal Niel, found himself, in consequence of the sudden and unexpected decision of the Emperor to unite all the forces in the single "Armée du Rhin," in command of only a single corps. The disasters of Woerth and Forbach, compelling the Emperor to relinquish the command, and his sole competitor, MacMahon, being put *hors de concours* by his recent defeat, Marshal Bazaine on the 13th of August succeeded to the command of the Army of the Rhine. Reorganization and concentration compelled a falling back upon Metz, and thence upon Verdun, where the shattered commands of MacMahon's corps and the reserves of France were being concentrated. The execution of the resolution, too tardily taken, was, in consequence, further delayed by the battle of Borny (Aug. 14), brought on by the Prussians for that sole purpose. In continuing the retreat through Metz his columns were vigorously attacked by the Prussians, and the battle of Rézonville (Gravelotte) resulted. Undertaken by the advanced Prussian troops hastily thrown over the Moselle above Metz, solely to disorder and delay the French march, the attack was successfully repulsed, and, to the French, "the moment had arrived to strike a great blow and to resume the offensive, ... to drive back the Prussians in disorder upon the Moselle." Before evening, however, the Prussians had been so greatly reinforced as to recover their position and resume the offensive conflict, but with the advantage, on the whole, on the French side. There was yet opportunity to continue the march on Verdun, but the Marshal spent the next day in forming a line of battle from Rozereuilles to St. Privat, with his back on Metz, while the Prussians were allowed, unmolested, to march across his front to form their line. The battle of St. Privat was fought defensively in position, on the 18th, without an order from the Marshal,[*] or a reinforcement to, or change in, the position of any part of the French line. The French left and centre were strongly posted—the right "dans l'air" at St. Privat. Without natural obstacles on which to rest, powerful artillery alone could have given to it adequate power of resistance. It was held by the 6th Corps (Canrobert's), which corps, alone, was deficient in its complement of artillery. The Guards (Bourbaki's) and Reserve artillery were stationed in ravines in the rear. The French effective force was 150,000 men—Prussians (eight corps) 240,000. That the Prussians, unsuccessful and even disastrously repulsed on the French left and centre, and at liberty to use their immense force where weakness exhibited itself, should, failing elsewhere, finally concentrate their artillery fire (272 guns) and their infantry masses (three corps, 80,000 men) on the French right, is natural; but not so, that the guard and reserve artillery should lie idle while the French right was overwhelmed and driven back (4th and 6th corps) disorganized, upon Metz and the Moselle. The remainder of the army, which had held its strong positions, was withdrawn the next day into the intrenched camp in which ten weeks later it was destined to lay down its arms.

But it is an error to say that Bazaine was *shut up* in the intrenchments of Metz. No portion of the Marshal's army was within the *enceinte* of Metz; and the new and (incomplete) advanced detached works *favored* rather than obstructed egress. The question is can an army of 200,000 men or less, "shut up," in an intrenched camp *any more than in open field*, another of nearly equal numbers? If, in open field, an army gives time and opportunity to its adversary to encircle it with intrenchments, such is their defensive capability with modern arms, that egress, even with equal numbers, *may* become impracticable; and the lines thrown up around Metz (see paper of Lt.-Col. Schaw, R. E., *Jour. U. S. Inst.*, No. 76) may ultimately have become too strong to be successfully assailed. On the other hand, the loss of *morale* and the resulting loss of confidence in the leaders may perhaps account for the few and futile attempts at sorties (Ml. Canrobert testifies that as late as Oct. 15 vigorous sorties could have been made); for the failure to cooperate with the movement of MacMahon on Sedan, the plea of failure to receive despatches announcing it, is put forward, and credibly substantiated.

His attempt to negotiate with the Prussians through the Empress at Hastings must be judged of by his own language at his trial: "My position was unprecedented. I was, in a certain sense, my own government. The duties of a military chief when a legal government exists are strictly defined. I by no means admit that to be the case in presence of an insurrectionary government. There was then no government; there was nothing;" coupled with the comment of the duc d'Aumale, "What! *France*, then, no longer existed?"

Thus exhausting the last days in which action was possible, the marshal surrendered on the 27th Oct., 1870, an army of 160,000 men, Metz, "la Pucelle," and its fortifications, and 1800 pieces of artillery.

He was arraigned Oct. 10, 1873, before a court consisting of the duc d'Aumale (president), General de la Motte Rouge, Baron de Chabaud-Latour, Generals Tripier, Martimprey, Princeteau, and Martinez-Dechesnez, charged:

First—Of having capitulated with the enemy, and surrendered the fortress of Metz, of which he had the superior command, without having exhausted all the means of defence.

Second—Of having, as the head of the army before Metz, signed a capitulation in the open field, the result of which was to cause his troops to lay down their arms; and of not having, before treating verbally and by writing, done everything which he was bound to do by duty and honor—offences provided for and punished by articles 209 and 210 of the Code of Military Justice.

After a trial of two months' duration he was unanimously pronounced guilty, sentenced to be degraded and shot, with equally unanimous recommendation that the sentence should not be carried into execution, in terms substantially as follows: "As jurymen, our conscience alone must guide us, and as judges it has been our duty to apply an inexorable law. The marshal, however, received the command of the army under the most unfortunate circumstances, and the court cannot forget that under fire he was always equal to himself; that at Borny, Gravelotte, and Noisseville no one surpassed him in bravery; and that on 16th of Aug. (Gravelotte) he maintained the centre of his line of battle by the firmness of his attitude. Neither can the army forget the glorious services rendered by the Volunteer of 1831."

His sentence was promptly commuted by President MacMahon to twenty years' imprisonment in a fortress, without military degradation.

In conclusion I venture to use the words of Niemann's military description of the French campaign. "The conduct of the marshal at Metz roused the conjecture that he wished to act not only as a general, but as a statesman; that he wished independently to make military action accord with political events; that even he believed he could pursue his own ambitious views, and at the same time the interests of France. The temptation of playing an important political *rôle* in the general overthrow of existing affairs, while at the head of the largest military body which France possessed, no doubt came home to the ambitious Bonapartist general."

That his conduct of the military operations from Aug. 13 to Aug. 18 was inefficient; that his so-called sorties had scarce the energy in them to reveal a serious intention to go out; that he allowed himself to waste the last precious days of his army's efficiency in what were futile—and some would call treasonable—attempts to negotiate with the empress; and finally crushed the rising—the *last*—hopes of France by a premature surrender at the very moment when a protraction might have modified the history of the war, must, I think, be the conviction of all who have impartially studied his career.

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[*] "In a combat where the enemy arrayed nearly two-thirds of the force with which he had invaded France, the general artillery reserve was left in its camp at more than 6 kilimeters distance, the cavalry of the Guard did not put foot to stirrup, the heavy cavalry remained at Longueville (a suburb of Metz), and as to the infantry of the Guard, it lay without orders till 6 P. M. at more than a league from the field of battle." (*Metz, Campagne et Negotiations.*)

On the 9th of Aug., 1874, Bazaine, aided by his wife, escaped from his fortress prison, Ilé St. Marguerite, pleading in justification (*Letter addressed to the Minister of War*), while alleging that "respect for the military uniform which he has very honorably worn for nearly half a century" would have deterred him from this step but for the "humiliating régime to which he was subjected, from which his past career ought to have saved him," that maxim of public law, that "no sentence is legal unless pronounced by the peers of the accused." In Jan., 1886, he was living in Madrid, Spain, in great poverty. J. G. BARNARD.

Bazalgette (JOSEPH WILLIAM), C. B., an English civil engineer of French descent, was born in 1819. He has won great fame in the construction of sewers, street alterations, and other departments of city engineering. As engineer-in-chief to the Metropolitan Board of Works, London, he has constructed many hundreds of miles of sewers and river embankments, and has introduced subterranean passages for the carrying of gas and water pipes and telegraph-wires, so that it is not necessary to break up the pavements for repairs.

Bazancourt, de (CÉSAR), BARON, a French historian, born in 1810, wrote a "History of Sicily under the Norman Rule" (2 vols., 1846), histories of the Crimean, Italian, Chinese, and Cochin-Chinese wars of Napoleon III., a treatise on Fencing, and many novels. Under Louis Philippe, De Bazancourt was a director of the library of Compiègne, and under Napoleon III. he was official historiographer. Died at Paris Jan. 25, 1865.

Bazard (AMAND), the founder of French Carbonarism, was born in Paris Sept. 19, 1791. He organized societies of Carbonari about 1820, and afterwards became a disciple of Saint-Simon the Socialist, and editor of the "Producteur," a Saint-Simonian journal. After the death of Saint-Simon (1825), Bazard and Enfantin were the chief priests of the sect, and they published an "Exposition of the Doctrine of Saint-Simon" (1828–30). Bazard became disgusted with the extreme innovations of Enfantin (who advocated a community of wives), and he seceded from the sect in 1831. Died July 29, 1832. (See MICHAUD et VILLENAVE, "Histoire du Saint-Simonisme," 1847.)

Bazin' (ANAÏS DE RAUCOU), born at Paris in 1797, was an historian and a lawyer. Wrote "History of France under Louis XIII." Died 1850.

Bazin (ANTOINE PIERRE ERNEST), a French dermatologist, born Feb. 20, 1807, at St. Brice, came of a long line of medical men. In 1847 he became physician and professor of dermatology in the hospital of St. Louis, Paris. He has written able works on venereal and skin diseases.

Bazin (ANTOINE PIERRE LOUIS), a brother of the preceding, born Mar. 26, 1799, was a professor of the Chinese language, and published in 1856 a grammar of the Mandarin dialect. He also made many translations from the Chinese. Died in Jan., 1863.

Baz'ley (SIR THOMAS), BART., was born at Gilnow, Lancashire, England, in 1797. He learned cotton-spinning in his youth, went into business on his own account at Bolton in 1818, and removed in 1826 to Manchester, where his manufactory of fine cotton and lace thread was the largest in the world, employing more than 1000 persons, for whom he established schools, free lectures, and reading-rooms. An early anti-corn-law man and free-trader, he became a prominent liberal politician, first entering Parliament in 1858. In 1862 he retired from business, and in 1869 became a baronet.

Bdel'lium [Gr. βδέλλιον], a gum-resin resembling myrrh, but weaker and more acrid, was esteemed by the ancients for its supposed medicinal virtues. It is not often used by modern physicians. Two varieties of bdellium are obtained from the *Amyris commiphora* of India and the *Heudelotia Africana*, a tree or shrub of Senegal. It is used in both human and veterinary pharmacy in India, and for incense in temples.

Beach (ABRAHAM), D. D., a Protestant Episcopal divine, was born at Cheshire, Conn., Sept. 9, 1740, graduated at Yale College in 1757, and was ordained by the bishop of London in 1767. He was until 1783 rector of a church at New Brunswick, N. J., and afterwards an assistant minister of Trinity church, N. Y., for thirty years (1783–1813). He was the author of some religious works. In his last years he was a farmer in New Jersey. The degree of D. D. was conferred upon him by Columbia College in 1789. He was a strict Episcopalian, and opposed the liberalism of Bishop White. Died Sept. 11, 1828.

Beach (JOHN), a Protestant Episcopal divine, born in 1700, graduated at Yale in 1721, and was for some years Congregational minister of Newtown, Conn. He conformed in 1732, was ordained by the bishop of London, and was for fifty years a minister of the English Church in Connecticut. He published sermons and polemical tracts. Died Mar. 8, 1782.

Beach (JOHN WESLEY), D. D., LL.D., an able preacher of the Meth. Episcopal Church, was born at Trumbull, Conn., Dec. 26, 1825, graduated in 1845 at Wesleyan University, Middletown, Conn., was for nine years a teacher, and in 1854 entered the ministry. His labors have been mostly in New York City and vicinity. In 1872 he received the degree of D. D. from his *alma mater*, in 1873 became pastor of a church in New Haven, Conn., and in 1880 president of Wesleyan University, Connecticut.

Beach (MOSES YALE), an American inventor and publisher, born at Wallingford, Conn., Jan. 7, 1800. He learned the trade of a cabinet-maker in youth, and afterwards experimented in machines for propelling balloons. He invented a rag-cutting machine, now in general use in paper-mills. In 1835 he became interested in the "New York Sun," and is regarded as a pioneer in the penny newspaper business. In 1857 he left his profession and retired to his native town, where he died July 18, 1868.

Beach Plum, the *Prunus maritima*, a shrub of the order Rosaceæ, growing along the sea-beaches of the Atlantic coast of the U. S. It bears an edible fruit, sometimes not much smaller than that of the cultivated plum, which it resembles. Away from the sea-shore it degenerates.

Beach'ville, a post-village of Oxford co., Ontario, Canada, on the Great Western Railway and the river Thames, 4 miles from Woodstock, has three churches, manufactures of lumber, linen, cordage, machinery, castings, flour, etc., and an extensive trade. Pop. about 700.

Beach'y Head, the highest headland on the S. coast of England, 2½ miles S. S. W. of Eastbourne, Sussex. It consists of perpendicular chalk cliffs 564 feet high, forming the E. end of the South Downs. Here is a lighthouse 285 feet high. The French fleet defeated the Dutch and English near this point in 1690.

Bea'con. The Anglo-Saxon root is the same as that of the noun *beck* and the verb *beckon;* hence the word implies something which constitutes a significant sign or signal. Before other means of *rapid* telegraphy were invented, *fires*, kindled on the tops of mountains or prominent points of the coast, were an obvious resort as alarm-signals, giving warning of the approach of hostile fleets or armies. So, too, as a guide to mariners, to whom the dangers of a contiguous coast are enhanced by darkness, blazing fires or "lights" of some kind (see LIGHTHOUSE) were ever the most obvious *beacons;* hence a "fiery signal" is associated with the classic signification of the word. The word *beacon* (in a special signification) is now almost exclusively restricted to the last-mentioned uses, denoting a mark or sign erected on coasts for guiding and preserving vessels at sea by night or by day. Practically, it is still further restricted by being divested, almost entirely, of reference to "light" or "fire," and applied to fixed structures or material marks erected on rocks or shoals in harbors or narrow channels; nevertheless, a small light-tower erected for no other than this limited purpose is sometimes called a "*beacon-light*" (as distinct from the lighthouse proper); while fixed *un*-illuminated signal structures are called "*day*-beacons." J. G. BARNARD.

Beaconsfield (LORD). See DISRAELI.

Bead, or **Bede,** in Anglo-Saxon and Old English signified a prayer, and hence the small perforated balls, of whatever material, used for keeping an account of the number of prayers repeated. Beads are small perforated globular bodies worn as ornaments by women and children around the neck and on other parts of the person, for which purpose they are arranged on strings. They are made of various materials—gold, amber, coral, pearl, crystal, glass, etc. More beads are made of glass than of any other material. They are often used in the ornamentation of slippers, purses, and other articles. The ancient Egyptians understood the art of making glass beads, which are now extensively manufactured at Murano, near Venice, and in China. There are three kinds of beads—the hollow, the common, and the bugle.

Beadle (WILLIAM HENRY), b. at Liberty, Park co., Ind., Jan. 1, 1838, was educated at Rockville and in the University of Michigan; entered the army in 1861 as first lieutenant of the Thirty-first regiment of Indiana infantry; served throughout the whole war, and was in 1864 brevetted a brigadier-general. After the war he studied law and began to practise in Wisconsin, when, in 1869, he was appointed U. S. surveyor-general over the Territory of Dakota. Since that time he has devoted his whole energy to the development, material as well as moral, of the Territory, as a member of the legislature, and more especially as superintendent-general of public instruction (since 1879), in which last position he succeeded in organizing the whole school system of the Territory.

Bea'gle, a small variety of hound, formerly employed in England for hunting hares, but now nearly supplanted by the harrier. The beagle is about ten inches high at the shoulder, is compactly formed, and has long pendulous ears and smooth hair. It is remarkable for its keenness of scent and perseverance. During the chase it utters a musical cry. A small variety is used as a lap-dog.

Beak [Lat *ros'trum;* Fr. *bec*], the bill of a bird; in other words, the hard, horny mouth of a bird, consisting of two parts, called the upper and lower mandible. (See BILL.) The term was also applied to a pointed piece of wood fortified with metal, and fastened to the fore end of ancient galleys and modern steam-rams, in order to pierce the vessels of the enemy.

Bea'ker, a name formerly given to a kind of drinking-bowl or cup, derived from the same root as the German *becher*, the Italian *bicchiere*, or the barbarous Latin *baccarium*. The name is now applied to a glass vessel used in chemical laboratories.

Beale (LIONEL SMITH), F. R. S., an accomplished English microscopist and physiologist, born in 1828, graduated M. B. at the University of London in 1851, in which institution he was afterwards appointed professor. Many remarkable books and monographs upon histology and biology have been published by Dr. Beale. His papers written against the Darwinian hypothesis (1870) have attracted much attention. Among his numerous works are "How to Work with the Microscope" (1858), "The Structure of the Tissues of the Body" (1861), "Protoplasm" (1870).

Beam [Ger. *Baum*, a "tree"], any large piece of timber; the principal piece of timber in a building, that lies across the walls and serves to support the rafters; also a collection of luminous rays emitted from the sun or other luminary. The word has several technical applications. The part of a balance from the ends of which the scales are suspended is called the beam; a weaver's beam is a wooden cylinder on which the web is wound. The term is also applied to the part of a steam-engine to which the piston is attached. In ships, a beam is a great main cross-timber, extending across the hull, supporting the deck, and preventing the sides from collapsing. Each of these beams is made of one solid piece of good timber, if possible, and is upheld at or near the middle by a pillar or pillars. In large steamships iron beams are often used instead of wood. A ship is said to be "on her beam ends" when so much inclined to one side that the beams become nearly vertical. The word also occurs in the phrase "on the starboard beam," which is applied to the position of an object at sea which is seen towards the right by a person whose face is turned towards the bow. (See FLEXURE OF BEAMS.)

Beaman (FERNANDO C.). See APPENDIX.

Beams'ville, a post-village of Clinton township, Lincoln co., Ontario, Canada, on the Great Western Railway, 11 miles W. of St. Catharine's, has manufactures of farming tools, carriages, etc. Pop. in 1881, 685.

Beam Tree, White (*Py'rus A'ria*), a tree which is a native of Europe and Asia, grows to the height of from twenty-five to forty feet. It has ovate and serrate leaves, which are white and downy beneath, flowers in terminal corymbs, and bears a scarlet fruit about as large as a pea. This fruit, which is sometimes called sorb or service-berry, is acid and astringent, and is used to make beer. The hard, fine-grained wood is useful for cog-wheels.

Bean (*Fa'ba*), a genus of annual herbaceous plants of the order Leguminosæ, sub-order Papilionaceæ, was included by Linnæus in the genus *Vicia*, from which it may be distinguished by its leathery, tumid pods and a large scar on the end of the seed. The common European bean (*Faba vulgaris*) has been cultivated in Asia and Europe since the earliest ages. It has pinnate leaves, without tendrils, and fragrant flowers. The seeds, which are nutritious food, are enclosed in long pods which are woolly on the inside. Many varieties of this species are cultivated in gardens and fields, and are used as food for men, cattle, swine, etc. This plant prefers a dry and moderately rich soil. Garden beans are planted in the spring in rows. The kidney-bean or haricot (*Phaseolus vulgaris*) is a totally distinct plant from the proper bean. The beans cultivated for use in America are of various species of *Phaseolus*. Flowering beans are grown almost exclusively for ornament, and are known as "scarlet runners" or "white runners," being profuse in beautiful flowers and not very prolific bearers. They are edible, but not of such delicate flavor as to be recommended for that purpose.

Bear [Lat. *ur'sus*, female *ur'sa;* Ger. *Bär*], a genus of quadrupeds of the order Carnivora and tribe Plantigrada, is the type of the family of Ursidæ. Bears walk on the soles of their feet, have five toes on each foot, and have claws which are not retractile, but are adapted for digging in the earth or climbing trees. Their tails are very short. They have six cutting teeth in each jaw, and one canine tooth on each side in each jaw. Bears are found both in warm and cold climates in Europe, Asia, and America, but they are not known to live in Africa. The species that inhabit cold climates are generally more fierce and carnivorous than those of tropical regions. Some species pass the winter in a state of torpidity and hibernation, during which they eat nothing and remain stationary in hollow trees or holes in the ground.

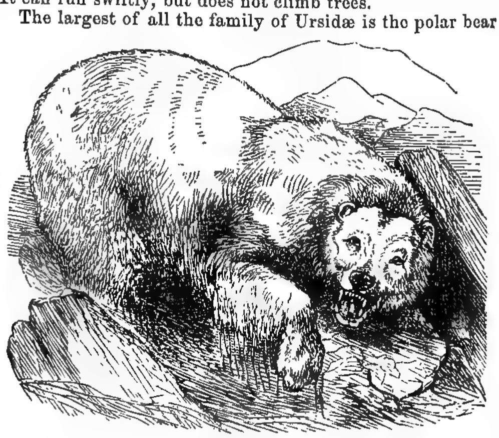
The brown bear (*Ursus arctos*) is widely distributed over the continents of Europe and Asia, but it has been extirpated from the British Islands. It is generally believed to be the only European species. It is solitary, infests mountains and forests, eats fish and other animals, and subsists partly on fruits and vegetable food. The flesh of this bear is eaten by the people of Kamtchatka and other regions.

The black bear (*Ursus Americanus*) is found in all parts of North America. Its total length is about five feet. It prefers vegetable food, but when pressed by hunger will kill and eat small animals. It kills its prey by hugging or squeezing with its fore paws. Great numbers of black bears are killed for their skins, which have a smooth, glossy fur, and are valuable for cloaks, caps, etc. This animal is an expert climber, is very fond of honey and green corn (maize), and is less fierce and dangerous to man than the brown bear.

The Rocky Mountains and adjacent parts of North America are infested by the grizzly bear (*Ursus ferox* or *horribilis*), which is much larger and more carnivorous than the black bear. It sometimes measures nine feet from the nose to the tail, which is very short. The hair is long, and its color is a mixture of brown, white, and black. This bear, which is very tenacious of life, is the most formidable beast of prey on the continent of America. It is able to master a buffalo (bison) and carry away its huge carcass. It is stated that it hunts for prey both by day and night. It can run swiftly, but does not climb trees.

Grizzly Bear.

The largest of all the family of Ursidæ is the polar bear (*Ursus maritimus*), called also the white bear, the fur of


Polar Bear.

which is an impure white. It sometimes measures nearly ten feet long and five feet high. It is strictly marine in its habits, is never found far from the sea, and inhabits the most northern shores of Greenland, Asia, etc. It subsists chiefly on animal food, and pursues seals and fishes both on the ice and in the water. These bears display a remarkable affection for their cubs. It has not been ascertained whether the polar bear usually hibernates or not.

The bear mentioned in the Bible was probably the Syrian bear (*Ursus Syriacus*), which resembles the brown bear in its habits, and has a stiff mane of erect hairs between the shoulders. The color of its hair is mostly dingy white or brown. Among the other species is the *Ursus labiatus*, or long-lipped bear of the East Indies, an inoffensive and gentle animal, which is often led about by Indian jugglers for exhibition. Among the Andes of Chili occurs the *Ursus ornatus*, called spectacled bear, which is black except two semicircular yellow marks above its eyes. Remains of several extinct species of bears have been found in caves in England and Germany. Of these, *Ursus spelæus*, called the cave bear, is the best known. It is now thought that the "cave bear" was identical with *Ursus horribilis*, the "grizzly" of America. The bears are by some naturalists all arranged in one genus; by others in several genera.

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Bear-Baiting. A custom was formerly prevalent in many countries of baiting bears with dogs. The place in which the bears were kept was called a "bear-garden." Bear-baiting was a favorite sport in England, not only for the common people, but also for the higher classes. Queen Elizabeth is said to have enjoyed it. It was hated by the Puritans, Macaulay wittily says, "not because it gave pain to the bear, but because it gave pleasure to the spectators." This coarse and inhuman entertainment gradually died out, and was finally prohibited by act of Parliament Sept. 9, 1835.

Beard, a name applied to the hair which grows upon the lower part of the face of a man, and in exceptional cases upon the faces of women, or even children. The wearing of the beard is universal in the East, where it has long been regarded as a mark of honor and dignity. Some races of men, like the American Indians, carefully pluck out the beard, which with them and others, such as the Mongolians and Bedouins, is scanty. Most white races have beards with hairs differing decidedly in structure and appearance from those of the scalp. The wearing or not of beards in European nations has been regulated partly by fashion and partly by legal enactments for or against the practice. The beard is believed to protect the throat and chest from colds.

Beard (GEORGE MILLER), M. D., born at Montville, Conn., May 8, 1839, was educated at Phillips Academy, Andover, and at Yale, where he graduated 1862; attended one year at medical department of Yale, and, coming to New York, graduated from College of Physicians and Surgeons 1866, having for eighteen months (1863–64) been assistant surgeon on the gunboat New London in the western Gulf blockading squadron; commenced practice at once in New York, and with Dr. A. D. Rockwell made electro-therapeutics and nervous diseases his specialty; wrote many works, among them "American Nervousness, with its Causes and Consequences," "The Scientific Basis of Delusions; being a New Theory of Trance and its Bearing on Human Testimony," "Clinical Researches in Electro-Surgery" (together with Dr. Rockwell), "Medical Uses of Electricity," and "The Physiology of Mind-Reading;" 1863–64 was acting assistant-surgeon in U. S. N.; in 1868 became lecturer in New York University on nervous diseases; gave especial attention to mesmerism, and lectured in 1881 on "Artificial Trance." Died Jan. 23, 1883.

Beard (JAMES H.), born at Buffalo, N. Y., 1815, became a portrait-painter: settled in Cincinnati, and was for a long time one of the principal Western artists. He painted portraits of Harrison, Clay, Taylor, and J. Q. Adams, and also compositions such as "North Carolina Emigrants," etc.

Beard (RICHARD), D. D., a clergyman of the Cumberland Presbyterian Church, was born Nov. 27, 1799, in Sumner co., Tenn. His early education was not without care, yet limited. His education preparatory to the ministry was conducted better than usual for the time in his Church. He was licensed and commenced preaching in 1820, and was several years exclusively devoted to the work of the ministry. His health failing, he spent two or three years teaching. He was two and a half years at Cumberland College, Princeton, Ky., and graduated. He was immediately appointed professor of languages in that college. He afterwards spent five years at Sharon, Miss., in connection with Sharon College. In 1843 he became president of Cumberland College, Ky., and remained there ten years and a half, giving a great impetus to the classic training of young men, especially those seeking the ministry. In 1854, when the Cumberland Presbyterian Church established a chair of systematic theology in Cumberland University, at Lebanon, Tenn., his high character as a scholar and educator at once called him to that position, which he held till his death. He gave to the Church an able and standard work on "Systematic Theology," in 3 vols. 8vo. It is regarded as the crystallization of Cumberland Presbyterian thought and faith. He published two octavo volumes of biographical sketches of ministers. Also, "Why am I a Cumberland Presbyterian?" 1 vol. His contributions to the "Quarterly" and general literature of the Church were constant and most valuable. His great dignity, purity, and gentleness of character marked him as a representative man, calling him to the moderator's chair times almost without number. Died Dec. 2, 1880.

Beard (WILLIAM H.), an American painter, born at Painesville, O., about 1826, located in Buffalo in 1850, visited Europe 1858–60, and settled in New York City in 1860. Among his most popular works are "Bears on a Bender," "The Guardian of the Flag," "In and Out," "Little Red Riding-Hood," "Christmas Eve," "Raining Cats and Dogs," "A Bird in the Hand," "Dance of Silenus," and "Grimalkin's Dream."

Beard'slee (LESTER A.), U. S. N., born Feb. 1, 1836, in Little Falls, N. Y., entered the navy as a midshipman Mar. 5, 1850, became a passed midshipman in 1856, a lieutenant in 1859, a lieutenant-commander in 1862, and a commander in 1869. He served in the iron-clad Nantasket in the engagement with Fort Sumter of April 7, 1863, and is thus commended by his commanding officer, Captain Fairfax, in his official report to Rear-Admiral Dupont of April 8, 1863: "I am gratified to be able to say that the officers and crew behaved with becoming coolness and bravery. Lieutenant-Commander L. A. Beardslee, the executive officer, and the senior engineer, Mr. George H. White, rendered me great assistance in the working of the guns, turret, and even the vessel." In 1883 he was commander of the receiving-ship Franklin, and held the rank of captain.

FOXHALL A. PARKER.

Beards'ley (E. EDWARDS), D. D., LL.D., born in 1808 in Fairfield co., Conn., graduated at Trinity College, Hartford, in 1832, where he was two years a tutor. He was for a time principal of the academy at Cheshire, Conn., took orders in the Protestant Episcopal Church in 1835, and became rector of a church in New Haven in 1848. He is the author of a "History of the Episcopal Church in Connecticut" (2 vols., 8vo) and a "Life of Samuel Johnson, D. D.," both valuable works.

Beardsley (SAMUEL), LL.D., a native of Otsego co., N. Y., practised law in Rome and Utica, N. Y., held various State offices, as district-attorney of Oneida county 1821–25, as State senator 1823, as U. S. district-attorney for the northern district of New York; was a member of Congress from New York (1831–36 and 1843–45), attorney-general of the State (1837), became a judge of the State supreme court in 1844, and its chief-justice in 1847. Died May 6, 1860.

Beards'town, city and R. R. junction, Cass co., Ill. (see map of Illinois, ref. 6–C, for location of county), situated on the bank of the Illinois River. It ranks as one of the oldest towns in the State. The celebrated "Lithia Springs" are here. There is a fine park near the business portion of the city. The Rockford machine-shops are located here, which employ from 100 to 200 men. There are a foundry, flouring, woollen, and saw-mills, etc. The railroad bridge of the Rockford road crosses the river at this point, and is a fine structure, costing some $300,000. The piers are of iron. Pop. in 1870, 2588; in 1880, 3135.

Bear Mountain, in Pennsylvania, rises, in the N. E. part of Dauphin co., to the height of about 750 feet. The valley of Bear Creek, which flows at the base of this mountain, contains valuable beds of anthracite coal.

Bear River, a port of entry of Digby co. and township, Nova Scotia, at the head of navigation, has quite extensive manufactures of lumber, leather, etc.; shipbuilding is also carried on. It has a large trade in firewood and lumber, which are sent to the U. S. and West Indies. Pop. about 900.

Bear River, a river of the U. S., rises in the N. part of Utah, flows northward into Idaho, and changes its course abruptly towards the S. Having again crossed the S. boundary of Idaho into Utah, it flows south-westward, and enters Great Salt Lake about 25 miles N. W. of Ogden. The total length is about 400 miles.

Bears and Bulls, a phrase often used in connection with the purchase and sale of stocks, and applied to persons who speculate in government securities and in the stocks of railroads and other corporations. The "bears" are those who wish to depress the value of stocks, and the "bulls" are those whose interest prompts them to act in the other direction. If two men have contracted, the one to deliver and the other to take a certain stock at a specified price on an appointed future day, the former party will naturally belong to the bears, and the latter to the bulls.

Bear's Grease, or **Bear's Oil,** is said to be efficacious in promoting the growth of human hair. The genuine article being insufficient to supply the demand, perfumers and others sell under the name of bear's oil large quantities of beef-marrow, hog's lard, spermaceti, etc.

Beas'ley (Frederick), D. D., an American clergyman and philosopher, born near Edenton, N. C., in 1777, graduated at Princeton in 1797, became an Episcopalian minister, and was long provost of the University of Pennsylvania. Among his works, which attracted attention in Europe, are "A Search of Truth in the Science of the Human Mind," and a "Reply to the Views of Dr. Channing." Died at Elizabethtown, N. J., Nov. 2, 1845.

Beasley (Gen. Nathaniel), born in 1751, was a pioneer of Ohio, and a noted Indian-fighter and scout; was in the campaigns of St. Clair and Wayne, and afterward settled in Chillicothe, O.; member of Ohio legislature, a canal commissioner, and for many years major-general of militia. Died Mar. 27, 1835.

Beatifica'tion [Lat. *beatifica'tio*, from *bea'tus*, "blessed," and *fa'cio*, *fac'tum*, to "make"], in the Roman Catholic Church, is a solemn act by which the pope pronounces a person blessed. It is the first step towards canonization, and permits the term "blessed" to be given to the new saint. This honor is reserved for those who have performed miracles, have suffered martyrdom, or have died in the odor of sanctity. The first solemn beatification was that of Saint Francis de Sales by Alexander VIII., Jan. 8, 1662.

Beatific Vision, or the direct vision of God, is a Christian doctrine directly founded on Scripture (1 Cor. xiii. 12; 1 John iii. 2; Rev. xxii. 3, 4), and universally accepted by the churches. The time, however, at which the beatific vision is to take place has been the subject of some dispute. The Greek Church puts it after the day of judgment, and among the Protestant churches this view has been adopted by both the Calvinists and the Lutherans. But it was condemned by the Council of Florence, 1439, which determined that "the souls of those who have remained pure and spotless after baptism, and of those whose sins after baptism have been pardoned, either in this life or in the next, are immediately received into heaven, and behold plainly the triune God as He is;" which decision was confirmed by the Council of Trent.

Beating the Bounds, a popular phrase used in England to denote the periodical survey or perambulation by which the boundaries of parishes are preserved. It is the custom that the clergyman of the parish, with the parochial officers and the boys of the parish school, should march to the boundaries, which the boys strike with willow rods. The boys themselves were sometimes whipped in proximity to an important landmark, in order to impress the subject durably on their memories.

Bea'ton, Beatoun, or **Bethune** (David), a Scottish cardinal, born in 1494, was a zealous opponent of the Protestant Reformation. He was appointed lord privy seal in 1528, and was sent as ambassador to France in 1533. He became a cardinal in 1538, and succeeded his uncle as archbishop of St. Andrew's in 1539. On the death of James V., in 1542, Beaton produced a forged will of that king, appointing himself, with three others, regent of the kingdom; but his artifice failed, and the earl of Arran became the regent. Cardinal Beaton was a cruel persecutor of the Protestants, and caused George Wishart to be burned at the stake. He was assassinated in his own castle by Norman Leslie and others May 29, 1546. (See Knox, "History of the Reformation in Scotland;" Froude, "History of England," vol. iv.; Robertson, "History of Scotland.")

Be'atrice, city and R. R. junction, capital of Gage co., Neb. (see map of Nebraska, ref. 7–K, for location of county), on Big Blue River, 90 miles S. S. W. of Omaha. It is noted for its fine water-power and excellent building-stone. The U. S. land-office for the Nemaha district is located here. Pop. in 1880, 2447; in 1885, 5211.

Beatri'ce Portina'ri, a beautiful Italian lady, a native of Florence, who excited the admiration of Dante, and was immortalized by him in his "Divina Commedia." She was married to Simone dei Bardi, and died in 1290, aged about twenty-four.

Beat'tie (James), LL.D., D. C. L., a Scottish poet, born in the county of Kincardine Oct. 25, 1735. He became in 1760 professor of moral philosophy in Marischal College, Aberdeen. To refute the doctrines of Hume he published his "Essay on Truth" (1770), which was extremely successful. His most popular poem is "The Minstrel" (1771–74), which excited general admiration. Among his other works are "The Evidences of the Christian Religion, briefly and plainly stated" (1786) and "The Elements of Moral Science" (1793). Died Aug. 18, 1803. (See Sir William Forbes, "Life of James Beattie," 2 vols., 1806; Alexander Bower, "Life of James Beattie," 1804.)

Beatty (John), M. D., born in Bucks co., Pa., Dec. 10, 1749, graduated at New Jersey College in 1769; studied medicine with Dr. Rush, but entered the army early in the Revolutionary war, and became lieutenant-colonel in the Pennsylvania line in Sept., 1776; was taken prisoner at the capture of Fort Washington, and, having been exchanged, was appointed commissary-general of prisoners in 1778, with rank of colonel; resigned in 1780, and engaged in the practice of medicine at Princeton, N. J.; was delegate to the Continental Congress 1783-85; often a member of the State legislature; was speaker of the House; member of convention which adopted the federal Constitution; member of Congress 1793–95; secretary of state for New Jersey 1795–1805; president of Trenton Bank 1815–26. Died May 30, 1826.

Beatty (John), born near Sandusky, O., Dec. 16, 1828, was engaged in banking, but entered the Third Ohio Infantry as a private in 1861, became its lieutenant-colonel in that year, its colonel in 1862, and brigadier-general of volunteers in the same year. He distinguished himself in many important battles in West Virginia, Kentucky, and Tennessee in the late civil war. In 1868 he was elected member of Congress from Ohio for the unexpired term of C. S. Hamilton, deceased.

Beatty (Ormond), LL.D. See Appendix.

Beattyville, Ky. See Appendix.

Beaucaire, a town of France, in the department of Gard, on the right (W.) bank of the Rhone, and on a railway from Cette to Tarascon, 15 miles by rail E. of Nîmes. A bridge nearly one mile long here crosses the Rhone. It has an active trade, which is facilitated by a canal extending to the Mediterranean. Here is held annually a great fair (July 25–28), which was formerly perhaps the largest in Europe. It is said to have been instituted by Count Raymond II. of Toulouse in 1217, although we do not find it mentioned until 1315. It has declined in modern times, but it is still frequented by merchants from all parts of Europe and the Levant. The number of annual visitors was formerly estimated at 100,000, but has greatly declined. The chief articles sold at this fair are silks, wine, oil, drugs, wool, leather, and spices. Pop. in 1881, 9724.

Beauchamp, de (Alphonse), a French historian and publicist, born at Monaco, in Italy, in 1767, resided in Paris. He contributed to the "Moniteur" and the "Gazette de France," and published many works, among which are a "History of La Vendée" (3 vols., 1806), a "History of Brazil" (1815), and a "Life of General Moreau" (1814). Died June 1, 1832.

Beau'champ, Earls of, Viscounts Elmley (1815), Barons Beauchamp (1806, in the United Kingdom), a noble family of Great Britain.—Frederick Lygon, the sixth earl, was born Nov. 10, 1830, and succeeded his brother in 1866. He was lord of the admiralty in 1859, member of Parliament for Tewksbury 1857–63, and for West Worcestershire 1863–66.

Beauchesne (Alcide Hyacinthe du Bois de), born at Lorient, in the department of Morbihan, France, Mar. 31, 1804, died at Varenne, Allier, Dec. 5, 1873, was chief of the department of beaux-arts 1825–30 and inspector of the archives since 1853, and wrote "Louis XVII." (1852), "Vie de Madame Elizabeth" (1869), besides several collections of poems.

Beaufort,* a port of entry, capital of Carteret co., N. C. (see map of North Carolina, ref. 4–J, for location of county), at the mouth of Newport River, about 4 miles from the ocean and 168 miles E. S. E. of Raleigh. Its harbor is the best in the State, and is defended by Fort Macon. There is a lighthouse 156 feet high at Cape Lookout, 11 miles S. E. of Beaufort, in lat. 34° 37′ 16″ N., lon. 76° 31′ 07″ W. Pop. in 1870, 2430; in 1880, 2009.

Beaufort, on R. R., a port of entry, capital of Beaufort co., S. C. (see map of South Carolina, ref. 8–E, for location of county), on Port Royal Island, and on an arm of the sea called Port Royal River, about 55 miles W. S. W. of Charleston. It has a good harbor, with nearly sixteen feet of water over the bar at the entrance. Lumber, rice, and cotton are exported. Pop. in 1870, 1739; in 1880, 2549.

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* This name is usually pronounced bu'fort in South Carolina, and bō'fort in North Carolina.

Beau′fort (Henry), Cardinal, an ambitious English prelate, born about 1375, was a natural son of John of Gaunt and half-brother of King Henry IV. He became bishop of Lincoln in 1398, bishop of Winchester in 1405, lord chancellor in 1403, again in 1413, and a third time in 1424. He acted a prominent part in political affairs, for which he had superior abilities. During the minority of Henry VI. he was very powerful, and was a rival of his nephew, the duke of Gloucester. He was suspected of complicity in the murder of that rival. He was present at the Council of Constance, and voted for Martin V. He presided over the tribunal which sentenced the Maid of Orleans to death, and was extremely wealthy. Died April 11, 1447. (See Lord Campbell, "Lives of the Lord Chancellors.")

Beaufort, de (François de Vendôme), Duc, born in Paris in 1616, was a grandson of Henry IV. of France, and a son of César de Vendôme. He was a leader of the malcontents or opponents of the court in the civil war of the Fronde. Having returned to his allegiance, he was appointed commander of the fleet by Louis XIV. about 1662. He was killed at the siege of Candia in 1669.

Beaufort, Dukes of (1682), marquesses of Worcester (1642); earls of Worcester (1514); earls of Glamorgan, Viscounts Grosmont, and Barons Beaufort (1642); Barons Herbert (1461); Barons Herbert of Ragland, Chepstow, and Gower (1506); Barons Bottetourt (1308, in England), an old and prominent family of Great Britain.—Henry Charles Fitzroy Somerset, the eighth duke, was born Feb. 1, 1824, and succeeded his father in 1853. He was member of Parliament for East Gloucestershire 1846–53, master of the horse 1858–59 and 1866–68, and is at present lord lieutenant of Monmouthshire.

Beaugency, an old town of France, in the department of Loiret, on the right bank of the Loire, and on the railway from Paris to Bordeaux, 16 miles S. W. of Orleans. It has manufactures of woollen and leather goods, and a trade in wine, grain, and wool. Pop. in 1881, 4439.

Beauharnais, de (Eugène), a son of Vicomte Alexandre de Beauharnais, was born in Paris Sept. 3, 1781. His mother, Josephine, became the wife of Bonaparte, whom he accompanied to Egypt in 1798. He was rapidly promoted in the army, was appointed viceroy of Italy in 1805, and married the princess Amalie Augusta, a daughter of the king of Bavaria, in 1806. His functions as viceroy were performed with ability, prudence, and moderation. He also displayed superior military talents in the campaign against Austria in 1809 and in the invasion of Russia in 1812. Having obtained command of the army in Russia after it had suffered great disasters, he acted with remarkable firmness and constancy, and made a masterly retreat. After the battle of Lützen, May, 1813, in which he took part, he went to Italy, which he defended against the Austrians until the deposition of Napoleon. He afterwards resided at Munich, and obtained from the king of Bavaria the title and estate of duke of Leuchtenberg. Died in Munich Feb. 21, 1824. One of his sons married Dona Maria, queen of Portugal, in 1835. (See Léonard Gallois, "Histoire du Prince Eugène de Beauharnais," 1821; A. Aubriet, "Vie de Eugène de Beauharnais," 1824.)

Beauharnois, capital of Beauharnois co., Quebec, is on St. Lawrence River, 27 miles S. W. of Montreal. It has flax-mills, potteries, and factories. Pop. in 1881, 1499.

Beaujour′ (Louis Félix), born in Provence, France, in 1765, entered the diplomatic service in 1788, and in 1804 became consul-general and *chargé d'affaires* to the U. S.; wrote "A Sketch of the United States at the Commencement of the Nineteenth Century," returned to France in 1814, became consul-general, etc., on the Levant, and was made baron in 1819. Died July 1, 1836.

Beaumarchais, de (Pierre Augustin Caron), a French dramatist remarkable for his wit and versatility, and whose adventurous career and vicissitudes of fortune obtained for him great celebrity, was born at Paris Jan. 24, 1732, and was the son of a clockmaker. Although sent to the college (Anglicè, *school*) at Alfort, he was at the early age of thirteen apprenticed to his father. He soon discovered a decided taste for literature and an excessive fondness for music, in which art he became so proficient that he was enabled to procure an introduction to the court of Louis XV., and was employed to teach the princesses, his daughters, to play upon the harp, in the performance upon which he was skilled, and in the pedals of which he introduced an improvement. At the concerts given at the court he made the acquaintance of Duverney, the celebrated financier of that period, whom he was enabled to aid, by his influence with the princesses, in the accomplishment of certain projects in which the banker was at that time engaged. In return, Duverney instructed him in the affairs of finance, and aided him with funds and credit. The first literary production which attracted attention to Beaumarchais was his drama of "Eugénie," published in 1767, which, however, did not meet with success. In Nov., 1768, Beaumarchais's second wife died, and in July of the same year, Duverney. Although one-half of his wife's fortune was in a life-annuity, and the settlement of Duverney's affairs discovered a balance in favor of Beaumarchais, a rumor prevailed that he had poisoned his wife, and he was accused by Comte de la Blache, Duverney's heir, of embezzlement, fraud, and forgery. A seven years' litigation in securing the amount due him from Duverney was the occasion of his masterly "Mémoires" in his defence, which obtained for him great notoriety. These productions are admitted to be masterpieces in their way, and the interest and excitement produced by them is described as magical and electrical. Although thus occupied in the law and in his favorite literary pursuits, Beaumarchais was still actively engaged in various business speculations. He was prompt to foresee the success of our American Revolution, and engaged by connivance with, though unaided by, the French government, in supplying the Americans with arms and ammunition. How his services in this direction were appreciated the following will show: "By express order of the Congress sitting at Philadelphia, to M. de Beaumarchais: Sir,—The Congress of the U. S. of America, grateful for the great efforts you have made in their favor, presents you its thanks, and the assurance of its esteem. It grieves for the misfortunes you have suffered in support of its States. Unfortunate circumstances have prevented the accomplishment of its desires, but it will take the promptest measures for acquitting itself of the debts it has contracted with you. The generous sentiments and the exalted views which alone could dictate a conduct such as yours are your greatest eulogium, and are an honor to your character. Whilst by your great talents you have rendered yourself useful to your prince, you have gained the esteem of this rising republic, and merited the deserved applause of the New World. John Jay, *President*."

Notwithstanding this, his claim, which Alexander Hamilton approved, was not paid until 1835, thirty-six years after his death, and then but one-fourth part of the principal.

In the midst of his manifold labors he undertook at this time an expensive reproduction of the works of Voltaire, one edition of which was to be in 92 volumes, by which he sustained a very heavy loss. Notwithstanding he gave his support to the principles of the French Revolution, and imported firearms for the use of the French, his property was confiscated, and he was for a time an exile from his native land. After undergoing persecution and accusation, he returned to France after the Revolution was over. His sufferings during this period were described by him in a published work entitled "Mes Six Époques." He recovered possession of his beautiful villa at Faubourg St. Antoine, where he remained till his death. The evening of May 17, 1799, he passed with his family and a few friends; on the morning of the 18th he was found dead in his bed.

Beaumarchais, besides the works mentioned, was also the author of various dramatic productions. "Le Mariage de Figaro," his masterpiece, produced the greatest excitement in Paris, and his "Barbier de Séville," which preceded it, was also a great success. The first formed an epoch in the dramatic, social, and political annals of France, and was styled by Napoleon "the Revolution already in action." It is but proper to add that no conception of its wit, vivacity, and telling social and political allusions and sarcasms can be had at the present day, especially from the opera librettos with which we are familiar. (See L. de Loménie, "Beaumarchais, sa Vie et son Temps," 1852; Saint-Marc Girardin, "Notice sur la Vie de Beaumarchais," 1835; E. Berger, "Essai sur la Vie et les Ouvrages de Beaumarchais," 1847; "Edinburgh Review," vol. civ., 1856; "London Quarterly Review," July, 1873, etc.)

J. G. Barnard.

Beauma′ris, a seaport of Wales, and the capital of the island and county of Anglesea, is on the E. coast of the island, 3 miles N. of Bangor and about 2 miles from the N. end of Menai Strait. It is a favorite place of resort for sea-bathing. The Bay of Beaumaris affords here safe anchorage. Here is a ruined castle built by Edward I. Pop. in 1881, 2241.

Beau′mont, R. R. junction, capital of Jefferson co., Tex. (see map of Texas, ref. 5–K, for location of county), 85 m. E. by N. of Houston and 68 m. N. E. of Galveston, and at head of tide-water navigation on Neches River, which is navigable for 331 m. from the sea by steamers. The yellow pine and cypress lumber and shingles manufactured on the

Neches River (which has eight or ten mills) are shipped in steamers and schooners from Beaumont *viâ* Sabine Pass. Its population is not given in the United States census of 1880.

Beaumont (Francis), an English dramatic poet, born in Leicestershire in 1586, was educated at Oxford. After he left college he associated with Ben Jonson in London, and became an intimate friend of John Fletcher, in partnership with whom he wrote several popular dramas, among which are "Philaster" (1611), "The Coxcomb" (1613), and "Cupid's Revenge" (1613). Beaumont also wrote "The Masque of the Inner Temple" (1612), and other poems. Died Mar., 1616. Beaumont and Fletcher are lyrical and descriptive poets of the highest order, but they are offensively coarse and licentious.

Beaumont (John C.), U. S. N., born Aug. 27, 1821, in Pennsylvania, entered the navy as a midshipman Mar. 1, 1838, became a passed midshipman in 1844, a lieutenant in 1855, a commander in 1862, and a captain in 1872. While commanding the steamer Aroostook, North Atlantic blockading squadron, he took part in the shelling of Drury's Bluff, May 15, 1862, and commanded the steamer Mackinaw in both attacks upon Fort Fisher, and for his services on these occasions was recommended for promotion by Admiral Porter in his despatch of Jan. 28, 1865. Became rear-admiral Nov., 1881; retired soon after. D. Aug. 2, 1882.

Beaumont (William), M. D., an American surgeon, born at Lebanon, Conn., in 1785. While in the U. S. army in 1825 a young man (Alexis St.-Martin) was brought to him who had received a wound from a musket discharged at the distance of only a few feet. The wound healed, and left an aperture about two and a half inches in diameter, through which the process of digestion could be seen. Doctor Beaumont availed himself of this to make various experiments on digestion, the results of which are extremely interesting and of great importance to physiological science. They were published in 1838. D. April 25, 1853.

Beaumont de la Bonnière, de (Gustave), an eminent French publicist and advocate, was born in Sarthe Feb. 16, 1802. He was a grandson of La Fayette. He visited the U. S. in 1831, in company with De Tocqueville, in order to study American systems of prison discipline. He wrote an able work "On the Penitentiary System of the U. S., etc." (2 vols., 1832), and "Slavery in the U. S." (1835); elected to the Chamber of Deputies in 1840, and was a moderate republican member of the National Assembly of 1848; was imprisoned for a short time for opposing the *coup-d'état* of Dec., 1851. D. Mar. 2, 1866.

Beaune (anc. *Vellaunodu'num*), an old town of France, in the department of Côte-d'Or, is on the river Bouzoise and on the Paris and Lyons Railway, 23 miles by rail S. S. W. of Dijon. It has the beautiful church of Notre Dame, and a splendid hospital founded in 1443. Here are manufactures of woollen cloth, cutlery, leather, etc. Good burgundy wine is produced in this vicinity. Pop. in 1881, 12,038.

Beauport, a post-village and parish of Quebec co., Canada, 3½ miles N. E. of Quebec. It has extensive manufactures and trade in flour, lumber, nails, etc., and is the seat of Beauport Lunatic Asylum, a large and well-conducted institution. Pop. in 1881, 4429.

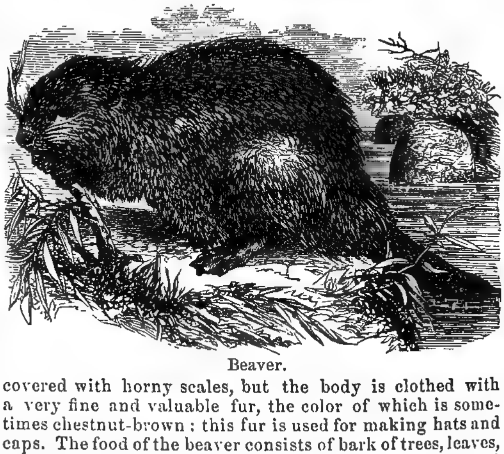
Beau'rain', de (Jean), born at Aix-en-Essart in 1696, was appointed royal geographer in 1721. His best work is "Topographical and Military Description of the Campaigns of Marshal Luxembourg from 1690 to 1694." Died 1771.

Beau'regard (Pierre Gustave Toutant), b. near New Orleans May 28, 1818; graduated at U. S. Military Academy July 1, 1838; 2d lieutenant of engineers July 7, 1838; was distinguished at the siege of Vera Cruz, in reconnoissances before the battle of Cerro Gordo, and in battles in the Valley of Mexico, for which twice brevetted; wounded in assault on Belen Gate, Sept. 13, 1847; captain of engineers Mar. 3, 1853; in charge of defences in Louisiana 1853–60; appointed superintendent of U. S. Military Academy Nov., 1860, but held this position a few days only. Resigned Feb. 20, 1861, and was made brigadier-general in Confederate army, in which capacity he directed the operations against Fort Sumter which opened the civil war. He commanded subsequently the forces which defeated Gen. McDowell at Bull's Run July 21, 1861, for which victory he was next day made general. Took direction of the army of the Mississippi Feb. 18, 1862; planned the successful attack on Gen. Grant Apr. 6, and on Johnston's death assumed chief command, holding his ground until 2 P. M. next day against the Federal forces, reinforced by the army of Gen. Buell, and then withdrawing to Corinth, which place he held against the superior forces of Gen. Halleck till May 30, when he evacuated it, making a masterly retreat to Tupelo. He subsequently commanded, with head-quarters at Charleston, the defence of the Southern coast, signalized by the unsuccessful attack, Apr. 7, 1863, of Admiral DuPont's squadron and by the combined operations of sea and land forces under Admiral Dahlgren and Gen. Gillmore. In 1864 he commanded in Virginia, successfully resisting Gen. Butler's forces at Drury's Bluff, and later, with a force of 5700 men, increased to 10,500, resisted Gen. Grant's front attack upon Petersburg, holding that place till reinforced by part of Lee's army, and thus compelling the long-protracted siege. Was subsequently charged with resisting Gen. Sherman's march to the sea, having but 5000 men, partly militia. The skilful withdrawal of Gen. Hardee's army from Savannah, invested by Sherman, to Pocataligo, was due to Beauregard. At the time of the surrender of Gen. Johnston's army Beauregard was voluntarily assisting him. Since the war he has been engaged in railroad management. In 1866 the chief command of the Roumanian army was tendered him, and in 1869 that of the army of the khedive of Egypt, both of which he declined. Became adjutant-general of Louisiana 1878. J. G. Barnard.

Beautiful, Science of the. See Æsthetics.

Beauvais (anc. *Bellov'acum*), an old city of France, capital of the department of Oise, is situated on the river Thérain, and in a rich valley enclosed by wooded hills, 64 miles by rail N. N. W. of Paris. It has a fine large but unfinished Gothic cathedral, a public library, a museum, and a college. Here are extensive manufactures of woollen cloths, flannels, shawls, Gobelin tapestry, printed cottons, and carpets. Pop. in 1881, 17,525. It was the chief town of the Bellovaci in the time of Cæsar. In 1443 it was besieged in vain by the English. The citizens of Beauvais, aided by the heroine Jeanne Lainé, surnamed La Hachette for her daring, and other women, repulsed Charles the Bold, duke of Burgundy, who besieged the city in 1472 with 80,000 men.

Bea'ver [Fr. *bièvre;* Lat. *cas'tor* and *fi'ber;* Ger. *Bi'ber*], (the *Castor Fiber* of the naturalists), a remarkable quadruped of the order Rodentia, is a native of Europe, Asia, and North America. Beavers were once abundant in the U. S., but they have gradually disappeared before the advance of civilization. They are characterized by industry, sagacity, and instinctive skill in building dams and houses. They have strong incisors or cutting teeth, in which a sharp, chisel-like edge is always preserved by the unequal abrasion of the hard enamel and the other part, which is softer. The body of the beaver is about two feet long. The toes of the hind feet are long, spreading, and webbed to the nails. Among its remarkable characteristics is a tail of an oval form, about ten inches long, horizontally flattened, and about three inches wide. This is covered with horny scales, but the body is clothed with a very fine and valuable fur, the color of which is sometimes chestnut-brown: this fur is used for making hats and caps. The food of the beaver consists of bark of trees, leaves, roots, and berries. Its favorite haunts are rivers and lakes which are bordered by forests. "Their work is all performed in the night," says Dr. Godman. When they find a stream that is not sufficiently deep for their purpose, they build a dam across it with wonderful ingenuity and industry. The dam, which is formed of sticks, roots, stones, and mud strangely combined, is watertight, and presents a convex surface towards the current. To obtain material for it they cut down the trees growing on the margin of the stream above the dam, and float them down. They prefer small trees, but sometimes fell those that are ten inches or more in diameter. It is stated that they have built dams nearly 300 yards long. The sides of the dam incline towards each other, so that the bottom of it is much thicker than the top. There is a popular opinion that beavers use their tails as trowels in plastering. It is more



Beaver.

probable that the tail serves as a prop or support when they work with their fore feet or carry burdens with them. They pass the winter in houses or lodges which are two or three feet high, are built on the edge of the water, and afford them protection from wolves and other wild beasts. They also have holes or burrows in the ground (adjacent to their lodges), with entrances under the water, in which they take refuge if their lodges are destroyed or become untenable.

The houses or huts of beavers are not built of sticks first, and then plastered, but all the materials, sticks, mud, and stones, are mixed together, and this composition is employed from the foundation to the summit. "The tops of the houses," says Godman, "are generally from four to six feet thick at the apex of the cone." "The outside of the hut is covered or plastered with mud late in the autumn, and after frost has begun to appear. By freezing it soon becomes almost as hard as stone, effectually excluding their great enemy, the wolverine, during the winter. The door or hole leading into the beaver-hut is always on the side farthest from the land, and is near the foundation of the hut or at a considerable depth under water." When they are much disturbed by the presence of hunters and settlers, beavers renounce their original programme, cease to build dams and houses, and, adapting themselves to their altered circumstances, excavate in the banks of rivers holes for their residence—a signal manifestation of sagacity.

Beavers are easily tamed, but no wooden cage will keep them confined, because they gnaw through. Many of them are caught in traps by the Indians and other trappers. In 1820, 60,000 beaver skins were sold by the Hudson's Bay Company. Their numbers are rapidly diminishing in consequence of the exterminating warfare waged against them by hunters, who often kill the young before they have attained half their growth. The bait which is used to entice beavers is prepared from the substance called castor (*castoreum*), obtained from glandular pouches connected with the reproductive organs of the male beavers. "The only species of beaver known," says Dr. Godman, "is the one we have described," but others believe the Old World and New World beavers to be distinct species. The remains of an extinct beaver, very much larger than the living species, have been found in the surface deposits of Ohio and New York. It was first described by Col. J. W. Foster, and by him was called *Castoroides*. (See Morgan, "The American Beaver," 1867.) Revised by J. S. Newberry.

Beaver, on R. R., capital of Beaver co., Pa. (see map of Pennsylvania, ref. 4–A, for location of county), on the right bank of the Ohio River, 2 miles below the mouth of the Beaver River, and 27 miles N. W. of Pittsburg. It is the seat of Beaver College, a female seminary, an academy, and has good union schools. There is a fine park in the centre of the village. Pop. in 1870, 1120; in 1880, 1178.

Beaver, city, capital of Beaver co., Utah (see map of Utah, ref. 4–F, for location of county), is on Beaver River, about 50 miles S. by W. from Fillmore. Copper and lead are found in the vicinity. Pop. in 1880, 1732.

Beaver Bay, a post-village, capital of Lake co., Minn. (see map of Minnesota, ref. 3–H, for location of county), in a township of the same name, on Lake Superior, at the mouth of Beaver Bay River, 55 miles N. E. of Duluth. Pop. of township in 1880, 106; in 1885, 101.

Beaver City, Neb. See Appendix.

Beaver Dam, on R. R., a city of Dodge co., Wis. (see map of Wisconsin, ref. 6–E, for location of county), on Beaver Dam Creek, 61 miles N. W. of Milwaukee. It is the seat of Wayland University, and has a fine water-power, two woollen factories, a large seeder establishment, etc. Pop. in 1870, 3265; in 1880, 3416; in 1885, 4184.

Beaver Falls, the capital of Renville co., Minn. (see map of Minnesota, ref. 10–C, for location of county), on the Beaver River, about 2 miles above where it empties into the Minnesota, and 108 miles S. S. W. of St. Paul. It has mills and splendid water-power, breweries, and county buildings. It is in an excellent agricultural region. Pop. of township in 1885, 611.

Beaver Falls, R. R. junction, Beaver co., Pa. (see map of Pennsylvania, ref. 4–A, for location of county), on Beaver River, 4 miles above its junction with the Ohio, 31 miles N. W. of Pittsburg. It has important manufactures. Pop. in 1870, 3112; in 1880, 5104.

Beaver Indians, a name given to a former tribe of Algonquins who lived on the Canada side of Lake Huron. It is also applied to a tribe allied to the Chippewyans. They live on the Peace River in the British N. W. provinces of North America.

Beaver Islands, a group of islands in the N. part of Lake Michigan, are a part of the county of Manitou, in State of Michigan. St. James, on Big Beaver Island, is the chief town. Here a branch of the Mormons, under Joseph Strong, settled in 1846.

Bea'vertail, the S. point of Conanicut Island in Narragansett Bay, R. I., has a square granite lighthouse 74 feet high, with a fixed white light of the third order 96 feet above the sea; lat. 41° 26′ 56″ N., lon. 71° 23′ 39″ W.

Bebee'ria, or **Bebee'rine** ($C_{19}H_{21}NO_3$), a vegetable alkali or alkaloid obtained from the bark of the bebeeru, or green-heart, a tree of British Guiana. It is used in medicine as a substitute for quinine, which it resembles in properties.

Bebee'ru, Bibiru, or **Beebeeru** (*Nectandra Rodiæi*), a tree of British Guiana, the timber of which is known in commerce by the name of green-heart. It is of the natural order Lauraceæ. (See Green-heart.)

Becancour, capital of Nicolet co., Quebec, Canada, 85 miles S. W. of Quebec, has a large trade in flour and lumber. Pop. in 1881, 2325.

Beccafi'co, *i. e.* "fig-eater" (*Syl'via horten'sis* or *Curru'ca horten'sis*), a small bird of the family of Sylviadæ or warblers, is sometimes called the garden warbler. It is abundant in Southern Europe as a summer bird of passage. The flesh of it is esteemed as a delicate food by the Italians. It has an agreeable song.

Beccamoschi'no, the Italian name of the *Syl'via cistic'ola*, a small bird of the family of warblers, found in Italy. Its nest resembles that of the tailor-bird.

Beccari'a, di (Cesare Bonesana), Marquis, an eminent Italian economist and writer on penal laws, was born at Milan Mar. 15, 1738. His principles were formed by the influence of Montesquieu. His most important work is a "Treatise on Crimes and Punishments" ("Trattato dei Delitti e delle Pene," 1764), in which he advanced eloquent arguments against the severities and abuses of criminal law. It obtained great popularity, and was translated into many languages. Voltaire admired it, and wrote a commentary on it. In 1768 he was appointed professor of political philosophy at Milan. Died Nov. 28, 1794. (See C. P. Villa, "Vita del Marchese C. Beccaria," 1821; P. Custodi, "Vita di C. Beccaria.")

Bêche-de-Mer [Fr. for "sea-spade," because they are pressed and dried in a shape not unlike that of a spade], or **Trepang,** a name given to the dried bodies of several species of *Holothu'ria*, or sea-cucumber, which are abundant in shallow lagoons and on reefs between Australia, the Fejee Islands, and the S. E. coasts of Asia. They are esteemed a luxurious article of food by the Chinese. The Malay divers catch them and prepare them in large quantities for the Chinese market. This animal is usually about nine inches long, but sometimes measures two feet. It is stated that 8000 hundredweight of the trepang are annually exported from Macassar to China. (See Holothurians.)

Be'cher (Johann Joachim), a German chemist, born at Speyer in 1645, is called the author of the first theory of chemistry. He became aulic councillor at Vienna, but soon fell into disgrace, and removed to Mayence. He was addicted to speculation, and wrote, besides other works, "Physica Subterranea" (1669). His theory was the basis of that which was developed by Stahl. He died in London in Oct., 1682.

Becher (Siegfried), a German political economist, born at Plan, in Bohemia, Feb. 28, 1806. Since 1835 he has been professor of history and geography in the Polytechnic Institute in Vienna. Among his works are "Das Oesterreichische Münzsystem von 1524–1838" (2 vols., 1838), "Organization des Gewerbwesens" (1851), and "Die Volkswirthschaft" (1853).

Bechua'na, Betjuans, Bechuans, or **Boshuana,** a nation of Southern Africa, occupying the country between 22° and 29° E. lon. Their southern boundary is near 28° S. lat. They are divided into numerous tribes, each governed by its chief. They are unwarlike and gentle in disposition, and are said to be superior to the Caffres in arts and civilization. They cultivate the soil with skill and diligence. Sheep and cows form an important part of their riches. The Bechuana worship several species of animals. Their language is called "Sechuana." "Bechuana" is a plural form; "Mochuana" is the singular. (See Dr. Livingstone, "Travels in Southern Africa;" Moffat's "Southern Africa.")

Beck (Charles), Ph. D., LL.D., a German philologist, born at Heidelberg Aug. 19, 1798. Having removed to America in 1824, he became in 1832 professor of the Latin language and literature at Cambridge, Mass. He obtained the degree of LL.D. from Harvard University in 1865. He published "The Manuscripts of the Satyricon of Petronius Arbiter Described and Collated" (1863), and other works. Died Mar. 19, 1866.

Beck (John Brodhead), M. D., an American physician, born at Schenectady, N. Y., Sept. 18, 1794, graduated at Columbia College in 1813. He became in 1826 professor of materia medica in the College of Physicians and Surgeons in New York City. He published "Infant Therapeutics" (1849). Died April 9, 1851.

Beck (Lewis C.), M. D., a brother of the preceding, was born at Schenectady Oct. 4, 1798. He graduated at Union College in 1817, became professor of chemistry in the medical college of Albany in 1840, and wrote several works on chemistry and botany. His report on the mineralogy of New York was published by the State in 1842. Died April 21, 1853.

Beck (Theodoric Romeyn), M. D., LL.D., a medical writer, a brother of the preceding, was born at Schenectady Aug. 11, 1791. He graduated at Union College in 1804, practised at Albany, and obtained in 1840 the chair of materia medica in the medical college of that city. He published "Elements of Medical Jurisprudence" (1823). Died Nov. 19, 1855.

Becker (Hermann Heinrich), a German politician, called der rothe Becker (*i. e.* "the Red Becker," on account of his extreme radical views in politics), was born Sept. 15, 1820, took part in the revolutionary movement in 1848, and was imprisoned for several years. In 1862 he was elected a member of the Prussian house of deputies, and in 1867 and 1868 of the North German Parliament, and is one of the recognized leaders of the liberal party.

Becker (Johann Philipp), a German patriot and radical, born at Frankenthal Mar. 19, 1809. He emigrated to Switzerland in 1837, and fought against the Sonderbund in 1847–48. During the revolutionary movements of 1848 and 1849 he served in the army of insurgents in Baden.

Becker (Karl Ferdinand), writer on music, was born at Leipsic July 17, 1804. He composed for the organ, and wrote, besides other works, "Trios" (1844) and "Die Tonkünstler des 19 Jahrhunderts" (1849). D. Oct. 26, 1877.

Becker (Karl F.), philologist. See Appendix.

Becker (Thomas A.), the first Catholic bishop of the diocese of Wilmington, Del., was born of German Protestant parents in Pittsburg, studied in Munich, where he joined the Catholic Church, and was consecrated as bishop Aug. 23, 1868.

Becker (Wilhelm Adolf), a learned German author, born at Dresden in 1796. He attempted to reproduce the social life of ancient Rome in "Gallus" (1838), and that of ancient Greece in his "Charicles" (1840), both of which were translated into English by Metcalfe. His chief work is "Handbuch der röm. Alterthümer" (1843–46). Died Sept. 30, 1846.

Beck'et (Thomas à), archbishop of Canterbury, was born in London in 1109. He studied at Oxford and Paris, and was appointed high chancellor in 1158, being the first native Englishman who filled a high office after the Conquest. His style of living was sumptuous in this part of his life, but when he became archbishop of Canterbury in 1162 a remarkable change took place in his habits and deportment. He practised or affected great austerity, and appeared as a zealous champion of the Church against the aggressions of the king, whose policy tended to keep the clergy in subordination to the civil power. Becket having been involved in a conflict with Henry II., escaped in 1164 to France, and appealed to the pope, by whom he was supported. Henry confiscated his property and sequestered the revenues of his see, and received in return a menace of a papal interdict. In 1170 a formal but hollow reconciliation was made between the king and the obstinate and haughty prelate, who returned to England and resumed his office. He also renewed his defiance of the royal authority, but on the 29th of Dec., 1170, was assassinated by four barons, servants of the king. He was regarded as a martyr by many patriotic Saxons, as well as by the zealous votaries of the Church. He was canonized by the pope in 1173, and his bones were deposited in a splendid shrine at Canterbury, which became the object of one of the great pilgrimages of Christendom.

Beckett (James M.), M. D., was a native of South Carolina, where he received his medical and literary education. He became a resident of Pickens, Ala., was a trustee of the State University in 1840, and entered the Senate as a State Rights Democrat in 1847. He acquired reputation as a debater, but his public life closed with the session of 1849.

Beck'ford (William), a celebrated author, was born in 1760. He inherited from his father an immense fortune, including the estate of Fonthill, in Wiltshire. His annual income was about £100,000. He married in 1783 Lady Margaret Gordon, a daughter of the earl of Aboyne. In 1784 he published his principal work, "Vathek," an Eastern tale (written in French), which was highly commended by Lord Byron. He was elected to Parliament in 1790, resided some years in Portugal, and expended an enormous sum in the erection of Fonthill Abbey, which he filled with rare and expensive works of art. In 1822 he sold this palace and the estate of Fonthill for £350,000, and built another palace at Bath. He published in 1834 a series of letters entitled "Italy, with Sketches of Spain and Portugal," 2 vols. He was a witty and graphic writer, and had much talent for sarcasm. Died May 2, 1844. (See "Memoirs of William Beckford," London, 2 vols., 1859; "Quarterly Review" for Mar. and June, 1834.)

Beckx (Peter John), a Belgian Jesuit, was born Feb. 8, 1795. He joined the Society of Jesus in 1819, was elected procurator of the province of Austria in 1847, was appointed, after the restoration of the Jesuits in Austria, provincial for Austria, and was elected in 1853 general of the order, in which position he has displayed great energy.

Becquerel (Antoine César), an eminent French savant, born at Chatillon-sur-Loing (Loiret) Mar. 8, 1788. He served in the army as an officer of engineers from 1810 till 1815, after which he gave special attention to the study of electricity, and made discoveries in electro-chemistry. He refuted and exploded Volta's theory of contact, and constructed the first constant pile. In 1837 he received the Copley medal of the Royal Society of London. He invented a method of electrotyping. He published, besides other works, "Traité expérimental de l'électricité et du magnetisme" (7 vols., 1834–40). He became a member of the Academy of Sciences in 1829. D. Jan. 21, 1878.—His sons, Alexandre Edmond (born Mar. 24, 1820), a physicist, and Louis Alfred, a physician (born in 1814, died in 1862), each attained distinction as scientific men.

Becse, Old (Hun. *O'Becse*), a market-town of Hungary, in the county of Bacs, 48 miles S. of Szegedin, on the Theiss. Pop. in 1880, 15,040.

Becse, New (Hun. *Uj-Becse*), a town of Hungary, in the county of Torontal, on the Theiss, 8 miles E. of Old Becse. Pop. 7193.

Becskerek, Nagy ("Great Becskerek"), a town of Hungary, in the county of Torontal, on the left bank of the Bega, 59 miles S. W. of Temesvár, with which it is connected by a canal. It has a considerable trade. Pop. in 1880, 19,529.

Bed, in geology, a stratum or layer of stratified sedimentary rock of variable thickness. A bed often consists of numerous thin laminæ or plates, resulting from intermissions in the supply of materials, produced by such causes as the ebb and flow of the tide, and variable degrees of the turbidness of the water under which they were deposited. Seams become beds, or are so called if they have a considerable thickness, as coal-beds.

Bed of Justice [Fr. *lit de justice*], a term applied to the seat or throne occupied by the king of France when he was present at a session of Parliament; also to such a session, or the conference of the Parliament with the king, who came to overrule the decisions of Parliament and enforce edicts or ordinances to which that body was opposed. Decrees promulgated at such a session were more authoritative than the ordinary decisions of Parliament. The ceremony became synonymous with an act of arbitrary power. The last "bed of justice" was held by Louis XVI., in 1787.

Bédarieux, a town of France, in the department of Hérault, on the river Orbe, 27 miles by rail N. of Béziers. It is well built, and has manufactures of fine cloths, hosiery, cotton stuffs, paper, hats, and soap. Pop. 8985.

Bed-bug, a well-known hemipterous insect, the *Cimex lectularius*, infesting beds, houses, dove-cots, and the nests of swallows, bats, etc. The eggs are oval and white; the young vermin flat and transparent. In eleven weeks the insect reaches its full size. It is tenacious of life, and has been kept alive more than a year in a sealed bottle without food. Cockroaches devour them in large numbers. Mercurial solutions, benzine, etc. will extirpate these vermin, but prevention by cleanliness is better than cure.

Bed'-chamber, Lords of the, twelve officers of the British royal household who in the reign of a king wait in turn on the person of the sovereign. They are under the groom of the stole, who attends His Majesty only in public ceremonies and on occasions of state. During the reign of a queen these offices are performed by ladies of the bed-chamber and the mistress of the robes, who is substituted for the groom of the stole. Queen Victoria has about eleven ladies and extra ladies of the bed-chamber. These offices are usually filled by the "prime nobility" of the kingdom, who are appointed by the sovereign, and are not removed on each change of the ministry.

Bed'does (Thomas), M. D., an eminent English physician and writer, born at Shiffnal, in Shropshire, April 13, 1760. He was educated at Oxford, and was well versed in the Latin and other languages. He married Anna, a sister of Maria Edgeworth, and in 1788 was appointed to the chemical lectureship in the University of Oxford. In 1792 he resigned this position. He wrote for the benefit of the working-classes a popular work called "The History of Isaac Jenkins." He opened in 1798 at Bristol a pneumatic hospital for the cure of disease by medicated gases, in which Humphry Davy was his assistant. Among his works is "Hygeia, or Essays, Moral and Medical" (3 vols., 1802). Died Nov. or Dec. 24, 1808. (See E. STOCK, "Life of T. Beddoes," 1811.)

Beddoes (THOMAS LOVELL), M. D., a poet, a son of the preceding, was born at Clifton July 20, 1803. He was a nephew of Maria Edgeworth. He studied medicine and anatomy at Göttingen, and resided many years in Germany. In 1822 he produced "The Bride's Tragedy," which excited general admiration by its profound thoughts, though not free from extravagance. Among his productions is a tragedy called "Death's Jest-Book" (1851), which displays great richness of imagery and passionate eloquence. He died at Bâle Jan. 26, 1849, in consequence of a dissection wound received in 1848.

Bede [Lat. *Be'da*], surnamed THE VENERABLE, an illustrious and pious English scholar and monk, was born in the county of Durham in 673 A. D. He was ordained a priest at the age of thirty, and devoted much time to study and literary pursuits. His name is regarded as the greatest in the ancient literature of Britain. He wrote on astronomy, grammar, music, etc. His most important work is an "Ecclesiastical History of the English Nation" ("Historia Ecclesiastica Gentis Anglorum"), which King Alfred translated into Anglo-Saxon, and which has often been reprinted. He died May 26, 735 A. D. His whole works were published by Dr. Giles (London, 6 vols., 1844), including an English translation of his "Ecclesiastical History." (See GEHLE, "De Bedæ Venerabilis Vita et Scriptis," 1838; J. A. GILES, "Life of Bede," prefixed to his complete works, 1844.)

Bedeau (MARIE ALPHONSE), a French general, was born in Vertou, near Nantes, Aug. 10, 1804. He served with distinction in Algeria (1836–47), and became a general of division in Sept., 1844. He had the command (under Bugeaud) of the troops in Paris when the Parisians revolted in Feb., 1848, and under the new republican régime he became commander-in-chief of that city. As a member of the National Assembly (1849–51) he acted with the republicans and opposed Louis Napoleon. Died Oct. 29, 1863.

Bed'egar, or **Bedeguar,** a name of a remarkable gall which is sometimes called sweet-brier sponge, and is found on the branches of the sweet-brier and other species of rose. It is produced by the *Cynips rosæ* and other insects, and is often one inch or more in diameter. It was once used in medicine.

Be'del (TIMOTHY), a Revolutionary patriot, born at Salem, N. H., removed to Haverhill, N. H., and was a lieutenant in 1760, serving in Canada. He became in 1775 a captain of rangers, and in 1776 colonel of the first regiment of New Hampshire troops, and served at Montreal and under Schuyler, and afterwards was major-general of New Hampshire militia. Died at Haverhill, N. H., in Feb., 1787.

Bedell' (GREGORY THURSTON), D. D., son of the following, an American Protestant Episcopal bishop, born at Hudson, N. Y., Aug. 27, 1817, educated at Flushing, L. I., and Bristol College, Pa. He became bishop of the diocese of Ohio. He is the author of "The Divinity of Christ," "The Profit of Godliness," "Sacredness of the Grave," "The Principles of Pastorship," "The Age of Indifference," "Episcopacy—Fact and Law," etc.; his sermons have been published in the U. S. and in Scotland.

Bedell (GREGORY TOWNSEND), D. D., an eminent American Episcopal clergyman, born on Staten Island, N. Y., Oct. 28, 1793. He graduated at Columbia College in 1811, was greatly admired as a pulpit orator, and wrote, among other religious works, "Onward, or Christian Progression," "Renunciation," and two volumes of sermons. Died at Baltimore Aug. 30, 1834. (See his "Life" by REV. DR. TYNG, 1836.)

Bedell (WILLIAM), an English Protestant prelate distinguished for his wisdom and virtue, was born in Essex in 1570. He went to Venice in 1604 as chaplain to Sir Henry Wotton, the English ambassador, and remained there eight years. In 1627 he was elected provost of Trinity College, Dublin, and in 1629 became bishop of Kilmore and Ardagh. He reformed abuses in his diocese, and acquired much influence by his acts of charity and his other virtues. He procured the translation of the Old Testament into Irish. Died Feb. 7, 1642. (See BURNET, "Life of Bishop Bedell," 1685; H. J. MONCK MASON, "Life of W. Bedell," 1842.)

Bedesman (*i. e. beadsman*), [from the Saxon *bead*, a "prayer"], equivalent to petitioner, was a common affix at the end of English letters in the fifteenth and sixteenth centuries. A common form of signature at one time was, "Your bounden bedesman," or "Your humble bedeswoman."

Bed'ford, an old market-town of England, capital of Bedfordshire, is on the river Ouse, here crossed by a bridge, 48 miles by rail N. N. W. of London. Several railroads pass here. It has more charitable institutions and public endowments, in proportion to its size, than any town in England. It has several fine Gothic churches, a public library, a famous grammar-school, a lunatic asylum, a jail, a penitentiary, numerous schools and charities, including about sixty almshouses. Bedford has manufactures of farming implements, lace, and straw hats, and a trade in corn, malt, and timber. John Bunyan wrote "Pilgrim's Progress" in Bedford jail. Pop. in 1881, 19,532.

Bedford, R. R. junction, capital of Lawrence co., Ind. (see map of Indiana, ref. 9–D, for location of county), 71 miles N. W. of New Albany; has an academy, a college, a large town-hall, and a fine stone court-house. Pop. in 1880, 2198.

Bedford, on R. R., capital of Taylor co., Ia. (see map of Iowa, ref. 7–E, for location of county), is on a prairie and on the river One-Hundred-and-Two, about 100 miles S. W. of Des Moines, and 35 miles S. of Creston, and has considerable trade. Pop. in 1880, 1763; in 1885, 1742.

Bedford, capital of Trimble co., Ky. (see map of Kentucky, ref. 2–G, for location of county), about 40 miles N. W. of Frankfort. Pop. in 1870, 200; in 1880, 197.

Bedford, R. R. junction, capital of Bedford co., Pa. (see map of Pennsylvania, ref. 6–D, for location of county), is on the Raystown Branch of the Juniata, 94 miles W. S. W. from Harrisburg. The Bedford Springs, about one mile distant, are a fashionable place of summer resort. Iron ores abound, and iron is here manufactured. Pop. in 1870, 1247; in 1880, 2011.

Bedford, DUKES OF (1694); earls of Bedford (1550); marquess of Tavistock (1694); Barons Russell of Cheneys (1539); Barons Russell of Thornaugh (1603); Barons Howland (1695, in England), a prominent family of Great Britain.—WILLIAM RUSSELL, the eighth duke (of this family), was born June 30, 1809, and succeeded his father in 1861. He was member of Parliament for Tavistock 1832–41.

Bedford (GUNNING), a patriot of Delaware, served against the French in 1755, was a native of Philadelphia, an officer of the Revolutionary army, was wounded at White Plains, became mustermaster-general in 1776, was a member of Congress (1783–85), and governor of Delaware (1796–97). Died Sept. 30, 1797.

Bedford (GUNNING), a cousin of the preceding, born in Philadelphia in 1747, and graduated at Princeton in 1771, was a member of Congress from Delaware (1785–86), and of the convention (1789) that formed the U. S. Constitution. He was U. S. district judge (1789–1812). Died Mar. 30, 1812.

Bedford (GUNNING S.), M. D., was born at Baltimore in 1806, and graduated at Mount St. Mary's College in 1825. After serving as professor in Charleston, S. C., and at Albany Medical College, he settled in 1836 in New York City, where he was professor of midwifery in the University of New York (1840–42). He published an excellent treatise on obstetrics and "Lectures on the Diseases of Women," besides valuable translations from the French. Died at New York Sept. 5, 1870.

Bedford (JOHN PLANTAGENET), DUKE OF, the third son of King Henry IV. of England, was born in 1389. He was created duke of Bedford in 1414, and was commander-in-chief of the forces in England during the absence of Henry V., who was his brother. After the death of Henry V. (1422) the duke of Bedford was regent of France, and waged war with success against the French dauphin. He gained a victory over the French at Verneuil in 1424, but his conquests were soon checked by Joan of Arc. He died at Rouen Sept. 19, 1435. His memory is stained by his abetting the murder of Joan of Arc. (See HUME, "History of England.")

Bedford Level, or **The Fens,** a tract of flat land in the eastern part of England, is bounded on the E. by the German Ocean, and comprises parts of Huntingdon, Northampton, Cambridge, Lincoln, Norfolk, and Suffolk. Its inland boundary is a range of highlands in the form of a horseshoe. Nearly all the marshy district called The Fens is included in the Bedford Level, which is intersected by the Cam, Ouse, Nene, and Welland rivers. It was formerly a vast morass, and was named in honor of Francis, duke of Bedford, who in 1634 undertook to reclaim it, and expended £100,000 in draining it. The work was completed by his son, William, duke of Bedford, who spent £300,000 on it. This tract now produces good crops of grain and flax, and grass for pasture. Its drainage has been improved in the present century.

Bed'fordshire, an inland county of England, bounded on the N. E. by Huntingdon, on the E. by Cambridge, on the S. E. and S. by Hertford, on the S. W. by Bucks, and on the N. W. by Northampton. Area, 463 square miles. The surface is undulating or nearly level, except the Chiltern Hills in the S. part. The principal river is the Ouse. The southern part of the county consists of chalk, thinly covered with a soil which is fit only for sheepwalks. Stiff clay and rich loams occur in other parts of the county, which is more exclusively agricultural than any other in England. There are some manufactures of straw hats and of lace. Capital, Bedford. Pop. in 1881, 149,461.

Bedford Springs, Bedford co., Pa., are 1 mile from Bedford, yield valuable medicinal water, and are also attractive from their cool climate in summer, their pleasant mountain-scenery, and their agreeable society. The springs are—Anderson's (saline chalybeate), the Sweet Spring (nearly pure), the Sulphur, the Chalybeate, Fletcher's (saline chalybeate), and the Limestone. The waters are generally laxative and tonic, and act upon the skin and kidneys.

Bed'lam, a corruption of **Bethlehem,** which was the name of a religious house in London converted in 1547 into a hospital for lunatics. When Henry VIII. suppressed the religious houses, one of these, coming into the control of the corporation of London, was converted into an asylum for the insane. In 1814 the insane patients were removed to a new asylum in St. George's Fields, which has good accommodations for almost 500 patients, and is managed in an excellent manner. Bedlam is sometimes used as synonymous with a mad-house, or a place of uproar.

Bedle (Joseph D.). See Appendix.

Bed'loe's Island, in New York harbor and in the city of New York, 1½ miles S. W. of the Battery. It was named from a former owner. In 1800 it was ceded to the U. S. government, and in 1841 Fort Wood, mounting seventy-seven guns, was erected upon it. Bartholdi's colossal statue of "Liberty Enlightening the World," presented to the U. S. by France, now stands within the fort. The U. S. government relinquished this island for the erection of the statue. (See New York City for description and illustration of it.)

Bedmar', de (Alfonso de la Cueva), Marquis, a Spaniard, born in 1572. He was sent as ambassador to Venice by Philip II. in 1607, and formed a daring and nefarious plot to betray the Venetian city and state into the power of the king of Spain. The plot was detected one day before that appointed for its execution, and Bedmar was expelled from Venice. He became a cardinal in 1622, and died in 1655. His conspiracy is the subject of Otway's "Venice Preserved." (See Daru, "Histoire de Venise;" Saint-Real, "Conspiration contre Venise.")

Bedos de Celles (Jean François), a French Benedictine monk, born at Caux in 1706. He made several good organs at Toulouse, and wrote a work called "L'Art du Facteur d'Orgues" (4 vols., 1770), which is highly commended. Died in 1779.

Bed'ouin, or **Beduin,** written also **Bedaween** and **Bedawee** ("inhabitants of the desert"), nomadic Arabs who are, according to tradition, the descendants of Ishmael and the aborigines of Arabia. They are a pastoral people, having no houses but tents, and no permanent places of residence. They form the greater portion of the population of Arabia, but are not confined to that country. Though they are not united by a strong national organization, they have never been entirely subjugated by any foreign conqueror, as the desert into which they can retreat forms an almost insuperable obstacle to an invading army. They are now widely distributed over Northern Africa, Syria, etc. As they have no general government or political institutions, religious traditions and customs form the only bond of order and union among them. They are divided into tribes, each of which is ruled by a sheik, whose authority is patriarchal. Their riches consist chiefly in flocks of sheep, camels, horses, goats, etc. They are ignorant, fierce, depraved, addicted to robbery and fighting, and reckless of the rights of property. They profess the Mohammedan religion, but are not very strict in the practice of its discipline. Their complexion is brown of various shades. They are generally lean, sinewy, and active. An admirable picture of Bedouin life and character may be found in Palmer's "Desert of the Exodus," 1871, and in Selah Merrill's "East of the Jordan."

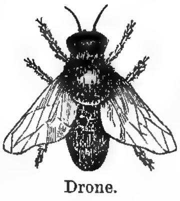
Bed'straw (*Ga'lium*), a name of a genus of herbaceous plants of the order Rubiaceæ, distinguished by a wheel-shaped corolla, and a fruit which is dry or fleshy, 2-lobed, separating when ripe into two seed-like, indehiscent, 1-seeded carpels. It comprises numerous species, natives of Europe, Asia, and the U. S. The roots of several species, as *Galium verum, Galium tinctorium,* etc., contain a red coloring-matter which is said to be equal to madder. The *Galium verum,* which is a common weed in England, is sometimes called cheese rennet, because it has the property of curdling milk. It is naturalized to some extent in the U. S. The *Galium tuberosum* is cultivated by the Chinese, who eat its farinaceous roots. *Galium Aparine,* or cleavers, is a valuable diuretic.

Bee [Gr. μέλισσα; Lat. *apis;* Fr. *abeille;* Ger. *Bie'ne*], the name of a large family of insects of the order Hymenoptera. All bees were included by Linnæus in the genus *Apis,* but they are now divided into many genera. The name Apiaria is now used to include the entire family, which has also been styled Anthophila ("flower-loving") and Mellifera ("honey-producing") by different naturalists. The insects of this extensive family, when in their perfect state, feed on saccharine juices, such as the nectar of flowers, honey, and the juice of ripe fruit. The honey-bee, on account of the large quantities of honey which it collects and stores, has attracted the attention of man in all countries, and has been celebrated for its remarkable habits in both ancient and modern times. A late writer justly remarks: "That within so small a body should be contained apparatus for converting the various sweets which it collects into one kind of nourishment for itself, another for the common brood, a third for the royal brood, glue for its carpentry, wax for its cells, poison for its enemies, honey for its master, with a proboscis as long as the body itself, microscopic in several parts, telescopic in its mode of action, with a sting so exceedingly sharp that were it magnified by the same glass which makes a needle's point seem a quarter of an inch, it would yet itself be invisible, and this, too, a hollow tube,—that all these varied operations and contrivances should be included within half an inch of length and two grains of matter is surely enough to crush all thoughts of atheism and materialism."

This small insect has doubtless excited more admiration than any other individual of the whole animal creation, except man himself, and, with the exception of the silkworm and cochineal, is almost the only insect of any commercial value. Professor Jaeger remarks: "It is impossible for any reflecting person to look at a bee-hive in full operation without being astonished at the activity and surprising industry of its inhabitants. We see crowds constantly arriving from the woods, meadows, fields, and gardens, laden with provisions and materials for future use, while others are continually flying off on similar collecting expeditions. Some are carrying out the dead, others are removing dirt and offal, while others are giving battle to any strangers that may dare intrude. Suddenly a cloud appears, and the bees hurry home, thronging at the entrances to the hives by thousands, until all are gradually received within their enclosure. In the interior of the hive we see with what skill they work their combs and deposit the honey; and when their labor is over for the day, they rest in chains suspended from the ceiling of their habitation, one bee clinging with its fore feet to the hind feet of the one above it, until it seems impossible that the upper one can be strong enough to support the weight of so many hundreds."

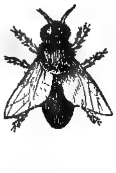
Every swarm is composed of three different kinds or classes—the queen, the workers, and the drones. The "queen" is the only perfect female in the hive, and during the propagating season lays from one to two thousand eggs in a day. She is longer than either the drones or workers, but her size in other respects is a medium between the two; in color darker on the upper side, with legs and under side yellowish. When the season for swarming approaches, which is always early in the season (usually June in our Northern States), she deposits eggs, first for the workers, then in drone and queen cells, from which males and queens are developed. There seems to be no difference between the eggs for producing a worker or a queen, but the nature of the cell and the food effects the difference. The queen lives much longer than any other bee, or often four or five years, although this longevity is disputed by some writers

Fig. 1.



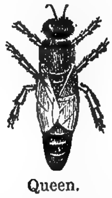
Drone.

Fig. 2.

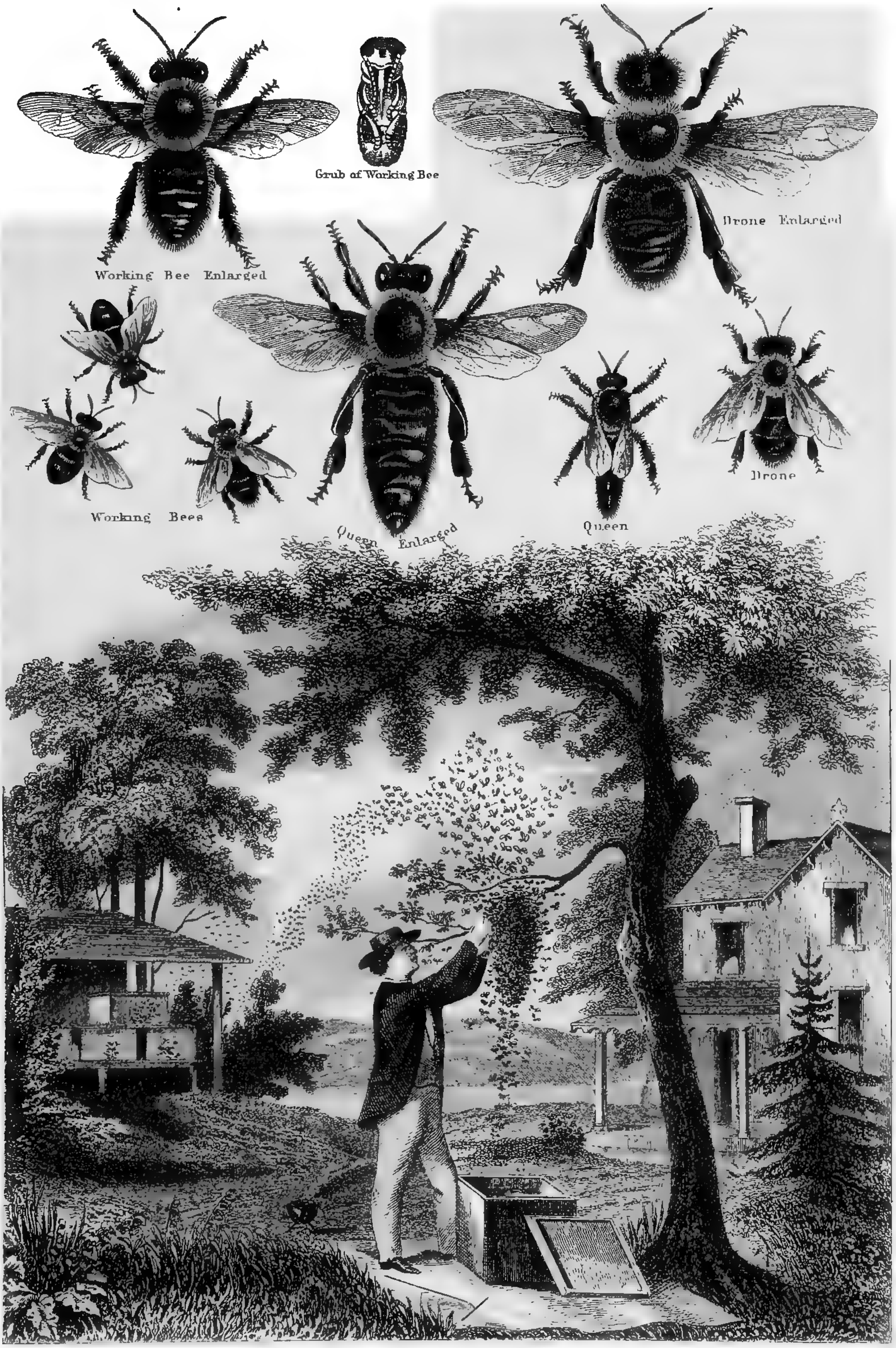


Worker.

Fig. 3.



Queen.



THE HONEY BEE.

on theoretical grounds, but observation appears to have fully established the age to be from three to five years. She is furnished with a sting, which she uses exclusively in combat with other queens.

It was well known in ancient times that a large bee with long body and short wings existed in every hive, and this was called the "king," to whom also was attributed great wisdom in governing the whole swarm. This opinion was common till within two hundred years, when Swammerdam proved by anatomical investigation that this supposed king was a female, which lays all the eggs for the multiplication and growth of the throng of individuals which she governs. Aristotle and Virgil held the opinion that this bee laid no eggs, but brought home from flowers and fruits a peculiar substance from which first the maggots and then the bees originated.

The best way of making the acquaintance of the queen is to divide a swarm and place each portion in separate hives. The portion which retains possession of the queen will soon become quiet and contented. The swarm without the queen, although apparently satisfied at first, will soon be restless and uneasy, and cease working. Then if the apiarian (who has previously provided himself with an extra queen taken from the queen-cells of a hive) offers them a queen, they receive her with a peculiar buzz of triumph, which is quickly conveyed like a telegraphic despatch through the hive, and in a few seconds they become quiet and satisfied. In order to prove that bees always follow the queen, Swammerdam tied one by means of a fine hair to the top of a pole, which he then stuck in the ground in his garden. The whole swarm immediately followed, and surrounded the queen on all sides, and he was enabled to carry them all wherever he pleased. It is in this way that certain self-styled "bee-charmers" cause the swarm to alight on the hat, beard, or other place, by securing the queen within a gauze bag or cage.

The worker-bees are imperfect or undeveloped female bees, comprising most of the hive, usually nine-tenths or more, and commonly twelve or fifteen thousand in a single hive. All the labor is performed by the workers; they gather all the honey, bee-glue, and pollen, carrying the latter in little baskets on their thighs, and the former in a little sack; they secrete wax from honey, construct the combs, feed the young, and clean the hives. They usually live about six months through the winter, and not more than two or three months during the working season. A hive is therefore a community renewed repeatedly through the year, the queen only seeing successive seasons, and on her producing many thousands of eggs the existence of the colony depends. When deprived of a queen from accident or death the hive soon dwindles and dies out.

The drones are the male bees of the hive. They have no sting, they do no work, and their only use is in the propagation of progeny. Huber, the celebrated blind naturalist of Geneva, in Switzerland, who made more discoveries of the habits of the bee by means of an assistant than any other person, asserted that the drones while on the wing meet the queen for this purpose, and this opinion is commonly adopted, but other writers think the drones only fecundate the eggs after they are deposited, in the same manner that male fishes fructify the spawn. They are larger than the working bee, have a rounder head, and are generally more clumsy in their movements. They are destroyed by the workers soon after the close of the honey season.

Bees begin to breed early in spring, and they have usually increased their numbers greatly by the month of June. After the queen has deposited eggs, it requires about twenty-two days before the worker comes out a perfect insect, and about twenty-five days for the drone. The time for the development of the queen is only sixteen days from the laying of the egg. The egg is fastened by one end to the bottom of the cell, so that it appears as if suspended in the air. It is soft and smooth, and five times as long as thick. It is first developed into a maggot which has little motion, with two white eyes, a mouth like a caterpillar, and ten respiratory holes on the sides. The maggot is fed by the workers for about a week, after which a wax cover is placed over the cell, and it becomes a pupa, remains ten days in this condition, and then breaks its wax cover, creeps out, dries its wings, and in a short time passes out of the hive, and flies away with its companions for the collection of honey and materials.

The first swarm, in the climate of the Northern and Middle States, usually leaves the hive in the month of June. The migration seems to depend in a great measure on the want of space in the mother-hive, and not on an instinctive desire for change; for skilful apiarians sometimes, by making additions to the hive, retain the increase and prevent swarming. No certain signs have been discovered to indicate the time when the first swarm will issue from the parent hive. If the weather and yield of honey are both favorable, swarming may be looked for when the bees become crowded for room and hang in large numbers outside the hive (although this often takes place without swarming), and when the hive is well filled with comb and stores. The indications are increased if it is found on examination that the royal cells for new queens are in a forward state of preparation. The old queen invariably leads forth the first swarm, usually in the heat of the day, and if rainy weather has occurred the swarming is more likely to occur on the appearance of bright sunshine. It is supposed that the queen takes the lead, and it is certain that the swarm always keeps with her, and she exercises an inscrutable influence over all the movements of the thousands which compose it. Wherever she alights they follow, and if from any cause she returns to the old hive, they all return with her.

In about nine days from the first swarming a second may be looked for, if the swarm is a strong one and the weather and honey-harvest are favorable. If a third swarm should follow, it is commonly about three days after the second. The occurrence of these two swarmings may be commonly determined with accuracy by what is termed "the piping of the queen." The apiarian places his ear near or against the hive in the evening of the seventh or eighth day, and if a second swarm is to issue he will hear a peculiar whining and peeping note within the hive. The whining sound comes from the new queen which has been left to reign by the departure of the old one; and this sound is commonly followed by a lower and quicker note from the third queen, who is to remain when the second queen quits the hive with her swarm. As this insect sovereign appears to be impelled by strong jealousy of all rivals, she endeavors to sting to death in their cells all the young queens which the workers have been feeding; and when restrained by the guard placed for their protection, it is supposed that she utters a complaint known as "piping." This is probably a fanciful supposition; but every one who has listened attentively to these sounds has been struck with the strong resemblance which the notes of the older queen bear to the tone of complaint, and those of the younger to that of defiance. Whenever these notes are heard, which is always a week or so after the departure of the first swarm, the apiarian confidently expects a second or a third, as the case may be, within a day or two, the weather permitting and no accident supervening.

The swarming of the first colony usually takes place between the hours of ten A. M. and three P. M., but second and third swarms often leave earlier or later in the day. The bees issue by many thousands, and the air is filled with them for a space of from twenty to fifty feet as dense as a snow-shower. In a short time they settle, usually on the limb of a tree, from which they hang in the form of a bag. To prevent their alighting too high up for hiving, it is best to have no high trees near the apiary, and hiving may be greatly facilitated by providing artificial supports to attract them. These are made in many different ways, all with the same object in view. A block of wood, cut in the shape of a bag or settled swarm, may be covered with dark-brown or black cloth, and hung by a hook in a convenient shady place in sight of the hives as a decoy. A few dead bees, or a portion of the seed-stalks of the mullen, strung to the block, increase the attractions. A number of these may be placed in different parts of the yard. When the swarm has settled, the support may be unhooked and carried carefully to the place for hiving, and the bees shaken off on the hiving-board. Another contrivance is the hiving-box, consisting simply of any box holding nearly half a bushel, with one side open, and attached to a pole. When the swarm comes out, the operator takes his box by the handle or pole, the box being held over his head, and walks slowly in the midst of the flying swarm. They will be likely to alight upon it and enter its open side. As soon as this takes place, it is put in a fixed position, resting against a fence, or with the pole thrust into a hole made with a crowbar by an assistant. When the bees have all settled, it is carried to the hive already prepared for the new swarm. A third contrivance is made by taking a board about the size of the bottom of the hive, boring several holes and inserting corn-cobs dyed brown or the seed-stalks of the mullen, nailing a smaller board at the top to form a hood, and attaching it by nails to a pole eight or ten feet long. When the bees begin to alight upon it it is placed, facing downward, in a sloping position in a crowbar hole, as already mentioned. A broad projecting board, inserted under the hive intended for the swarm, allows the operator to empty the bees upon it, from which they will readily pass in. When the bees have entered the board is withdrawn. The whole process is usually completed in a few minutes. If the swarm should not enter the hiving-box, but alight on some tree, the box is to be held against the spot as soon as they begin to cluster, when they will usually leave the tree and pass into the box;

or if they do not, a few jars with the side of the box will induce them to loosen their hold and enter it. The operation is easily performed, and only a minute or two is occupied in their clustering. It is well to have one or two boxes with longer poles, to secure such swarms as settle too high up for ordinary reach. The weight of swarms is usually five or six pounds, small ones four pounds, and very large ones eight or ten pounds.

The loss of newly-hived swarms, occasioned by their leaving the hive, which frequently happens under ordinary management, may be prevented by simply placing the hive flat on the bottom board for a few days, after which it may be raised on supports at the corners a third of an inch, as is always practised with established swarms. Another effectual mode is to contract the entrance to a breadth of exactly ten sixty-fourths of an inch, which allows the workers to pass, but confines the queen. Without her the bees will never leave. A strip of tin may be tacked on for this purpose, to be removed in three or four days.

Hives.—The first or original hives selected by the bees were the hollow trunks of trees, which they cleansed from dust and rubbish, gnawing off with their mandibles any asperities or projections which might interfere with the future construction of the comb. Next, they were made artificially somewhat of a bell-shape, and constructed of straw and willow twigs; and lastly in the form of oblong or cubical boxes, with various modifications and appendages. For small apiaries, when the owner desires honey simply for home consumption, and can give only occasional attention, a simple box-hive with holes through the top, and a simple rough box to hold twenty-five or thirty pounds to set over, answers a good purpose. The size of the hive should not exceed a capacity of 2000 cubic inches; it should be smaller rather than larger, and some good apiarians prefer 1700 or 1800 cubic inches, or about twelve inches each way inside. Sticks are set across for the support of the combs. It is convenient to have a pane of glass set in one side, covered and kept shut by a wooden door, for occasional examination of the interior. If *guide-combs* (or small portions of empty combs) are attached to the ceiling of the hive, the combs may be so directed that their edges will rest against the glass, and enable the operator to see between them.

If the honey which is obtained from the upper movable box is made in small glass boxes placed within this upper box, or in a corresponding chamber made in the upper portion of the hive, it will present a finer appearance and sell at higher prices in market. This chamber may be entered by a side door, and four boxes may be placed within it.

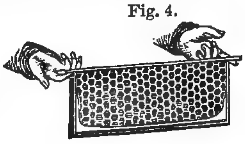
Artificial Swarms.—It often happens that the apiarian wishes to control the time and frequency of swarming, without leaving the bees themselves to decide this question at their own will. This is effected by making artificial swarms. The bees of the hive are separated into two nearly equal portions, as already alluded to, and the apiarian, having previously secured a new queen by cutting off a queen cell when she is about to come out, offers her to the unsupplied portion.

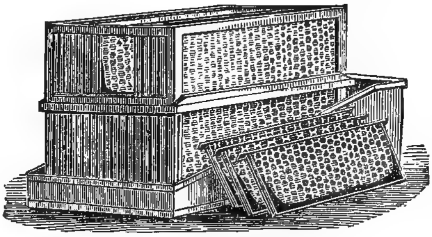
In performing all operations of this kind the bees will be rendered more quiet, and they may be handled more easily, by previously blowing upon them the smoke of rotten wood through a pipe made for the purpose. Cotton rags answer the same purpose, but tobacco smoke is too deadly. In addition to this a mask of gauze and thick gloves will afford ample protection.

Movable-comb Hives.—Apiarians who have a large number of hives for commercial purposes, who can give much personal attention, and who do not fear to approach and handle bees freely, have adopted of late years a contrivance known as movable-comb hives. These hives enable the owner to examine minutely every part of the interior, and any evil is readily discovered and remedied, each comb being made on a separate frame, which may be lifted out from the rest. If the hive should happen to be queenless, the fact may be at once determined without waiting till the numbers are ruinously reduced. Should the queen produce nothing but drones, the discovery may be at once made, and her place supplied with a more profitable incumbent. If too much drone-comb has been made, it may be replaced with worker-comb. If the moth has effected an entrance, the larvæ may be seen and at once taken out. He can limit the number of swarms, by taking out the combs and removing all the queen cells but one. When one hive has a surplus of honey and another is deficient, an equilibrium may be effected by exchanging a few combs. Old combs may be removed, all that is necessary being to substitute empty frames. Movable-comb hives greatly facilitate the making of artificial swarms.

The simplest form of the frame for the movable comb is shown by Fig. 4. Guide-combs are attached to the bars to have the bees work them straight. Langstroth's hive (Fig. 5) consists of a series of these frames, so arranged that any one may be taken out separately from the rest. Many other forms of the movable-comb hive have been lately devised, obviating difficulties connected with those first made.

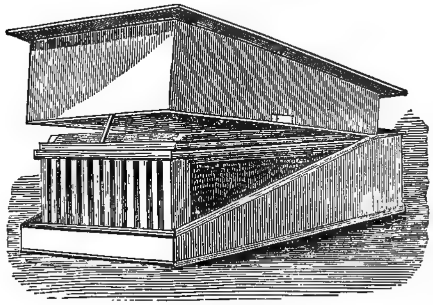
Fig. 4.





Movable frames taken out.

Fig. 5.



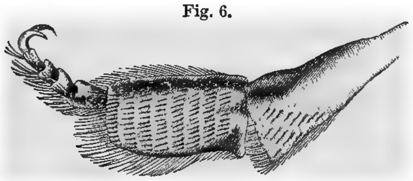
Langstroth's Hive.

The following detailed description of the mode of making artificial swarms by the use of movable-comb hives is given by L. L. Fairchild in vol. iv. of "Rural Affairs." *Artificial swarms*, equal in value to natural swarms, can be made in this way. It should only be practised when the bees are gathering honey abundantly, and there are plenty of drones to mate with the young queens. A little before, or about the time of natural swarming, is the time to practise it. A good way is to make one good swarm from two strong stocks. Take the combs from a hive (No. 1), and shake the bees back into the hive, brushing off with a wing any that may remain after a shake or two. Put these combs, destitute of bees, into a new hive. Leave one comb, containing eggs and brood, and the queen, in the old hive. Put in empty frames to fill the place of those taken out, and leave the hive on its old stand. Remove a strong stock (No. 2) to a new location, and put the hive containing the combs taken from No. 1 on the stand formerly occupied by No. 2. If this is done while the bees are in full flight, those in the field belonging to No. 2 will enter the new hive containing the combs, brood, and stores taken from No. 1. Finding their queenless condition, they will immediately set to work and build queen cells, and, if everything works right, will have a queen ready to emerge from her cell the fourteenth day. Plenty of brood will hatch from day to day to keep up the strength of the swarm until the young queen commences laying. The old stock will prosper, as it retains its fertile queen, and is in nearly the condition of a natural swarm. If a few frames containing empty comb could be given to them, it would be a great help, as every pound of comb they build consumes fifteen or twenty pounds of honey in its elaboration. There are many other ways of making artificial swarms, but this is about the safest method for the inexperienced, and produces a moderate increase of stocks, and yields a good supply of surplus honey. It will be found very safe, and profitable in the long run. The inexperienced had better not divide or increase their stocks more than fifty per cent. in any one year. Too great an increase of stocks is the rock that many an apiarian has split upon when endeavoring to increase his apiary by artificial swarming. There is a considerable saving to be made by rearing queens artificially to supply every new artificial swarm, but it should only be attempted by those well versed in the natural history and management of the bee. If you give the new swarm a sealed queen cell, it will save them time in rearing a queen.

As soon as a hive is occupied by a new swarm the first thing is to begin the manufacture of cells.

The formation of the wax is a singular and complex operation. Huber says, "The wax-makers, having taken a due portion of honey or sugar, from either of which wax can be elaborated, suspend themselves to each other, the claws of the fore legs of the lowermost being attached to those of the hind pair of the uppermost, and form themselves into a cluster, the exterior layer of which looks like a kind of curtain. This cluster consists of a series of festoons or garlands, which cross each other in all directions, and in which most of the bees turn their back upon the observer: the curtain has no other motion than what it receives from the interior layers, the fluctuations of which are communicated to it. All this time the nurse-bees preserve their wonted activity, and pursue their usual employments. The wax-makers remain immovable for about twenty-four hours, during which period the formation of wax takes place, and thin laminæ of this material may be generally perceived under their abdomen. One of these bees is now seen to detach itself from one of the central garlands of the cluster, to make a way amongst its companions to the middle of the vault or top of the hive, and by turning itself round to form a kind of void, in which it can move itself freely. It then suspends itself to the centre of the space which it has cleared, the diameter of which is about an inch. It next seizes one of the laminæ of wax with a pincer formed by the posterior metatarsus and tibia, and drawing it from beneath the abdominal segment, one of the anterior legs takes it with its claws and carries it to the mouth."

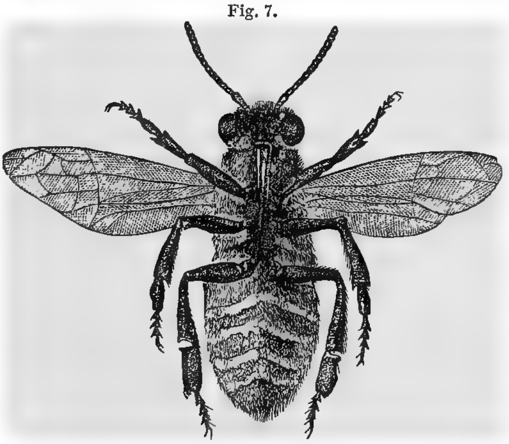
Fig. 6.



Brush and Pincers of the Bee (greatly magnified).

The wax has, perhaps, a nearer analogy to the sebaceous secretion of the integument than to any other animal secretion: it is formed beneath the scales on the under side of the abdomen, and, when accumulated there, seems to irritate the part, for the bee may then be observed wagging her body, and running round, or to and fro, as if endeavoring to shake out the little scales; and she is generally followed by one or two other bees which have been attracted by her movements, and are ready to seize upon the plates of wax as they fall. How the bees mould the scales into the walls of the cells is not yet exactly understood. Some have supposed that they bite pieces off and join them together; but the smooth and uniform surface of the cell shows that some other operation must take place: besides, the wall of the cell is sometimes thicker than a scale of wax. We must, therefore, suppose that the bees have the power of applying some dissolving or softening menstruum to the wax scales, by which they are enabled to knead and blend them into a ductile paste. And when we remember that the secretion of the salivary tubes of insects is generally alkaline, and that wax may be softened by alkali, it has been naturally supposed that it is by this means that the wax-scales are brought into a workable state. Reaumur, indeed, observed a frothy substance exuding from the mouth of a bee while working at a cell, which was applied to the proper place by the nimble tongue, and then kneaded in by the mandibles; and Huber has described the process very circumstantially: he says that the bee holds the laminæ of wax with its claws vertically—the tongue rolled up serving for a support—and by elevating or depressing it at will causes the whole of its circumference to be exposed to the action of the mandibles, so that the margin is soon gnawed into pieces, which drop, as they are detached, into the double cavity, bordered with hairs, of the mandibles. These fragments, pressed by others newly separated, fall on one side of the mouth, and issue from it in the form of a very narrow ribbon. They are then presented to the tongue, which impregnates them with a frothy liquor. During this operation the tongue assumes all sorts of forms: sometimes it is flattened like a spatula: then like a trowel, which applies itself to the ribbon of wax; at other times it resembles a pencil, terminating in a point. After having moistened the whole of the ribbon, the tongue pushes it so as to make it re-enter the mandibles, but in an opposite direction, where it is worked up anew. The liquor mixed with the wax communicates to it a whiteness and opacity which it had not before, and doubtless gives it that ductility and tenacity which it possesses in its perfect state.

Fig. 7.



Bee seen from below, with its ventral segments of wax (magnified).

Bees commonly begin at the top or roof of their chamber, and build downward, at first working irregularly, and as it were pasting over the surface, and then building horizontal cells of a more perfect form. These at length become so numerous that they extend downward in the form of a vertical wall; other congeries of cells are formed in succession, until the whole comb assumes the form of a series of perpendicular plates or partitions. Each plate consists of a double set of cells, the bottoms of which are applied to each other and form the partition between each set. The plates are not always regular, and the irregularities which may be observed are not always necessary adaptations to a peculiar form of the cavity in which they are built. The cells are not all of the same size, but a sufficient number of a given depth are reserved for receiving the eggs, and which are necessarily adapted to the size of the future maggot: the smaller or shallower cells are those in which the honey is stored. The breeding and store cells are placed horizontally, but the mouth of the cell is sometimes a little raised, the better to retain the honey. The interspace between the vertical combs is generally about half an inch; these streets, as they may be termed, in this city of industry, being just wide enough to allow two bees busied upon the opposite cells to pass without incommoding each other. In addition to these interspaces, the combs are perforated in various places, so as to allow a passage for the bees from one street to another, thus saving them much time.

The shape of each cell is not, as might have been expected, cylindrical, or that which seems best adapted to the form of the maggot, or even of the constructor bee; but it is hexagonal—the only form which allows the cell to be of the largest size in proportion to the quantity of matter employed, and at the same time to be so disposed as to occupy in the hive the least possible space. The form of the base of each cell, which is in apposition with the one on the opposite side, is also such as to gain greater strength, and more capacity, with less expenditure of wax; the latter consideration being one of great importance to bees, which do not secrete a very large quantity of this material; and the most profound mathematicians and most skilful geometers have found the solution of the problem, relating to the attainment of the preceding objects, as derived from the infinitesimal calculus, to have a surprising agreement with the actual measure of the different angles formed by the walls of the cell.

Bees do not gather honey indiscriminately from every flower. The oleander, which yields poisonous honey fatal to thousands of flies, is carefully avoided by bees, and the white nectaries of the crown-imperial tempt them in vain. The flowers of the white clover and of the basswood are especially attractive to them, and their hum may be heard among the branches of the latter at a considerable distance. Those flowers which yield a nectar innocuous to the bees themselves, but possessing poisonous qualities when taken by man (among which may be mentioned the *Kalmia latifolia*), are sometimes frequented by bees, and the honey derived from them acts like a poison.

The collection of the farina or pollen of flowers is a great object of the industry of bees. In large flowers, as the tulip, the bee dives in; and if the pollen receptacle or anther be not burst, she bites it open, and comes out singularly disguised, being covered over entirely with the fertilizing dust, which adheres readily to the fringed hairs of her body and legs.

Aristotle, who was well acquainted with much that is interesting in the economy of the bee, was the first to observe that a bee during each single excursion from the hive limits her visits to one species of flower. Modern naturalists have confirmed the general accuracy of this statement, and have noticed that the pollen with which a bee comes home laden is always of the same color. The necessity of this instinct arises out of the operation which the pollen first undergoes when collected by the bee. She rakes it out with incredible quickness by means of the first pair of legs; then passes it to the middle pair, which transfer it to the hind legs, by which it is wrought up into little pellets. Now, if the pollen were taken indiscriminately from different flowers, it is probable that the grains, being heterogeneous, would not cohere so effectually. Certain it is, that bees enter the hive, some with yellow pellets, others with orange, pink, white, or even green-colored ones, but they are never observed to be party-colored. Through this instinct, another important end is gained in relation to the impregnation of flowers; the production of hybrid plants by the application of the pollen of one species to the stigma of another is avoided, while those flowers are more effectually fertilized which require the aid of insects for that purpose.

When a pollen-laden bee arrives at the hive, she generally walks or stands upon the comb beating her wings, and three or four of her fellow-citizens assist in lightening her of her load; or the laden bee puts her two hind legs into a cell, and with the intermediate pair or the extremity of the abdomen brushes off the pellets. These are then kneaded into a paste at the bottom of the cell, and several cells are thus filled with the packed and softened pollen, which is called bee-bread.

Besides the honey and farina, bees also collect a peculiar substance like gum-resin, which was called "propolis" by Pliny; and this they obtain principally from the balsamic buds of the horse-chestnut, birch, and poplar, especially the *Populus balsamifera*. The propolis is soft, red, will pull out in a thread, and is aromatic. It is employed in the hive not only in finishing the combs, but also in stopping up every chink or orifice by which cold, wet, or any enemy can enter. Like the pellets of pollen, it is carried on the posterior tibiæ, but the masses are lenticular. Having thus traced the operations of the working bees relating to the collection of the substances required in the economy of the hive, we shall now return to the larvæ, which are the immediate objects of all this industry.

The bees may be readily detected feeding the young maggot, which opens its lateral jaws to receive the bee-bread, and swallows it. The well-fed maggot soon grows too large for its tough outer skin, and accordingly casts it; when its bulk has increased so that it fills its cell, it then requires no more food, and is ready to be enclosed for the chrysalis state. The last care of the foster-parents is to cover over the mouth of the cell with a substance of a light brown color, apparently a mixture of wax and farina. This takes place generally four days after the larva has been excluded from the egg. The enclosed larva now begins to line the cell and the covering of the aperture before mentioned with a silk, which it spins from glandular tubes similar to those of the silkworm. When the first three segments of the trunk to which the locomotive organs of the perfect insect are attached begin to be enlarged, the last larva-skin splits along the back, and is pushed off from the head backward, and deposited at the bottom of the cell, and it then becomes a chrysalis. Now the wonderful changes take place, partly by a formation of new organs, partly by a development of pre-existing ones, which end at last in the completion of the perfect bee.

Bees, although inactive during winter, are not in a torpid state, but continue to devour honey and to maintain their animal warmth.

Mr. Hunter found during an evening in July, when the temperature of the atmosphere was 54° Fahrenheit, that of the interior of a hive full of bees was 82°; and in December, the external atmosphere being 35°, the bees preserved a temperature of 73°; and, what is at this season extremely rare in the lower animals, they maintain their digestive powers and subsist on the produce of the summer and autumn. Accordingly, they are ready to take advantage of any fine or mild day, and may be seen then flying abroad and appearing to enjoy it. They void their excrements at this time, for they are insects of singular cleanliness and propriety; and when purposely confined in the hive, with abundance of food, they have been known to fall a sacrifice to this instinctive repugnance to defile the hive.

In conclusion, we may remark that the keeping and management of bees was formerly considered as very precarious and uncertain. But modern science, and the various improvements which it has effected, have made the business in practised hands as certain and successful as most agricultural pursuits. Full, populous stocks only are profitable. A weak hive will cost many times the care required for a strong one, and pays nothing back. When many hives are kept, a few spare combs on movable frames, with sealed brood, may be introduced into a weak hive. Facilities for examining and controlling are the foundation of success. As with other kinds of business, the management of bees requires attention, vigilance, and industry, combined with a knowledge of the natural history of the insect.

The Italian bee, which has been introduced of late years, is distinguished from the common bee by the yellow bands on its body and by its more vigorous habits. It commences working earlier in the morning, and continues at work later in the evening. It has a longer proboscis, which enables it to take honey from the red clover. When properly managed, it has furnished large stores of honey, but apiarians are not fully agreed as to its general value and adaptation to common management, and some years will probably be required to settle the question. John J. Thomas.

Bee (Barnard E.), a Confederate general, born in South Carolina 1824, graduated at West Point 1845 in the artillery, and served with distinction throughout the Mexican war (wounded at Cerro Gordo), his gallant conduct being recognized by his native State by the presentation of a sword of honor. He was on frontier duty principally from 1848 to Mar. 3, 1861, when he resigned, and was appointed a brigadier-general in the Confederate army. At the first battle of Bull Run, July 21, 1861, he was killed.

Beebe (Bezaleel), born at Litchfield, Conn., Apr. 28, 1741, was a Revolutionary officer; joined the Rogers Rangers in 1758; became a captain Jan., 1776, and was taken prisoner at the capture of Fort Washington; was exchanged, and became major in 1777, lieutenant-colonel in 1780, colonel in 1781, and afterwards commanded the Connecticut troops raised to defend the sea-coast; was often a member of Connecticut legislature between 1781 and 1795. Died May 29, 1824.

Beech [Ger. *Buche*], (*Fa'gus*), a genus of trees of the order Cupuliferæ, natives of Europe, America, and Australasia. The sterile flowers have a bell-shaped calyx five to seven cleft, with eight to sixteen stamens. The fertile (or female) flowers grow on the same tree, the fruit of which is a triangular or sharply three-sided nut, two of which are enclosed in an urn-shaped, coriaceous involucre or husk. These nuts, called beechmast, are edible, and are valuable as food for swine. They yield a large proportion of a bland fixed oil which is used as food and burned in lamps by Europeans; the husks contain a volatile, narcotic, poisonous principle called *fagine*. The genus comprises several species of beautiful forest trees, with a close and smooth ash-gray bark and a light horizontal spray. The *Fagus sylvatica*, or common beech of Europe, forms whole forests in many parts of that continent. It grows to the height of about 100 feet, and sometimes has a diameter of four feet, and is a very ornamental tree, especially when it stands alone. The wood is hard and valuable for fuel, and, being durable under water, is employed in the erection of mills. The French use it extensively in the fabrication of *sabots* or wooden shoes. The white beech, which is a common tree in some parts of the U. S., is, according to some botanists, the same species as that which has been just described. The *Fagus ferruginea* (red beech or American beech) is abundant in the Northern U. S., sometimes growing gregariously in forests which contain few other trees. Its leaves are oblong-ovate, taper-pointed, distinctly and often coarsely toothed or serrate. This is an ornamental tree, which sometimes attains a height of 100 feet, and surpasses most trees in the depth of shade produced by its rich green and shining foliage. The wood is hard, heavy, good for fuel, plane-stocks, shoe-lasts, tool-handles, and other purposes. The color of the wood is a light brown or reddish; hence the name. Among the other species is the myrtle tree of Tasmania (*Fagus betuloides* or *Fagus Forsteri*), a very large and ornamental tree, with evergeen and coriaceous leaves, which resemble birch leaves in form. *Fagus procera*, which attains a lofty stature in the Andes of Chili, is a valuable timber tree. The *Fagus antarctica* is a characteristic tree or shrub of far antarctic regions, and is said to be found farther S. than any other shrub.

C. W. Greene.

Beech Drops. See Epiphegus.

Beecher (Catharine Esther), an American writer, eldest daughter of Lyman, was born at East Hampton, Long Island, Sept. 6, 1800. She conducted a female seminary at Hartford, Conn., 1822–32, and for two years afterward was at the head of an institution in Cincinnati, O., for female education. For many years afterward she was employed in developing a plan for female Christian education, which included the training and subsequent employment of teachers. She published, besides other works, "Domestic Service," "Treatise on Domestic Economy," "True Remedy for the Wrongs of Women," "Manual of Arithmetic," "Elementary Book of Instructive Theology," "Physiology and Calisthenics," and "Common Sense applied to Religion." Died May 12, 1878.

Beecher (Rev. Charles), a preacher and writer, a brother of the preceding, was born at Litchfield, Conn., in 1815. He was ordained in 1844 pastor of a church at Newark, N. J., and was settled at Georgetown, Mass., in 1857. Among his works is "Pen Pictures of the Bible" (1855).

Beecher (Edward), D. D., a brother of the preceding, was born in 1804. He graduated at Yale in 1822, was president of Illinois College from 1831 to 1844, and pastor of Salem Street church, Boston, from 1846 to 1856. He published "The Conflict of Ages" (1856) and other works, including an able work on Baptism.

Beecher (Henry Ward), a celebrated American author and divine, son of Dr. Lyman Beecher, noticed below, was born at Litchfield, Conn., June 24, 1813. At an early age he had a strong predilection for a seafaring life, which, however, he renounced in consequence of the deep religious impressions which he experienced during a revival. Having graduated at Amherst College in 1834, he devoted himself to the study of theology at Lane Seminary under the tuition of his father, who was then president of that institution. He became in 1847 pastor of the Plymouth (Congregational) church in Brooklyn, where his genial and original eloquence has continued to attract the largest congregation, it is said, in the U. S. He was editor of the "Independent" from 1861 to 1863, when he visited Europe for the benefit of his health. His earnest addresses to large audiences on the subject of the American war appear to have had considerable influence in turning the current of public opinion in Great Britain in favor of the Union cause. Mr. Beecher has also been a prominent advocate of anti-slavery and temperance reform, and more recently of the rights of women. Among his principal works are "Lectures to Young Men" (1850), "Star Papers" (1855), "Life Thoughts" (1858), "Royal Truths" (1864), a novel, "Norwood" (1864), "Life of Christ" (vol. i. 1871), "Evolution and Revolution" (1884), and "Sermons on Evolution and Religion" (1885). He was editor of "Christian Union" 1870–81.

Beecher (Lyman), D. D., an eminent American theologian, born at New Haven, Conn., Oct. 12, 1775. He graduated at Yale College in 1797, studied theology under President Dwight, and became in 1810 minister of the Congregational church at Litchfield, Conn. He was a popular preacher, and acquired great influence among the orthodox churches. To oppose the rapid progress of Unitarian doctrines he removed to Boston about 1826, and preached in the Hanover Street church. He was president of Lane Seminary at Cincinnati 1832–51. He published, besides other works, "Views in Theology" and "Sermons on Temperance," which had a great circulation. He was a man of very energetic character. Died at Brooklyn, N. Y., Jan. 10, 1863. (See his "Autobiography and Correspondence," edited by his son, Charles Beecher, 2 vols., 1864.)

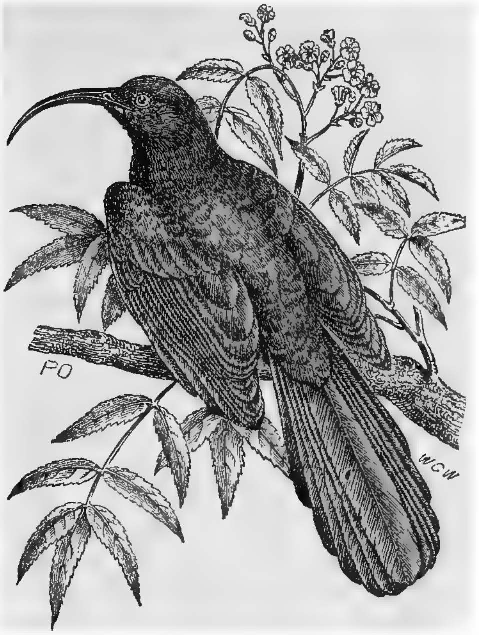
Beecher (Thomas Kennicutt), an able Congregational minister, son of the preceding, born Feb. 10, 1824, graduated at Illinois College (Jacksonville, Ill.) in 1843. For over twenty years he has been pastor of a church in Elmira, N. Y. He is an influential speaker and writer, and distinguished for philanthropy. His especial work seems to be to discourage sectarian feeling in the churches.

Beech'ey (Frederick William), an English navigator, born in London Feb. 17, 1796. He accompanied Sir Edward Parry in an Arctic expedition in 1819, and explored the northern coasts of Africa in 1821. Having obtained the rank of commander or captain, he conducted an exploring expedition to the Polar Sea *viâ* Behring Strait. He discovered Port Clarence and Port Grantley, returned in 1828, and published a narrative of his voyage in 1831. He became a rear-admiral of the blue in 1854. Died Nov. 29, 1856.

Beechey (Sir William), R. A., an eminent English portrait-painter, the father of the preceding, was born in Oxfordshire Dec. 12, 1753. He became a pupil at the Royal Academy in 1772, was employed by the nobility, and in 1793 was made portrait-painter to Queen Charlotte and associate of the Academy. Died Jan. 28, 1839.

Bee'der, or **Bider,** a fortified city of Hindostan, capital of a district of the same name, is near the Manjera River and in the Nizam's dominions, about 75 miles N. W. of Hyderâbâd. It was formerly an important place, but is now chiefly remarkable for the manufacture of tutenag wares of an alloy of tin and copper.

Bee-Eater, a name given to various birds of the order Insessores, tribe Fissirostres and family Meropidæ, which is allied to that of kingfishers. The genus *Merops* comprises numerous species, found in Asia, Africa, and Europe, which feed on bees and other hymenopterous insects. The common bee-eater (*Merops apiaster*) abounds in the S. of Europe as a summer bird of passage. It seizes bees as they fly in the air, and watches for them near their hives. It breeds in holes which it excavates in the banks of rivers. There are several other genera called bee-eaters. The Namaqua bee-eater (*Rhinopomastes cyanomelas*) is a West and South African bird.



The Namaqua Bee-Eater.

Beef-Eater, a term applied jocularly to certain British functionaries belonging to the yeomen of the guard, who form part of the train of royalty, and attend the sovereign at royal banquets, coronations, etc. This term appears to be a corruption of the French *buffetier,* one who serves at the *buffet* (sideboard).

Beef-Eater (*Bu'phaga*), a genus of birds of the order Insessores and tribe Conirostres, sometimes called ox-pecker. They are exclusively African, and have a remarkable habit of sitting on the backs of oxen, buffaloes, camels, etc., in order to feed on the larvæ of flies which they find on their hides, and which is said to be their principal food. This genus comprises the species called buffalo-bird of South Africa.

Beef Tea, an article of diet of the greatest importance in the treatment of the sick and the nurture of infants. To prepare palatable beef tea is a matter of some difficulty, but the following rules are excellent and easy to follow: Take one pound of juicy, lean beef from the shoulder or the round, and mince it with a sharp knife on a board or a mincing-block. Put it with its juice into an earthen vessel containing a pint of tepid water, and let it stand for two hours. Strain off the liquid through a clean cloth, squeezing well the meat, and add a little salt. Place the whole of the juice thus obtained over the fire, but remove it as soon as it has become browned. Never let it boil, otherwise most of the nutritious matter of the beef will be thrown down as a sediment. A little pepper or allspice may be added if preferred.

Beehive House, a name given to certain ancient dome-shaped buildings found in Ireland, and supposed to have been erected in the twelfth century or earlier. They are round edifices, built, without cement, of long thin stones placed in horizontal layers, each slightly overlapping another, and so gradually converging to the top. Beehive houses are single or in clusters. The former are generally beside ancient oratories, and are supposed to have been dwellings of priests. In some places occur several hive-shaped subterranean chambers connected by a passage or gallery. Ruins of single beehive houses are found in the Western Isles of Scotland.

Beek (David), born at Delft, South Holland, in 1621, was one of the most famous pupils of Van Dyck. He was appointed teacher of drawing to the prince of Wales and his brothers by Charles I. of England, and was afterward employed by Christina of Sweden to paint the portraits of the sovereigns and leading persons of Europe. Died in 1656. (See Descamps, "Vie des Peintres Flamands, Hollandais," etc.)

Beel'zebub [Gr. Βεελζεβούλ, *Beelzeboul*, or *Beelzebul*], (*i. e.* "the god of dung or of flies"), the name of a god worshipped by the people of Ekron, in Philistia. As the heathen deities were all regarded as demons by the Jews, the name Beelzebub came in course of time to be commonly applied to a prince or chief of evil spirits, and in this sense it is employed in the Gospels. This name is found only in the New Testament. The original and authorized spelling is Beelzebul, which appears to have been afterwards changed so as to resemble Baalzebub, which was the proper name of the heathen divinity.

Beer [Ger. *Bier;* Fr. *bière*]. The common beer known as *beer, ale, porter, stout,* etc. is the fermented infusion of malted barley, flavored with hops. In a wider sense the term *beer* is applied to beverages prepared from cereals, barley, rye, wheat, Indian corn, millet, etc., the chief constituent of which is starch. The treatment involves the preliminary operations of *malting* and *mashing*, or changing the starch to gum (dextrine) and sugar (glucose) by the aid of the natural process of germination. The term *wine,* on the other hand, is restricted to alcoholic liquids obtained by fermenting the saccharine juices of fruits, as the grape, apple, pear, currant, and gooseberry, or the sap of such plants as the sugar-cane, palm, American aloe, etc. There are, however, many beverages of inferior quality called beer, which consist of saccharine liquors more or less completely fermented, and flavored with various substances, such as spruce beer, ginger beer, root beer, etc.

The manufacture of beer from barley is divided into two distinct processes—*malting* and *brewing*—which are conducted in different establishments, the *malt-house* and the *brewery;* the brewer often purchasing his malt from the maltster. *Malting* consists of four successive operations: (1) *Steeping.* The barley is placed in wooden cisterns, covered with cold water, and allowed to soak for two or three days, when the water is drained off. By this operation the barley absorbs from 10 to 50 per cent. of water, softening and swelling up at the same time. (2) *Couching.* The softened barley is thrown out upon the floor of the malt-house in heaps or *couches*, where it heats spontaneously and begins to germinate, throwing out rootlets or *radicles*, and shoots or *acrospires.* At the same time it evolves a portion of its water, the operation being called *sweating.* (3) *Flooring* is resorted to in order to check the germination by reducing the temperature. It consists in spreading the barley over the floor, and repeatedly turning and respreading it over a constantly widening area in layers of diminishing thickness. When the process of germination has proceeded as far as is desirable, it is completely stopped by (4) *Kiln-drying.* This is effected in a large room with brick or tile floors, the *kiln,* which is heated to the desired temperature. Here the germinated barley is rendered perfectly dry and crisp. It is then *malt.* The appearance of the malt, and the color of the beer made from it, depend upon the temperature of the kiln. At between 90° and 100° F. pale malt results; at 120°–125°, amber malt; 150°–170°, brown malt for porter and stout. Black malt is prepared by roasting the malt in cylinders, at 360° to 400° F., such as are used for roasting coffee. It is used as a coloring for porter. During the process of malting the barley increases in volume and diminishes in weight; 100 measures of barley yield 101 to 109 of malt, but 100 pounds yield only about 80 pounds of malt. The loss in weight is largely due to the perfect drying in the kiln, fresh barley containing 10 to 16 per cent. of water. It is, however, in part due to the removal of some soluble constituents in the steeping, to the destruction of some during germination, and evolution in the form of carbonic acid, water, hydrogen, nitrogen, etc., and to the shoots and rootlets. An experiment made by C. John gave the following results, leaving out the percentages of water: 100 parts of barley lost in the steeping 0.391; 100 parts of steeped barley yielded—

Malt	83.09
Shoots	3.56
Rootlets	4.99
Gases	8.36
	100.00

The object of changing the barley to malt is to render its constituents soluble, and bring them into a condition suitable for fermentation. During germination the albuminous substances are changed to *diastase,* a body which exerts a wonderful action upon starch. One part of diastase is said to change 2000 parts of starch (which is insoluble) to dextrine (gum), and then to glucose (grape-sugar), both of which are soluble in water. It is very doubtful whether what Payen and Persoz called *diastase* is a distinct body, but the name is a convenient one for the albuminous matters, modified and rendered soluble by germination, which act as ferments, and possess the important properties above mentioned.

Germination is considered to have gone far enough when the acrospire has advanced two-thirds the length of the grain. Were the process of germination allowed to proceed farther, the various constituents of the seed would be assimilated by the young plant, and transformed into insoluble tissues, as they really constitute the supply of food designed to sustain the germ during its early development, until having acquired leaves and roots it can obtain its food from the atmosphere and soil. It was formerly supposed that the conversion of the starch into dextrine and glucose took place to a large extent during the malting, and the following analyses by Proust have long been quoted to sustain this view:

	Barley.	Malt.
Gluten	3	1
Starch	87	68
Gum	4	15
Sugar	5	15
Resin	1	1
	100	100

More recent investigations and analyses made by improved methods have shown that very little starch is changed to dextrine and sugar during the early stages of germination to which the barley is subjected during malting. While a larger quantity of starch is converted into dextrine during the kiln-drying, especially in the preparation of dark-colored malt, the starch is but little affected until the brewer exposes the malt to the action of warm water in his mash-tub. Here the changes supposed by Proust to occur during the malting actually take place.

The exact analysis of malt is attended with almost insurmountable difficulties, and it has not yet been possible to ascertain the precise nature of the chemical processes involved in its formation. Dr. Stein investigated the subject in 1860 (*Wilda's Centralblatt*, 1860, ii., p. 8) and C. John in 1869 (*Byer, Bierbrauer*, 1869, No. 5, p. 101). John found that in the conversion of barley into malt, not counting the shoots and rootlets, the fat diminished from 2.73 to 1.906 per cent., cellulose 12.24 to 7.18, while the dextrine increased to 8.600, the glucose from 0.34 to 1.49, and the substances soluble in alcohol and in water from 5.949 to 16.72. Stein reports that the fat diminished from 3.56 to 2.09, the cellulose 19.86 to 18.76, the starch 54.48 to 47.43, the insoluble albuminoids from 11.02 to 9.02, while the dextrine increased from 6.50 to 6.95, the soluble albuminoids from 1.26 to 1.96, the non-nitrogenous extractive matters from 0.90 to 3.68. These differences appear very slight; but although analysis thus fails to reveal the character of the changes, their extent and importance are at once seen on exposing barley and malt to the action of warm water. The former is hardly affected, while the latter quickly yields a sweet wort, containing large quantities of dextrine, glucose, albumen, etc.

The diastase of malt is capable of changing to glucose a much larger quantity of starch than exists in the barley; hence unmalted grain is sometimes added to the malt during the subsequent operation of mashing. In Belgium potato starch is largely employed.

Brewing.—The first operation of the brewer is the *bruising* or crushing of the malt, which is accomplished by passing it between iron rollers. It is then placed in the mash-tub with warm water, and raised gradually to about 167° F. It is here that the starch is transformed into dextrine and glucose, which, with the soluble albuminous and saline constituents, are taken into solution by the water. From one to four bushels of malt are used for each barrel of beer. When the price of malt is high, a portion of it is replaced by cheaper amylaceous or saccharine substances, such as potato starch, or glucose prepared from it by the action of sulphuric acid. The insoluble residuum from the malt is sold under the name of brewers' grains for feeding cows. The infusion is allowed to stand for a few hours to clarify or set, and the sweet clear *wort* is then drawn off into a copper boiler, when it is boiled with the hops. From one to five pounds of hops are added for each barrel of beer, the quantity varying with the strength of the beer, the length of time it is to be kept, and the climate to which it is going. The hops are the female flowers of the *Humulus Lupulus;* they contain a peculiar essential aromatic oil, a bitter principle, *lupuline,* tannic acid, resin, etc. They communicate an agreeable flavor to the beer, add to its tonic and stimulating properties, aid in clearing it by the action of the tannic acid on the albumen, and diminish its liability to spoil on keeping. (See Hops.) Dr. C. A. Seeley of New York has prepared an extract of hops by means of gasolene (petroleum spirits) which he considers much preferable to the entire hops. The boiled wort is cooled as quickly as possible, either by placing it in shallow vessels or passing it over a series of tubes through which cold water circulates. It is then run into the fermenting vats or tuns, which in large breweries sometimes have a capacity of 1200 or 1500 barrels. The temperature of the wort best suited to successful fermentation depends upon the season. In summer, with the atmosphere at 75° F., it should stand at about 55°; with air at 55°, at 60°; while in the winter it should have a temperature of at least 64°. If a very quick fermentation is desired, it may be considerably higher. For every 100 gallons of wort about 1 gallon of yeast is added, which has been produced in a previous brewing of the same kind of beer. The yeast is usually mixed with a little wort, and left in a warm place till it begins to ferment. This *lobb*, as it is called, is then added to the tun. More yeast is employed in winter than in summer; twice as much at 50° F. as at 68°. In six or eight hours fermentation becomes active; the wort begins to work, the glucose, under the influence of the active ferment *yeast*, undergoes decomposition, yielding alcohol and carbonic acid, the latter escaping in bubbles, and bearing to the surface particles of yeast, which form a scum. The yeast itself, being a plant, develops rapidly, largely at the expense of the nitrogenous albuminous matters of the wort, which are thus withdrawn. (See Yeast.) The temperature rapidly increases, rising many degrees. This fermentation continues for six or eight days. When it has reached the proper point, the beer is separated from the yeast, and transferred to the *cleansing butts*. Here a slow, almost imperceptible, fermentation takes place. The solid particles of the yeast rise to the surface and escape through the bungholes of the casks. Finings are sometimes added to clear the beer; they generally consist of isinglass dissolved in a little sour beer. The beer is then transferred to store-casks, where a slow fermentation occurs, which produces no perceptible quantity of yeast; the beer develops its finer qualities, and is here finished for use. (See Fermentation.)

The composition of the water used in brewing is supposed to exert an important influence on the success of the process. Lime salts are said to aid in clearing the beer, as they form insoluble compounds with some of the acids present. Sulphate of lime, or gypsum, is sometimes added to the water. The spring water at Burton-on-Trent is said to contain considerable sulphate of lime. The strength and taste of beer depend upon the quantities of malt and hops employed and the mode of conducting each of the several operations, especially the fermentation. *Strong* beers contain much alcohol; *substantial* beers are those which have not been fermented so thoroughly, and which consequently contain more of the extractive matters of the malt. Bitter beers contain more of the hop extract.

Ale is prepared from pale malt, and the active fermentation is checked while there still remains a considerable quantity of sugar unchanged. This, by subsequent fermentation in the barrel or bottle, keeps up the briskness. *Pale ale* is made from malt dried in the sun or by steam. It is not allowed to rise above 72° during the fermentation. The formation of acetic acid is thus prevented, and the unpleasant flavor due to the solution of the yeast by the alcohol is avoided. *Scotch ale* is a sweet strong ale. *Small beer* is a weak liquor made by using little malt, or by mashing with fresh water the malt residuum left after the wort for ale or porter has been drawn off. *Porter* is a dark-colored beer made from a mixture of pale, amber, brown, and black malt. *Stout* is strong porter. *Berlin white beer* (*weiss beer*) is prepared by quick fermentation from a mixture of 1 part of barley malt and 5 parts of wheat malt with half a pound of hops per bushel.

Lager Beer.—The beer of Bavaria, which has of late years been so extensively manufactured in the U. S. under the name of *lager beer*, owes its name (from *lager*, a "storehouse") to the fact that it is stored in cool cellars or vaults for several months before it is used, and its remarkable keeping qualities and highly prized properties to the peculiar kind of fermentation by which it is produced. The fermentation of ordinary beer and ale takes place at high temperatures; it is consequently rapid, and the carbonic acid, evolved in bubbles, carries a portion of the yeast to the surface, forming a thick scum. This scum protects the beer from the oxygen of the air. The conversion of gluten into yeast is in part a process of oxidation, and the oxygen being excluded considerable gluten remains unchanged, and acting as a ferment leads to the subsequent change of alcohol to acetic acid. The fermentation of lager beer is conducted at a low temperature—between 40° and 50° F. It proceeds more slowly, and the carbonic acid does not carry the yeast to the surface. Consequently, the air has a freer access, and the gluten is more completely converted into yeast. This beer is usually fermented in the winter, or, if in summer, in rooms cooled by ice. This is called sedimentary or under-fermentation, to distinguish it from the ordinary surface fermentation. The yeast, called bottom yeast, is quite different from ordinary yeast, and has a tendency to induce the kind of fermentation by which it was produced. The following is a brief outline of the process employed at one of the largest lager-beer breweries in New York. The barley is soaked two or three days, changing the waters; it germinates six to ten days, till the radicles are brownish; it is then kiln-dried. It is crushed between rollers, mashed at 120° to 140° F., the temperature being raised by the addition of boiling water to 160° or 170°. By adding hot water to the residue a second wort is obtained. The first wort is boiled with the hops; the second wort is let in, and the whole is boiled three or four hours. After cooling to between 44° and 50° F., it is run into open fermenting tuns. One gallon of yeast is added for every twenty to twenty-five barrels. Fermentation continues from ten to twenty days. There is a heavy froth at first, which subsides, leaving the surface clear. It is racked off into hogsheads, when the yeast is found at the bottom of the tuns. It stands in these hogsheads with the bung open. A few days before it is to be put in barrels for use the bung is driven in to accumulate carbonic acid for *life*.

Three varieties of this beer are made: (1) "*Lager*," or summer beer, for which 3 bushels of malt and 1½ to 3 pounds of hops are used per barrel, and which is not ready for use in less than from four to six months. (2) "*Schenk*," winter or present-use beer: 2 to 3 bushels malt and 1 pound hops per barrel; ready in four to six weeks. (3) *Bock* bier, which is an extra strong beer, made in small quantity and served to customers in the spring, during the interval between the giving out of the schenk beer and the tapping of the lager. In its manufacture 3½ bushels of malt and 1 pound of hops per barrel are used, and it requires two months for its preparation.

The barrels for lager are coated with pitch on the inside, to prevent the beer soaking into the wood and giving rise to acetic acid when they are empty. Lager is therefore the product of a peculiar slow under-fermentation, which takes place at low temperatures.

Chica, or maize beer, was used by the South American Indians before the Spanish conquest. *Bourza*, or millet beer, is made by the Crim Tartars. *Quass*, or rye beer, is a sharp acid beverage prized by the Russians. *Koumiss*, or milk beer, is prepared by the Tartars from mares' milk, which they dilute and ferment.

Composition of Beer.—The stimulant and tonic properties of beer are due to the alcohol and the bitter principle of the hop, while its nutritive value is ascribed to the extractive matters derived chiefly from the malt. The exact character of many of the constituents of beer is not known. Besides water, alcohol, dextrine, and grape-sugar, the following substances have been identified: glycerine, succinic, acetic, lactic, propionic, glucic, and carbonic acids, albumen and albuminous principles, bitter and resinous matters and essential oil from the hop, and alkaline and earthy salts. The latter, which amount to from 0.15 to 0.28 per cent. of the beer, are from one-half to two-thirds alkaline and earthy phosphates. The unrecognized constituents of beer are grouped under the term extractive matters. In the following table the term *extract* includes all the substances left when the alcohol and water are removed by evaporation:

Analysis of Beer.

Kinds.	Percentages.		Contents per Imperial Pint.	
	Alcohol.	Extract.	Alcohol, fl. ounces.	Extract, ounces.
Burton ale (Allsopp's)	8.25	13.32	2.16	2.77
Bass's barley wine	8.41	11.75	2.18	2.42
Edinburgh ale	4.41	3.58	1.12	.72
Guinness's stout	6.81	6.17	1.74	1.25
Truman, Hanbury & Co.'s porter	4.02	5.12	1.03	1.01
Whitebread's porter	4.28	5.15	1.09	1.03
Hoare's porter	4.18	5.04	1.06	1.03
Perry's ale	3.87	3.65	0.98	0.73
Munich lager	4.70	6.10	1.19	1.22
New York lager	5.86	4.32	1.48	0.88
Munich schenk	3.90	5.7	1.00	1.16
Munich bock	4.60	9.2	1.17	1.90

Adulteration of Beer.—There is a popular impression that beer is extensively and injuriously adulterated; that potato starch, grape-sugar, glycerine, and molasses are added as substitutes for malt; pine bark, quassia, walnut leaf, wormwood, bitter clover, aloes, picric acid, cocculus indicus, and strychnine as substitutes for hops; and various chemicals to neutralize acidity or conceal dilution. A few of the first mentioned would not be unwholesome, and it is not probable that many, if any, of the others are ever used. Glucose, or grape-sugar, made from corn-starch, is extensively used whenever the relative prices of barley and grape-sugar make it profitable to do so. Grape-sugar is in no way unwholesome, but it is a very poor substitute for barley. It yields alcohol by fermentation, but does not contain the albumen, extractive substances, and inorganic salts which are contained in barley; consequently, the beer is poor. It has been customary of late to omit the storage of beer before it is sold; the beer is sent to the consumers without waiting for the after-fermentation in the barrels, and to produce the effervescence which formerly came from fermentation compressed discs of sodium bicarbonate are introduced into the kegs and barrels through the bung-hole. C. F. Chandler.

Beer'sheba (*i. e.* the "well of the oath," or "well of the seven"), an ancient frontier place of Palestine, situated about 50 miles S. S. W. of Jerusalem, and near the border of the desert. Abraham, Isaac, and Jacob often dwelt there. The phrase "from Dan to Beersheba" was used proverbially to express the whole extent of the land of Israel. There are still to be seen seven wells of ancient masonry, from five to twelve and a half feet in diameter; but only two of them now contain water.

Beershe'ba Springs, Grundy co., Tenn., on the summit of a spur of Cumberland Mountain, 12 miles N. E. of McMinnville, has valuable tonic, saline, and chalybeate mineral waters, and very beautiful scenery. This is a fashionable watering-place for the people of the South-west.

Bees'wax [Lat. *ce'ra*], a substance manufactured or secreted by the honey bee, is the material of which its cells and combs are constructed, and is an important article of commerce. Purified beeswax is tasteless, odorless, and colorless. Its specific gravity is about .960. It fuses at 145 F., is insoluble in water, and partly soluble in boiling alcohol. Beeswax is extensively used in the manufacture of candles and tapers, and for other purposes. It consists of—(1) myricin, which is insoluble in boiling alcohol, and is chiefly myricic palmitate, $C_{30}H_{61}.C_{16}H_{31}O_2$; (2) cerotic acid, $C_{27}H_{54}O_2$, which dissolves in boiling alcohol, but crystallizes out on cooling; (3) cerolein, which remains dissolved in the cold alcohol.

Beet [Ger. *Beete*], (*Be'ta*), a genus of plants of the order Chenopodiaceæ, extensively cultivated for their esculent roots, which are large and succulent. The species of *Beta*, which are not numerous, are mostly biennial, with smooth, ovate, and petiolate radical leaves. They are natives of the temperate parts of the Eastern hemisphere. The common beet (*Beta vulgaris*) is indigenous on the shores of the Mediterranean, and is extensively cultivated in gardens and fields. The boiled roots are a common article of food in most civilized countries of Europe and North America. Large quantities of sugar are extracted from the roots of the beet in France and Germany. The beet-sugar, when refined, is identical with that of the sugar-cane. The beet prefers a rich, light soil. The variety chiefly cultivated in gardens is the red beet, so called from the color of the root, which is sometimes conical. A coarser variety of beet, called mangold-wurzel, is a valuable food for cattle. (See Sugar.)

Bee'thoven, van (Ludwig), a famous musical composer, born at Bonn Dec. 17, 1770. He was the second of four children, of whom the first died an infant. His father, Johann van Beethoven, tenor singer in the chapel of the elector, being poor, mainly in consequence of bad habits, discerned the remarkable musical talents of his son, and prepared early to press them into service by teaching him to play the harpsichord before he was five years old. Having outgrown his father's instruction, the lad was put under the tuition of Pfeiffer, oboist in the chapel, and then under that of Van der Eder, reputed the best organist in Bonn. At the age of eleven he was transferred from Van der Eder to his successor in the chapel, Neefe, who spoke warmly of the boy's proficiency and mastery of the music adapted to the harpsichord. The master himself seems to have given him special instruction in the science of composition, and even had published some of his compositions. At this period the lad dedicated to the elector three pianoforte sonatas, which also were printed. From this time his reputation increased, and his prosperity, under the auspices of eminent patrons, brightened. When but fourteen he was made assistant court-organist, and three years later was sent to Vienna, at the elector's expense, to pursue his studies under the direction of Mozart, then at the height of his fame. In Vienna he finally made his home, after an incidental residence of several years in Rome, where his efforts were required to support his two younger brothers. On his return to Vienna he studied hard with Haydn and Albrechtsberger, the celebrated contrapuntist, making himself perfect master of the science of musical composition. His favorite instrument at this time was the pianoforte, on which he soon rivalled the best performers. His technical education being completed, his powers trained, his method formed, works came from his hand with astonishing rapidity. There is difficulty in fixing the dates of his compositions, but before he was thirty years old he had published as many as twenty sonatas for the pianoforte, nine for piano and instruments, two concertos for piano and orchestra, trios, quartetts, quintetts, septetts, a ballet, "The Men of Prometheus," and two orchestral symphonies. At this period he moved in the best society, was noticed by persons of rank, and recognized by all as a genius of the first order. These were his happy, hopeful days, but they did not last long; they were soon clouded by the one great calamity of his life—a misfortune that to a musician would seem almost fatal to achievement. Already in 1800 he speaks sadly of a defect in his hearing which occasioned serious inconvenience. It increased so rapidly that before long, in the course of two or three years, during which he had a violent sickness, he became totally deaf. This affliction clouded his inner life, made him distrustful, restless, suspicious, melancholy, and unsocial. From this time books, meditation, and solitary walks in the country were his sole recreation. His society was limited to a few select friends, with whom he could forget himself. He lived in his work, and his work went on increasing in volume, gaining in power and deepening in intensity from year to year. The achievements of his genius cannot be described in few words. In less than five years were produced the "Heroic Symphony," "Fidelio," Symphonies Fourth, Fifth, and Sixth, with the grand mass in C. In 1813 came the Seventh Symphony; three years later the Eighth, in 1824 the Ninth or "Choral" Symphony, by many thought the most wonderful of all—by Beethoven himself regarded as the most significant; and in the intervals between these gigantic creations was produced some of his most perfect music. To give here any account of these works is impossible; they cannot so much as be named, for they cover nearly every species of composition, and are so remarkable that nearly every one merits special notice. They are as extraordinary for their wealth of thought and feeling as for their mastery of the laws of composition. They constitute a musical library by themselves. The nine symphonies and the grand sonatas for the pianoforte are monuments of genius which alone would give immortality to their creator.

Beethoven died Mar. 26, 1827, of dropsy, following a violent inflammation of the lungs. His constitution, naturally strong, had been tried by severe shocks of illness. His life was solitary; he was never married. His strongest natural attachment was for a nephew who proved unworthy of his uncle's devotion. Though his deafness made him a recluse, he was not selfish, sordid, or narrow-souled. On the contrary, his human feeling was of the deepest, and, though he could never have been rich, he showed himself capable of generosity. An enthusiastic republican in his belief, and an ardent sympathizer with his countrymen in their struggles for political liberty, Beethoven suffered bitterly for the woes of his Fatherland, and poured out through his music the passion of his proud, agonized heart. There are worlds of sorrow in his compositions. They are, in every sense of the words, modern and living. Though so thoroughly accomplished in musical science, Beethoven was never scholastic; though so deeply charged with emotion, he was never sentimental. His works convey the profound, various, comprehensive feeling which was natural to a sensitive spirit, keenly responsive to all the joy and sorrow of the new age. To this is due their extraordinary hold on people who are quite unable to appreciate their technical excellence.

That Beethoven was a man of vast intellect his compositions testify. But he was something besides a musician. He read much and thought much; he was by no means unfamiliar with the literature of Germany, and even with Italian letters. When interested, his conversation was animated, brilliant, and instructive.

In person Beethoven is said to have been of middle size, stout and apparently strong. His statues, busts, and portraits represent him with a massive head, broad brow, a dignified, sombre expression of countenance, and features of harsh but heroic cast. The bronze statue erected in the public square of his native city in 1845 is of majestic aspect. His latest and most careful biographer, however, Mr. A. W. Thayer, an American, describes him as looking much like a mulatto, short and sallow, with wide nostrils and projecting teeth, heavy lips, and high cheek-bones. A great deal has been written about him. Until the biography of Mr. Thayer the authorities were his contemporary, Moscheles (whose work has been republished in this country), Marx, and Schindler. O. B. Frothingham.

Bee'tle, a common name given to several species of insects of the order Coleoptera. Most writers on natural history extend the meaning of the term, and apply it to all coleopterous insects, the species of which are very numerous. They may be distinguished and recognized by the two hard sheaths or *elytra* which cover the pair of true membranous wings and organs of flight. Many beetles are remarkable for their singular forms and the brilliant colors and ornamental markings of their elytra. Each beetle has two antennæ, two mandibles of a horny consistence, two compound eyes, and six legs. (See COLEOPTERA and SCARABÆUS.)

Bee′tle Stones, a name given by the lapidaries of Edinburgh to hard nodules of clay iron-stone found abundantly at Newhaven, a suburb of that city. They take a fine polish, and are used to make ornamental articles. The name is derived from a fossil which often occurs as a nucleus of the nodule, and was erroneously supposed to be a fossil beetle, but is really a coprolite.

Beet-root Sugar, a kind of sugar made in France and Germany. The beet root contains about 10 per cent. of saccharine matter, which is only about two-thirds that of the cane, and the juice is highly charged with impurities. The Prussian chemist Achard was the first who succeeded in extracting sugar from beets. Beet-sugar is extensively manufactured in Europe. (See SUGAR.)

Beeville, Tex. See APPENDIX.

Beffroi. See BELFRY.

Be′gas (KARL), a German painter, born at Heinsburg Sept. 30, 1794. He became about 1818 a resident of Berlin and court-painter to the king of Prussia. He painted "The Finding of Moses" and many other scriptural subjects; also excellent portraits of eminent authors and artists, including Humboldt and Schelling. Died Nov. 24, 1854.

Beg′gar, a person who solicits charitable aid from the public at large. In all ages and countries persons have practised various arts in order to enlist the sympathies of the benevolent. Severe enactments have from time to time been made against them. By a law of Richard II. (1388) able-bodied beggars were punished and compelled to labor, and provision was made for the helpless. By an act of Henry VIII. (1530) licenses were given to impotent persons to beg within fixed limits, but unlicensed beggars were whipped, and all persons giving alms to such forfeited ten times the amount given. In reign of Elizabeth beggars above age of fourteen were grievously whipped, burned through the ear with a hot iron, and for third offence were put to death. This regulation was repealed in 1593.

Begging Friars. See MENDICANT ORDERS.

Beg′hards [Lat. *Beghardi, Begehardi,* and sometimes *Beguini*], a name of uncertain derivation (for which see BEGUINES, below), applied to semi-monastic societies of men, originating in the Netherlands, and dating from the early part of the thirteenth century, or not very long after similar societies of women had been formed. At first the Beghards were distinguished for piety and works of beneficence. Some connected themselves with the Tertiaries of the monastic orders; some became wildly fanatical; and some fell off into heresies. They were severely handled by the Inquisition, but spread into Germany, France, Switzerland, Italy, and even Sicily, and continued down to the Reformation. (See MOSHEIM, "De Beghardis et Beguinabus Commentarius" 1790; and HALLMANN, "Geschichte d. Ursprungs d. belgischen Beghinen," 1843.)

Beghar′mi, or **Bagir′mi,** a country of Central Africa, is bounded on the N. by Lake Tchad, on the E. by the kingdom of Wadaï, and on the W. by the river Shari, which separates it from Bornu. Area, 56,600 square miles. The greatest length is about 250 miles. Capital, Masena. The surface is for the most part nearly level; the soil is the most fertile and the best watered of the Soodan. It was founded by a heathen chief about 300 years ago, but Mohammedanism soon became the ruling religion. It is tributary to both Bornu and Wadaï. The natives are physically well-formed and warlike. Begharmi was visited by Dr. Barth in 1852. Pop. about 1,500,000. (See BARTH, "Travels in Central Africa.")

Bego′nia, a genus of tropical plants, the type of the natural order Begoniaceæ. Some of them are cultivated in hot-houses for the sake of the flowers. The leaves, which are oblique at the base, have a reddish tinge. The succulent stems and leaves of *Begonia tuberosa* and other species are used as potherbs and eaten in the form of tarts. The name *Begonia* was given in honor of Michel Bégon, a patron of science.

Begonia′ceæ (so named from *Bego′nia,* one of the genera), a natural order of exogenous plants, mostly herbaceous, have alternate leaves, oblique at the base, and cymes of unisexual pink flowers, with a colored perianth and numerous stamens. There are also white and deep scarlet varieties. They are nearly all tropical plants, but one species of *Begonia* grows on the Himalayas 11,500 feet above the sea. The order comprises about 160 species. Some of the Mexican species are used as drastic purgatives.

Béguines, bå-geen′ [Lat. *Beguinæ, Begutæ,* some say from the old Saxon *beggen,* "to beg" or "to pray;" others from the supposed founder, Lambert le Bègue or Bèghe], the name given to semi-monastic societies of women, originating in Belgium, perhaps at Liège, about 1180 A. D. These societies grew in part out of the numerical inequality between the sexes caused by the Crusades. The women, without assuming monastic vows, lived in houses by themselves, labored for their own support, and took care of the sick. There are now in Belgium 20 of these establishments with about 150 members. (For literature, see BEGHARDS.)

Be′gum [bā′gŭm, the feminine form of the Tartar *beg* or *bey,* a "lord" or "prince"], a title of honor given in the East Indies to princesses and the sultanas of seraglios. Among the charges against Warren Hastings was his cruelty to two rich begums of Oude, the mother and the wife of Sujah Dowlah. In order to extort money from them, Hastings or his agents invaded the privacy of their zenanas, and reduced them to the alternative of delivering their treasures or exposing their faces to the view of strange men. They preferred the former of these two evils.

Be′haim, or **Be′hem** (MARTIN), an eminent cosmographer and navigator, born at Nuremberg about 1459. He became a merchant, and visited foreign countries in that capacity. In 1484 and 1485 he accompanied the navigator Diogo Cam in a voyage of exploration along the W. coast of Africa. He gained distinction as a maker of maps and globes. A large globe which he made in 1492 is still preserved by his descendants in Nuremberg, and is prized as a monument and record of the progress of geography. Died July 29, 1506. (See GHILLANY, "Geschichte des Seefahrers Ritter Martin Behaim," 1853; C. G. VON MURR, "Diplomatische Geschichte des Ritters M. Behaim," 1778.)

Be′ham (BARTHOLOMEW), a German portrait-painter and engraver, born in 1496, was a scholar of Dürer. Died in 1540.—His nephew, HANS SEBALD BEHAM, born in 1500, one of the best of the Nuremberg engravers, chose grotesque, sometimes coarse subjects.

Beheading. See CAPITAL PUNISHMENT.

Be′hemoth, a huge animal described in the book of Job (xl. 15–24). Some critics consider the Hebrew term a plural noun for cattle in general. Others think some extinct species of animal is referred to. Others think the elephant is meant. But most writers, including English commentators generally, say the hippopotamus.

Behistun′ [Lat. *Bagista′nus;* Pers. *Baghistan′, i. e.* "place of gardens"], an ancient and ruined town of Persia, in Irak-Ajemi, 21 miles E. of Kermanshah. Here is a remarkable limestone mountain (the ancient *Mons Bagistanus,* on the confines of Media), which rises to the height of 1700 feet, and is almost perpendicular on one side. According to Diodorus, the famous Semiramis, on her march from Babylon to Ecbatana, encamped here and prepared a residence, and having cut away the lower part of the rock of Bagistanus, caused her portrait to be carved or sculptured there. The geography of this locality has been carefully investigated by Rawlinson and Masson. A peculiar interest attaches to the rock of Behistun on account of its cuneiform inscriptions, which were made by order of Darius I., king of Persia, about 515 B. C., and have been deciphered by Sir H. Rawlinson. Close to these inscriptions are thirteen human figures, one of which represents Darius. "The labor," says Rawlinson, "bestowed on the whole work must have been enormous. . . . But the real wonder of the work consists in the inscriptions. For extent, for beauty of execution, for uniformity and correctness, they are perhaps unequalled in the world. It is evident that after the engraving of the rock had been accomplished, a coating of silicious varnish had been laid on to give a clearness of outline to each individual letter, and to protect the surface against the action of the elements. This varnish is of infinitely greater hardness than the limestone rock beneath it. It has been washed down in several places by the trickling of water for three-and-twenty centuries, and it lies in flakes upon the foot-ledge like thin layers of lava." (*Journal of the Asiatic Society,* vol. x.) The Persian inscriptions which Rawlinson deciphered are contained in five columns, one of which has ninety-six lines, and the others each nearly as many. There are on the same rock inscriptions in the Median and Babylonian languages. (See RAWLINSON'S "Herodotus," vols. i. and ii.)

Behn (APHRA), a female writer in the reign of Charles II., born in 1640. She wrote seventeen plays, besides novels and poems which were witty, but licentious. She was employed as a spy at Antwerp. Died in 1689.

Behring, or **Bering** (VITUS), a Danish navigator, born in Jutland in 1680. He entered the Russian navy at an early age, and fought with distinction against the Swedes. In 1725 he was appointed the commander of an expedition sent to explore the Sea of Kamtchatka. During this voyage, which occupied several years, he discovered Behring Strait (1728), and ascertained that Asia was not joined to America. In a subsequent voyage he was wrecked on Behring's Island, where he died Dec. 8, 1741.

Behring, or **Bering, Sea, Sea of Kamtchatka,** the most N. part of the Pacific Ocean, extending between the peninsulas of Alaska and Kamtchatka. It is connected by Behring Strait with the Arctic Ocean.

Behring, or **Bering, Strait** connects the Pacific Ocean with the Arctic Ocean, and separates Asia from America. It was discovered by Vitus Behring in 1728. Its width is about 45 miles at the narrowest part, between East Cape (Asia) and Cape Prince of Wales (America). The depth of this strait near the middle is about 30 fathoms.

Beilan, a town and pass of Northern Syria, on the E. side of the Gulf of Iskanderoon, one of only two passes between Cilicia and Syria. It is thought by some to be the same as the ancient *Amanian Gates.* The town of Beilan is situated on a crest 1500 feet above the sea. Pop. about 5000. It has numerous aqueducts.

Beira, or **Beyra,** bā'rå, a province of Portugal, bounded on the N. by Entre-Douro-e-Minho and Tras-os-Montes, on the E. by Spain, on the S. by Estremadura and Alemtejo, and on the W. by the Atlantic. Area, 9244 square miles. Besides the Douro, which flows along its N. boundary, and the Tagus, which touches it in the S. E. corner, Beira is also drained by the Mondegos. The surface is mountainous; the soil is generally poor. Among the staple productions are wine, grain, and olives. Marble, iron, and coal are found here. Capital, Coimbra. Pop. in 1878, 1,323,134.

Beirout, or **Bairut.** See Beyroot.

Beis'sel (Johann Conrad), born at Eberbach, in Germany, in 1690, removed in 1720 to Pennsylvania, and became the founder of the religious community at Ephratah, in Lancaster county. He died in 1768, leaving several theological works.

Beit-el-Fa'kih ("house of a saint"), a town of Arabia, in Yemen, on the Red Sea, 90 miles N. of Mocha. The heat here is very great, the thermometer rising to 104° F. in the shade, and 145° in the sun. It has a citadel and a mosque. Pop. about 8000. It is one of the largest marts for coffee in Arabia.

Be'ja (anc. *Pax Ju'lia*), a fortified town of Portugal, in Alemtejo, 57 miles by rail S. of Evora. It has a castle, a cathedral, and manufactures of earthenware and leather. It is the seat of a Roman Catholic bishop. Two annual fairs are held here in the fall. Pop. 7843.

Bejar', a fortified Spanish town romantically situated on the Cuerpo de Hombre, 48 miles S. of Salamanca. It has manufactures of wool, and is noted for hams. Pop. 11,099.

Bejapoor' (*i. e.* "the victorious or unconquerable city"), a city of India, in the presidency of Bombay, 140 miles S. E. of Bombay. It was formerly the populous capital of the powerful Hindoo kingdom of the same name, which was founded by Tusnef (died 1510), was conquered by Aurungzeb in 1686, and was afterwards a part of the empire of the Grand Mogul. According to tradition, it contained 100,000 houses, but is at present in ruins. It presents a magnificent external show of domes and minarets, temples and mausoleums, some of which display exquisite workmanship; and lofty walls of hewn stone enclose this scene of splendid desolation. Among the ruins, which are of great extent, is a mausoleum of Mahmood Shah, the dome of which is visible at a distance of fourteen miles. Here are several brass cannon of enormous size.

Beke (Charles Tilstone), Ph. D., an English traveller, born in London Oct. 10, 1800. He explored Abyssinia (1841–44), and after his return published, besides other works, an "Essay on the Nile and its Tributaries" (1847), and "On the Sources of the Nile in the Mountains of the Moon" (1848). He has since made other visits to Africa. Died July 30, 1874.

Be'kes, a county of Central Hungary, is bounded on the N. by the county of Szabolcs, on the E. by Bihar, on the S. by Csanad, and on the W. by Csongrad. Area, 1321 square miles. The country consists of a plain, and is watered by the Black, White, and Rapid Körös. The climate is unhealthy, but the soil is extremely fertile, yielding large quantities of wheat of the first quality. Pop. in 1880, 229,814. Chief town, Bekes.

Bekes, or **Bekesvár,** bå'kêsh-var, a town of Hungary, capital of the above county, is at the confluence of the White and Black Körös, 62 miles S. W. of Debreczin. It has considerable trade. Pop. in 1880, 23,938.

Bek'ker (Immanuel), a philologist, was born in Berlin in 1785, was a pupil of F. A. Wolf at Halle. He became professor of philology at Berlin in 1810, and published "Anecdota Græca" (3 vols., 1814–21). He produced good editions of many classics, among which are Plato (10 vols., 1814–21), "The Attic Orators" (5 vols., 1823–24), and Aristotle (4 vols., 1831–36). Died June 7, 1871.

Belai'a, Bielaja, or **Biela,** a river of Russia, rises in the Ural Mountains, flows through Orenburg, and, after a very tortuous course of about 650 miles, enters the river Kama.

Bel Air, on R. R., capital of Harford co., Md. (see map of Maryland, ref. 1–F, for location of county), 22½ miles N. of Baltimore, has an academy. Pop. of election dist. in 1870, 5650; in 1880, 6586.

Belair' (Alexandre Pierre Julienne), born at Paris, France, in 1747, became commander of the National Guards, and wrote a number of works on fortifications. Died in 1819.

Be'lia Tser'kof (*i. e.* "White Churches"), a town of Russia, in Kiev, on the river Ross. It has considerable trade. Pop. about 8000.

Belcher (Joseph), D. D., a Baptist divine, born in Birmingham, England, April 5, 1794, came to America in 1844, and published nearly 200 works, among which are "The Baptist Pulpit" (1850), "History of Religious Denominations" (1855), etc. Died at Philadelphia July 10, 1859.

Bel and the Dragon, History of, an apocryphal book of the Bible, regarded as a fable by the Jews, by Saint Jerome, and many eminent theologians. It is canonical in the Roman Catholic Church, being part of the fourteenth chapter of Daniel in the Vulgate. By the Anglican Church it is recommended to be read for edification.

Bel'cher (Sir Edward), F. R. S., an English vice-admiral, born in 1799. As commander of the Sulphur he sailed on a voyage around the world in 1836, and explored the western coasts of America. During this voyage he served in the naval operations against the Chinese in 1841. He became a post-captain in 1843, and commanded an expedition sent in search of Sir John Franklin in 1852. Returning without any success, and having lost his vessels, he was placed before a court-martial, but acquitted. In 1864 he became rear-admiral of the red. He published, besides other works, a "Narrative of a Voyage round the World in the Sulphur." D. Mar. 18, 1877.

Belcher (Jonathan), a merchant, born in Cambridge, Mass., Jan., 1681, graduated at Harvard in 1699. He was governor of Massachusetts and New Hampshire from 1730 to 1741. Having been removed from office, he went to England to vindicate himself, and was appointed governor of New Jersey in 1747. Died Aug. 11, 1757.

Belcher (Jonathan), son of the preceding, was born at Boston, Mass., July 28, 1710; studied law at the Temple, London; was one of the first settlers in Chebucto, Nova Scotia; became lieutenant-governor of Nova Scotia in 1760 and chief justice in 1761. Died Mar. 29, 1776.

Bel'ed-el-Jereed' (*i. e.* "the country of dates"), an extensive region of Northern Africa, bordering on the Desert of Sahara, is bounded on the N. by Algeria, and on the W. by Morocco. The soil is mostly arid and sterile, except some oases which produce the date-palm, which affords the inhabitants their principal and often their only food.

Belem. See Para.

Belem'nite [Lat. *belemni'tes*, from the Gr. βέλεμνον, a "dart" or "arrow"], a genus of fossil Mollusca of the order Cephalopoda, is the type of the family Belemnitidæ. The portion of the animal usually preserved is a cylindrical or conical mass of carbonate of lime, from two inches to a foot in length, one extremity generally acute, the other excavated to form a conical cavity. This organ is called the *guard.* The guard of the belemnite expanded above into a hollow, chambered cone, the "phragmacone;" and from one side of this projected a spatulate lamina of horny or shelly material, the homologue of the "cuttle-bone" of *Sepia* and the "pen" of *Loligo.* In a few instances the body of the belemnite is represented in the fossil state, and such a specimen is in the cabinet of Columbia College. These show that in form the belemnite resembled our common *Loligo*—that it had an ink-bag, and eight arms, which were furnished with many sharp hooks like the living *Onychoteuthis.* The belemnites begin in the St. Cassian beds, as the top of the trias, are very numerous in the Jurassic strata, but are not found in any more recent deposits. They are represented in the chalk by *Belemnitella*, but have no living analogue.

Belemnitel'la [dimin. of *Belemnites*], the name given to the guard of a cuttle-fish closely allied to the belemnite, but distinguished by a slit which cuts the side of the phragmacone. It is characteristic of the cretaceous strata, and one species (*Belemnitella mucronata*), found on both sides of the Atlantic, is common in the cretaceous strata of N. J.

Belemni'tidæ, a family of extinct cephalopods, of which the type is the genus *Belemnites*. It also includes *Xiphoteuthis*, *Belemnoptera*, and *Belemnoteuthis*, of the Jurassic, and *Belemnitella*, etc., of the cretaceous.

Belen, Miss. See APPENDIX.

Belfast', an important city and seaport of Ireland, in the county of Antrim and province of Ulster, is situated on Belfast Lough (an arm of the sea), at the mouth of the river Lagan, 101 miles by rail N. of Dublin, and 118 miles S. W. of Glasgow; lat. 54° 35′ N., lon. 5° 57′ W. The river is crossed by three bridges, the finest of which is the Queen's Bridge. Railways extend from this point to Dublin, Armagh, and Londonderry. The site of the city is low and level, but is partly enclosed by the ridge of Divis and Cave Hill, the former of which rises to the height of 1567 feet. The houses are mostly of brick and are well built; the streets are regular, spacious, well-lighted, and macadamized. Belfast is the most prosperous commercial town of Ireland, except Dublin. The principal public edifices are Queen's College, a beautiful structure in the Tudor style (opened in 1849); a Presbyterian and a Methodist college; the Royal Academical Institution, affiliated to the London University; the museum, the theatre, Linen Hall, the Corn Exchange, etc. It has about 80 churches, of which 28 are Presbyterian. Although the seat of the Roman Catholic bishop of Down and Connor, it is mostly Protestant, having only five Catholic churches. The botanic garden of Natural History Society occupies about seventeen acres. Belfast is the chief seat of the Irish manufactures of linen and cotton, and is the great dépôt of the linen trade. The linen manufacture was established here in 1637. The other chief branches of industry are weaving of linen and cotton, bleaching, dyeing, calico-printing, and iron-founding. Numerous steamers, engaged in the Channel trade, ply regularly between Belfast and Liverpool, Glasgow, Dublin, London, etc. The chief articles of export are linens, cotton goods, grain, flax, cattle, and provisions. This city has also a large foreign trade. The adjacent country is extremely beautiful. Belfast returns two members to Parliament. It first became an important place about 1604, and was chartered in 1611. Pop. in 1881, 207,671.

Belfast, on R. R., a city and seaport, the capital of Waldo co., Me. (see map of Maine, ref. 9–D, for location of county), is on the N. W. shore of Penobscot Bay (sometimes called Belfast Bay), 30 miles from the ocean and 30 miles S. by W. of Bangor. Belfast Bay, 9 miles wide, separates it from Castine. It has a spacious harbor, which is safe and sufficiently deep for large ships. Belfast is extensively engaged in trade, manufactures of paper, shoes, and iron, the fisheries, and in shipbuilding. Pop. in 1870, 5278; in 1880, 5308.

Bel'ford (JAMES B.), born at Lewistown, Pa., Sept. 28, 1837, was educated at Dickinson College; studied law; was appointed one of the judges of the supreme court of Colorado (1870–75). Since the admission of Colorado as a State he has been elected its representative in the 44th, 45th, 46th, 47th, and 48th Congresses, but was refused his seat by the Democratic majority in the 45th on a technical quibble.

Belfort, an important fortified town of France, at the foot of the Vosges and on the river Savoureuse, 60 miles by rail N. E. of Besançon. Pop. 8014. It has a citadel constructed by Vauban, a fine church, and a public library; also manufactures of iron, paper, and calico. It was ceded to France by Austria in 1648. In the winter of 1870–71 it was besieged by the Germans, and capitulated Feb. 16 with the sanction of the government, but was afterward evacuated by the Germans. It once belonged to the department of Haut-Rhine; is now in the territory of Belfort.

Bel'fry, or **Beffroi,** the name of a military engine used in sieges in the Middle Ages and in ancient times. It was a movable tower about as high as the walls of the town in the siege of which it was employed. It was constructed of wood, with four or more stories or stages, and was moved on wheels. The lowest story was sometimes armed with a battering-ram, and the other stories were occupied with archers, slingers, etc. Near the top of the beffroi was a hinged drawbridge, which, when let down on the parapet of the wall, sometimes enabled the besiegers to storm the town.

Belfry [Fr. *beffroi*], a bell-tower or turret, usually forming part of a church, but sometimes detached from it. Towers built for such purposes in Italy are called campaniles. On the continent of Europe municipal belfries often occur as portions of the town-house (*maison de ville*).

Bel'gæ, the name given by Cæsar to the warlike tribes which in ancient times occupied one of the three great divisions of Gaul (*Gallia*). Their country, which was bounded on the N. W. by the ocean and on the E. by the Rhine, comprised the modern Belgium, part of Holland, and the N. E. part of France. This region was sometimes called *Belgica* or *Gallia Belgica*. It was separated from the territory of the Celtæ by the river *Sequana* (Seine) and its affluent the *Matrona* (Marne). Cæsar represents the Belgæ as distinct from the Celtæ proper and the Aquitani in language, usages, and political institutions. A part of the Belgæ were probably Germans or of German origin, and a part are believed to have been Cymric Celts. Some of the Belgæ had crossed the Channel and settled in the southern maritime parts of Britain, and were found there by Cæsar when he invaded the island. The Belgæ were a brave, warlike people. (See CÆSAR, "Commentaries on the Gallic War;" SMITH, "Dict. of Ancient Geog.)

Bel'gard, written also **Bjaligrod,** a town of Prussia, in the province of Pomerania, 90 miles by rail N. E. of Stettin, has a castle, several churches, and manufactures of tobacco and woollen stuffs. Pop. in 1880, 7868.

Belgaum', a town of British India, in the presidency of Bombay, 105 miles S. W. of Bejapoor. It has solid, bastioned walls and ancient ruins, among them two temples. Pop. about 8000.

Belgiojoso (CRISTINA), PRINCESS OF. See APPENDIX.

Bel'gium, a kingdom of Europe, situated on the German Sea between Holland, Prussia, and France, has an area of 11,373 square miles, and (in 1880) a population of 5,519,844 inhabitants. It is the most densely peopled of any European country, having 485 inhabitants to the square mile. The soil is partly fertile, partly (in the E.) sandy and marshy. The only mountains are some offshoots of the Ardennes in the S. The coast has a length of 46 miles, and is of a uniform character. The country is well watered by the Meuse and the Scheldt, and their affluents, the Sambre, Ourthe, Werze, Lys, Dender, and Rupel. There are no lakes of importance, but many canals. The climate in general is temperate. Among the chief products of Belgium belong cattle, fish, corn, fruit, wood; among those of the mineral kingdom, iron and coal. A coal region covering an area of 476 square miles traverses all Belgium, and embraces two large basins, one of which extends into France and the other into Prussia. Celebrated mineral springs are found at Spaa. The people belong, in almost equal proportion, to two different nationalities, the Flemish (German) and the Walloon (French). The Flemish language, which is spoken by about 2,500,000, prevails in the provinces of East Flanders, Antwerp, Limburg, West Flanders, and Brabant, while the Walloon is the predominant language in the provinces of Liege, Hainaut, Namur, and Luxemburg, and is spoken by a population of about 2,000,000. The French, though the language of the minority, has since 1794 been the official language of the state authorities and the court; of late, however, the Flemings have begun an active agitation for the recovery of equal rights for their idiom. The total number of periodicals published in the Flemish language is about 40. With the exception of about 15,000 Protestants and 3000 Jews, the entire population belongs to the Roman Catholic Church, which has in Belgium one archbishop at Malines, and five bishops at Namur, Ghent, Bruges, Tourney, and Liege.

There are four universities—at Ghent, Liege, Louvain, and Brussels; the two first named are controlled by the state; the third by the Catholic bishops, and the last named by the Liberal party. Prominent among the other educational institutions of the country are the Academies of Fine Arts at Antwerp and Brussels, the Museum of Painting and Sculpture at Brussels, the Conservatories of Music at Brussels, Liege, and Ghent. The people are chiefly occupied with agriculture, and in this respect excel most nations of Europe. The working of mines also constitutes a most important part of the national industry. First in order are the coal-mines (with three great centres at Mons, Charleroi, and the city of Liege), which produce annually about 10,000,000 tons. The annual produce of the iron-mines, which are especially numerous in the district between the Sambre and the Meuse, amounts to about 7,200,000 hundredweight. Wool is the object of an immense industry, and the Belgian woollen cloths are greatly superior in quality to those produced in France. The linen cloths of Belgium have long been highly valued, and the manufacture of lace, though now less prosperous than formerly, has nothing to fear from foreign competition. The breweries amount to 2671, and beer is the common beverage of all classes. The commerce of the country is also in a very prosperous condition, being greatly promoted by a dense net of railroads, which in 1881 had an aggregate length of 2600 miles. It is chiefly carried on with France, Holland, England, Prussia, North America, and Russia. The exports amount to about $450,000,000, and the imports to a trifle more. The commercial fleet, in 1881, consisted of 68 vessels (42 steamers), with an aggregate of 65,224 tons. The aggregate length of the telegraph lines was, in 1882, 3530 miles. The most important ports are those of Antwerp, Ostende, and Nieuwport; the most important centres of the commerce of the interior are Brussels, Ghent, Bruges, Liege, Namur, Courtray.

According to the constitution of Mar. 3, 1831, Belgium is a constitutional monarchy. The crown is hereditary, according to the right of primogeniture, in the male line only. The executive power is vested in the king alone; the legislative he shares with the senate and the house of representatives. The court of cassation at Brussels is the supreme court of the country; besides it there are three courts of appeal (Brussels, Ghent, and Liege). The jury has been introduced since 1831. The Code Napoléon is regarded as the judicial standard. The public revenue in 1880 was $54,115,230; expenditure, $54,695,060; public debt, $268,644,500. The army on the war footing numbered (without officers) 108,643 men, 10,622 horses, and 152 pieces of ordnance; besides, the country has a civil guard consisting of 30,954 active and 90,000 non-active men. The navy is unimportant. The most important fortresses are Antwerp, Mons, Charleroi, Philippeville, Marienbourg, Ath, Tournay, Menai, Ypres, Ghent, Namur. The measures and coins are the same as in France. In point of administration the country is divided into nine provinces: South Brabant, Antwerp, East and West Flanders, Hainaut, Namur, Liege, Limburg, Luxemburg. Brussels is the capital and residence of the king: during the summer months the king resides at Laeken. The national colors are red, yellow, and black, placed perpendicularly beside each other; the escutcheon, the lion of Brabant with the inscription, "L'union fait la force."

In the time of the Romans, the present Belgium, which was then inhabited by Celtic and Germanic tribes, formed, under the name of Gallia Belgica, a part of Gaul. The treaty of Verdun, in 843, united the southern districts with France, the northern with Germany. After the termination of the Carlovingian rule, the French districts were gradually converted into duchies and counties. In 1385 the county of Flanders fell to the House of Burgundy, which in the early part of the fifteenth century gradually obtained possession of all the provinces of the Netherlands. The marriage of Maria of Burgundy, the last scion of her house, with the emperor Maximilian I., incorporated the Netherlands with the extensive dominions of the House of Habsburg, and, under the name of the "Circle of Burgundy" (Burgundischer Kreis), with the German empire. When, after the abdication of Charles V. (1555), his states were divided, Belgium remained united with Spain, and this union continued after the northern provinces had successfully established their independence. Only from 1598 to 1621, Belgium constituted an independent state under the rule of Isabel, daughter of Philip II., and her husband, the archduke Albert. In the course of the seventeenth century Spain had repeatedly to cede portions of Belgian territory to France. The peace of Utrecht in 1713 gave Belgium to Austria.

In the Austrian war of succession the whole country was conquered by the French, but it was restored to Austria in the peace of Aix-la-Chapelle (Oct. 18, 1748). In consequence of the unpopular reforms and innovations which Joseph II. undertook to introduce, an insurrection broke out against Austrian rule in Dec., 1789, and on Jan. 11, 1790, the Belgian provinces (with the exception of Luxemburg) proclaimed their independence under the name of "United Belgium," but in Nov., 1790, the rule of the Austrians was re-established. After the battle of Jemappes (Nov. 7, 1792), Belgium was occupied by the French, and in 1794 the country was ceded by Austria to France. It was now divided into nine departments, and the administration wholly assimilated to that of France. In 1814 the first treaty of Paris united Belgium with Holland into the kingdom of the Netherlands. The union lasted until Aug., 1830, when the whole country rose in revolution against the Dutch government. On Sept. 20 a provisional government was formed, which, on Oct. 4, after the evacuation of the capital by the Dutch, proclaimed the independence of Belgium. On June 4, 1831, the prince Leopold of Saxe-Coburg was elected king. The preliminary treaty of 1833 between England, France, and Holland put an end to the efforts of the Dutch government for the recovery of Belgium, but the definite acceptance of the articles drawn up by the London Conference in 1831 for the regulation of the frontier between Holland and Belgium did not take place until 1838. The subsequent history of Belgium under Leopold I. (died Dec. 10, 1865) and his son Leopold II. has been one of quiet and steady development. The administration has been sometimes in the hands of the Catholic and sometimes in those of the Liberal party, but the peace of the country has never seriously been disturbed, not even by the European revolution of 1848. (See JUSTE, "Histoire de Belgique," 2 vols., 4th ed. 1868.)

A. J. SCHEM.

Belgo′rod, a town of Russia, in the government of Koorsk, on the river Donets, 88 miles S. S. E. of Koorsk, and on the railway from Moscow to Kharkof. It is an archbishop's see, and has numerous churches. Pop. in 1882, 16,097.

Belgrade, bĕl-grād′ (anc. *Singidu′num;* Turk. *Bilgraad;* Ger. *Belgrad*), an important fortified town, capital of Servia, is on right bank of the Danube, at the mouth of the river Save, 42 miles S. E. of Peterwardein. The citadel, which is very strong, is situated on a point of land between the rivers, behind which rises the city with antique German edifices, a cathedral, and a palace. Belgrade had formerly an Oriental appearance, but it has been abandoned by many wealthy Turks, and mosques are partly superseded by churches. Here are manufactures of arms, cutlery, silk goods, saddlery, and carpets. It has a good port and an active trade, being the entrepôt of the commerce between Austria and Turkey. It is the seat of the chief authorities of Servia. In consequence of its importance as a strategical point, Belgrade has been the scene of many famous sieges and battles. It was besieged without success by the Turks in 1456, and taken by the sultan Solyman in 1522. In 1688 it was stormed and captured by the elector of Bavaria, but it was recovered by the Turks in 1690. Prince Eugene here defeated 200,000 Turks in 1717, after which it changed owners several times. Servia became independent July 13, 1878. Pop. of Belgrade in 1880, 26,651.

Belgrado (JAMES), born at Udine, Italy, Nov. 16, 1704, a Jesuit and famous mathematician and antiquary, published a large number of works, mostly scientific, in Latin and Italian. Died Apr. 17, 1789.

Bel Green, Ala. See APPENDIX.

Be′lial [Heb. "worthlessness"], a term used in the Bible, frequently occurring in the phrase "a son of Belial," which, by a common Hebrew idiom, signifies merely a worthless or very bad person; but in the New Testament it is generally believed that Belial sometimes is used as a proper name of Satan, though it is not universally admitted. Some commentators think that it is always used in the New Testament in its Old Testament signification.

Bélidor, de (BERNARD FOREST), an eminent French military engineer and writer, born in Catalonia in 1697. He served in the German campaign of 1742, and became a member of the Academy of Sciences. Among his works may be mentioned his "Hydraulic Architecture" (1737), a "New Course of Mathematics for the Use of Artillery" (1757), a "Traité de Fortification," and "La Science des Ingénieurs." Died Sept. 8, 1761.

Beligat′ti (CASSIO), born at Macerata, Italy, in 1708, was a Capuchin and Orientalist, and became a missionary in Thibet. He published an alphabet of the language of that country and a Hindostanee grammar. Died in 1791.

Belin′ de Ballú (JACQUES NICOLAS), born at Paris in 1753, became professor of Greek in the university of Kharkov, Russia. He translated into French the "Hecuba" of Euripides, and wrote "Critical History of Eloquence among the Greeks and Romans." Died in 1815.

Belisa′rius [Slavic, the "white tsar or chief"], a celebrated general to whom Justinian was chiefly indebted for the military glory of his reign, was born at Germania, in Illyria, about 505 A. D. Having been appointed general-in-chief of the army of the East, he defeated the Persians at Dara in 530, and suppressed a formidable sedition at Constantinople in 532. He gained two victories over the Vandals in Africa, and took their king, Gelimer, a prisoner, in 534 A. D. In 534 he obtained a triumph, and the office of consul in 535. He also commanded the army of Justinian in a long war against the Ostrogoths, who had made themselves masters of Italy. He occupied Rome in Dec., 536, and gained some other advantages, but was recalled in 540, after which he suffered adverse fortune through the enmity of the empress Theodora. In 544 A. D. he was again sent to Italy to oppose the Gothic king Totila, but his army was so inferior in number that he could not gain a decisive victory. He resigned the command in 548, and passed nearly ten years in inaction. He served with success against the Bulgarians in 559, and was imprisoned in 563 on a charge of treason. Died Mar. 13, 565 A. D. He was distinguished for his loyalty, humanity, and other virtues. (See LORD MAHON, "Life of Belisarius," 1829; GIBBON, "Decline and Fall of the Roman Empire;" C. F. Zeller, "Belisarius," Tübingen, 1809; C. L. Roth, "Ueber Belisars Ungnade," 1846.)

Belize, capital of British Honduras. See Balize.

Belknap (George E.), U. S. N., born Jan. 22, 1832, in Newport, N. H., entered the navy as a midshipman Oct. 7, 1847, became a passed midshipman in 1853, a lieutenant in 1855, a lieutenant-commander in 1862, and a commander in 1866. In 1856, while attached to the sloop-of-war Plymouth, he took part in the assault and capture of the "Barrier Forts" at the mouth of the Canton River, China, and was executive officer of the iron-clad New Ironsides from 1862 to 1864 in her numerous engagements with the forts and batteries of Charleston harbor. In his official report to Rear-Admiral Dupont of the part taken by the New Ironsides in the first bombardment of Fort Sumter, April 7, 1863, Commodore Turner writes: "I should fall short of my duty, sir, if I omitted to present to your especial notice the first lieutenant of this ship, Lieutenant-Commander George E. Belknap. It was not in the hour of battle only that great demand was made upon him; there was a constant pressure upon the high qualities that distinguish him as an efficient officer to meet exigencies, which, through a week of toil and labor, he had to provide for. He was equal to his work, gave me a perfect support at all times; and I desire here, and through you, to commend him to the favorable consideration of the government as an officer of the highest merit." Captain (now Vice-Admiral) Rowan, in a report to Rear-Admiral Dahlgren of "the services of the New Ironsides against the defences of Charleston harbor," dated Sept. 10, 1863, says: "I particularly recommend to your notice and that of the department the services of Lieutenant-Commander Belknap, to whose zeal and ability as an executive officer I am so much indebted for his untiring efforts to make the ship efficient in every department, and for his fine judgment and bearing in carrying out my orders as commander of the gundeck during the fourteen times this ship has been under the fire of the enemy's batteries." He commanded the iron-clad Canonicus in both attacks on Fort Fisher. His services on these occasions are thus highly spoken of by Rear-Admiral Porter in his "commendatory letter" of Jan. 28, 1865: "I recommend that Commanders Parrott and Calhoun, and Lieutenant-Commanders Weaver and Belknap, be promoted. These officers have given a world-renowned name to the monitors, and have shown what they were capable of performing when properly placed and managed. They had the hardest part of the work, and there is no end to their energy, bravery, and untiring zeal." He was captain at Norfolk navy-yard in 1883. Foxhall A. Parker.

Belknap (Jeremy), D. D., born at Boston, Mass., June 4, 1744; graduated at Harvard 1762; taught school four years; studied theology; was pastor of the Congregational church at Dover, N. H., from Feb. 18, 1767, until 1786, and of the Federal street church at Boston from Apr. 4, 1787, for the remainder of his life; kept a diary in interleaved almanacs from his fifteenth year, and a series of MS. books called "Quotidiana Miscellanea," in which he jotted down abstracts of his reading; was an active patriot during the Revolution, but declined the chaplaincy of the New Hampshire troops at Cambridge 1775; projected in 1790 the Massachusetts Historical Society, which recognizes him as its founder: delivered before it, Oct. 23, 1792, a ter-centennial discourse on the discovery of America; devoted much of his life to historical and biographical labors, making good use of the library left by his early pastor, Rev. Thomas Prince, to the Old South church at Boston; received from the legislature of New Hampshire a grant of £50 in aid of his publications, and became in 1792 an overseer of Harvard College. D. at Boston, of paralysis, June 20, 1798. Author of a "History of New Hampshire" (3 vols., 1784–92; new ed. 1813), which "has long ranked at the head of the local State histories of the country;" "A Discourse intended to Commemorate the Discovery of America by Columbus, with Four Dissertations" (1792); "An Historical Account of those Persons who have been Distinguished in America," etc. (vol. i. 1792; vol. ii. 1798), generally known as the "American Biography" (new ed., 3 vols.), and of a "Collection of Psalms and Hymns" (1795), etc. To him was attributed by Mr. Bryant "the high merit of being the first to make American history attractive." A "Life, with Selections from his Correspondence" (1847), was published by a granddaughter.

Belknap (William G.), an American officer, born at Newburg, N. Y., Sept. 7, 1794, entered the service of the U. S. in 1813 as third lieutenant of infantry, and rose through successive grades to be lieutenant-colonel of the Fifth Infantry in 1847. He served with marked gallantry in the war with Great Britain (1812–15), in the Florida war against hostile Seminoles, and in the war with Mexico. For his services in Florida he was brevetted lieutenant-colonel, and for gallant conduct in Mexico he won the brevets of colonel and brigadier-general; served on frontier duty from 1848 to 1851 in command of his regiment and departments, and while on duty in Upper Texas he contracted a disease from which he died near Fort Washita Nov. 10, 1851. G. C. Simmons.

Belknap (William Worth), son of Gen. William G., b. at Newburg, N. Y., 1829; graduated at Princeton 1848; studied law; settled at Keokuk, Ia., 1851; elected to the legislature as a "Douglas Democrat" 1857; entered the army as major of 15th Iowa 1861; served under Grant at Shiloh, Corinth, and Vicksburg, and was in Sherman's "march to the sea." At the battle of Atlanta, under McPherson, he so distinguished himself that he was promoted over his superior officers to be brigadier-general of volunteers; brevetted major-general 1865; collector of revenue in Iowa 1866–69; and secretary of war, under Grant, from 1869 to 1876, when he resigned. Being impeached before Congress on a charge of corruption, he was acquitted, and his case in the civil court was dismissed, as the testimony did not sustain the prosecution.

Bell [from the Ang. Sax. *bellan,* to "make a loud noise"], a hollow metallic instrument employed to give signals by its sounds. It is usually composed of Bell-Metal (which see), but steel bells have been cast with good results. From a remote antiquity hand-bells were used in religious ceremonies. In Egypt the feast of Osiris was announced by the ringing of bells; several bells of bronze have been found in the ruins of Nineveh; Jewish high priests wore golden bells attached to their vestments. In Palestine bells were used in personal adornment, as now in the East. The Hindoo and Burmese priests have long used them in their temples, and in Athens the priests of Cybele used bells in their rites. The Greeks employed bells (κώδωνες) in garrisons and markets; the Romans announced the hour by the *tintinnabulum.* The introduction of bells into churches is usually ascribed to Saint Paulinus, bishop of Nola in Campania (400 A. D.). Their use in churches and monasteries soon spread through Christendom. They were introduced into France about 550, and Benedict, abbot of Wearmouth, brought one from Italy into England about 680. Portable bells had long before been used in the Church. Several specimens, some of them, it is believed, as old as the sixth century, are still preserved in Ireland, Scotland, and Wales. Bells came into use in the East after 865. Church bells were then of a comparatively small size, and were frequently made of wrought instead of cast metal. It was not until the fourteenth century that they reached a large size. The "Jacqueline" of Paris, cast in 1300, weighed 15,000 pounds; another, cast in 1472, weighed 25,000 pounds. The famous bell of Rouen, cast in 1501, weighed 36,364 pounds. One at Toulouse weighs 66,000 pounds. The largest bell in the world is the Great Bell of Moscow, above 19 feet in height, and weighing 448,000 pounds. It was cast in 1734, but fell during a fire in 1737, was injured, and remained till 1837, when it was raised, and now forms the dome of a chapel. Another Moscow bell, cast in 1819, weighs 80 tons. The Great Bell at Pekin, 14 feet high, weighs 53½ tons.

Bells have long been connected with the services of the Christian Church, so that the Mohammedans substitute for them the cry of the muezzin from the tops of the mosques. Associated in various ways with the ritual of the Church, bells acquired a sacred character. They were cast with religious ceremonies, and consecrated by baptism; received names, had sponsors, were sprinkled with water, anointed, and covered with the white chrisom, like infants. This custom is still practised in Roman Catholic countries. Bells were believed to disperse storms and pestilence, drive away enemies, extinguish fires, etc. In the Middle Ages it was common to put some inscription on the bell, like the following:

> "Vivos voco, mortuos plango, fulgura frango."*
>
> "Funera plango, fulgura frango, Sabbata pango,
> Excito lentos, dissipo ventos, paco cruentos."†
>
> "Laudo Deum verum; plebem voco; congrego clerum;
> Defunctos ploro; pestem fugo; festamque honoro."‡

The notion that bells are efficacious in dispelling storms is by no means extinct.

It was a belief that bells had the power to terrify evil spirits, and the custom of ringing the *passing-bell* grew out of the belief that devils troubled the expiring patient, and

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*Literally: "I call the living, I mourn the dead,
I break the lightnings" (or thunderbolts).

†"I mourn the deaths, I break the lightnings,
I mark the Sabbaths, I arouse the slow, I scatter the winds,
I appease the cruel."

‡"I praise the true God; call the people; assemble the clergy; bewail the dead; put to flight the plague; honor the festivals."

lay in wait to afflict the soul the moment when it escaped from the body. The tolling of the passing-bell was retained at the Reformation, and the people were instructed that its use was to admonish the living and excite them to pray for the dying. The practice of tolling church-bells at funerals is still a usage in various nations.

The ringing of the *curfew*, incorrectly supposed to have been introduced into England by William the Conqueror, was a civil regulation to warn the public to extinguish their fires and lights at eight o'clock.

The ringing of bells in chimes, and the playing of tunes upon them in church-towers, have been carried to the greatest perfection in the Netherlands; but many fine chimes are found in various other European countries and in the U. S.

Revised by R. D. Hitchcock.

Bell (Alexander Graham), inventor of the speaking telephone, born Mar. 3, 1847, at Edinburgh, Scotland; educated at the high school and the university, and specially trained to follow his father's and grandfather's profession for the removal of impediments of speech. In 1872 he took up his residence in the United States, and introduced his father's invention of visible speech in institutions for deaf mutes, and was subsequently appointed professor of vocal physiology in Boston University. He occupied his leisure during many years in working out his telephonic discovery, and first exhibited it publicly, but in an imperfect form, at the Centennial Exhibition in 1876. Its success is now established throughout the civilized world. He received in 1882 diploma and decoration of National Legion of Honor of France.

Bell (Alexander Melvill), inventor of visible speech, a system of universal alphabetics which has been successfully used for teaching the deaf (and dumb) to speak, born Mar. 1, 1819, at Edinburgh, Scotland, and educated under his father, Alexander Bell, author of a method for the removal of impediments of speech. From 1843 to 1865 he held classes in connection with the Edinburgh colleges, and in 1865 was appointed lecturer in University College, London. In 1870 he removed to Canada, and was appointed register in Queen's College, Kingston, in 1877. His second and only surviving son is Alexander Graham Bell, inventor of the telephone.

Bell (Andrew), D. D., a Scottish teacher noted as the founder of the monitorial system (or Madras system) of education, was born at St. Andrew's in 1753. He took orders in the Anglican Church, and became chaplain of Fort St. George at Madras in 1789. Having obtained the direction of a school for male orphans at Madras, he employed the scholars in mutual instruction, and after his return to Britain published a treatise on his new method in 1797. He died Jan. 27, 1832, and left £120,000 sterling to found educational institutions on the monitorial system.

Bell (Sir Charles), F. R. S. (London), an eminent British anatomist and physiologist, the youngest brother of Andrew Bell, was born in Edinburgh in Nov., 1774. He removed in 1804 to London, where he lectured on anatomy and surgery, and published a "System of Operative Surgery" (1807). In 1814 he was elected one of the surgeons of the Middlesex Hospital. He gained distinction as a surgical operator, and excelled in the treatment of nervous affections. He made the important discovery that the nerve filaments of sensation are distinct from those of motion. In 1836 he became professor of surgery in the University of Edinburgh. Among his works are an "Exposition of the Natural System of the Nerves of the Human Body" (1824), and "The Hand, its Mechanism and Vital Endowments as evincing Design" (1834). The last is one of the Bridgewater Treatises. Died April 29, 1842.

Bell (Charles H.), Rear-Admiral, born in New York Aug. 15, 1798, became a midshipman of the U. S. navy in 1812, and served in the war with Great Britain, became captain in 1854, commodore in 1862, and rear-admiral in 1866. Died at New Brunswick, N. J., Feb. 19, 1875.

Bell (Henry), a Scottish engineer, born in Linlithgowshire April 7, 1767, was the first who obtained success in steam navigation in Europe. He worked in London under Rennie. A small vessel called "The Comet," with an engine constructed by himself, was launched on the Clyde in 1812. Died Nov. 14, 1830.

Bell (Henry H.), U. S. N., born Nov. 17, 1807, in Orange co., N. C., entered the navy as a midshipman Sept. 1, 1823, became a lieutenant in 1831, a commander in 1854, a captain in 1862, a commodore in 1863, and a rear-admiral in 1866. In 1861 he commanded the steamer Brooklyn, West Gulf blockading squadron. In 1862 he was selected as fleet captain by Rear-Admiral Farragut, and while acting in this capacity led the second division of gunboats at the attack upon Forts St. Philip and Jackson and capture of New Orleans, where his sound judgment and coolness were conspicuously shown and highly commended by the whole fleet. His services during the passage of the Hartford by the Vicksburg batteries, June 28, 1862, are thus referred to by Admiral Farragut: "The captain of the fleet, Commander H. H. Bell, was on the poop by my side, and not being able, as I before stated, to do much in the management of the fleet, owing to the darkness and the smoke, gave his attention to looking up the batteries, and pointing them out to the officers in charge of the guns, and assisting them with his judgment on all occasions." In 1863 he commanded, during the temporary absence of Admiral Farragut, the West Gulf blockading squadron. In 1865 he was appointed to the command of our squadron in the East Indies, where he was drowned, April 12, 1867, in an attempt to pass in his barge over the bar at the mouth of the Osada River, Japan. Rear-Admiral Henry H. Bell was an able and gallant officer, and his death was much lamented.

Foxhall A. Parker.

Bell (James), a brother of S. D. Bell, was born at Francestown, N. H., Nov. 13, 1804, and graduated at Bowdoin in 1822. He studied law at Litchfield, Conn., practised at Gilmanton, Exeter, and Guilford, N. H., and was U. S. Senator (1855–57). Died May 26, 1857.

Bell (John), an eminent surgeon, born in Edinburgh May 12, 1763, was an elder brother of Sir Charles Bell. He began in 1786 to lecture on surgery, which he also practised with success in his native city. He published, besides other works, a "System of the Anatomy of the Human Body" (2 vols., 1793–98), to which his brother Charles added two more volumes, and "The Principles of Surgery" (3 vols., 1801–07). He was a good classical scholar, and one of the most skilful operators of his time. He died at Rome April 15, 1820, leaving "Observations on Italy," which was published by his widow in 1825.

Bell (John), an American statesman, born near Nashville, Tenn., Feb. 15, 1797. He graduated at the University of Nashville in 1814. He was elected a member of Congress in 1827, and by successive re-elections continued in that body about fourteen years. He supported Gen. Jackson for the presidency in 1832, but joined the Whig party in 1833, and was chosen Speaker of the House of Representatives in 1834. He was an earnest advocate of a protective tariff. In Mar., 1841, he was appointed secretary of war by President Harrison. He resigned that office in Sept., 1841, because he disapproved the policy of Mr. Tyler. He was elected a Senator of the U. S. for Tennessee in 1847, was re-elected in 1853, and opposed the repeal of the Missouri Compromise in 1854. He was nominated in 1860 for President of the U. S. by the Constitutional Union party, having Lincoln, Douglas, and Breckenridge as his competitors. He received only thirty-nine electoral votes. Died Sept. 10, 1869.

Bell (John), born at Londonderry, N. H., about 1765, was governor of New Hampshire (1829–30). He was a brother of Gov. Samuel Bell, and was long prominent in public affairs. Died at Chester, N. H., Mar. 22, 1836.

Bell (Luther V.), M. D., LL.D., a son of Gov. Samuel Bell, was born at Chester, N. H., Dec. 20, 1806, graduated at Bowdoin in 1823, and received his diploma in medicine at Dartmouth. He practised medicine in New York and Chester, N. H., and became an excellent surgeon, and was president of the McLean Insane Asylum, Somerville, Mass. (1837–56). He published able professional writings. In 1845 he visited Europe by invitation of the trustees of the Butler Hospital for the Insane at Providence, R. I., the plans for which he prepared. In Aug., 1861, he was appointed brigade surgeon in the U. S. army, and at the time of his death was medical director of Hooker's division. Died in camp at Budd's Ferry, Md., Feb. 11, 1862.

Bell (Robert), a journalist, born at Cork, in Ireland, Jan. 10, 1800, passed his mature life in London. In conjunction with Sir E. Bulwer and Dr. Lardner he founded in 1841 "The Monthly Chronicle," which he edited. Among his numerous works are a "History of Russia" (3 vols., 1836–38), "Lives of the English Poets" (2 vols., 1839), a "Life of George Canning" (1846), and several dramas and tales. He died in London April 12, 1867.

Bell (Samuel), LL.D., was born in Londonderry, N. H., Feb. 9, 1770, and graduated at Dartmouth in 1793. He became a lawyer, and held many public offices. He was a judge of the supreme court of New Hampshire (1816–19), governor (1819–23), U. S. Senator (1823–35). D. 1850.—His sons, James, Samuel Dana, Luther V., and Col. Lewis Bell (1836–65, mortally wounded at Fort Fisher), all attained distinction.

Bell (Samuel Dana), LL.D., son of the above, was born at Francestown, N. H., Oct. 9, 1798, and graduated at Harvard College in 1816. Besides many minor offices, he was justice of the superior court of New Hampshire (1849–55), justice of the supreme court (1855–59), chief-justice

(1859–64), and was one of the most eminent and profound jurists that New England has ever produced. Died July 31, 1868.

Bell (Thomas), F. R. S., an English naturalist, born in Dorsetshire Oct. 11, 1792. He became a member of the College of Surgeons in London in 1815, and professor of zoology in King's College, London, in 1832. In 1853 he was elected president of the Linnæan Society. Among his works are a "History of British Quadrupeds" (1836) and a "History of British Stalk-eyed Crustacea" (1853). D. Mar. 17, 1880.

Belladon'na[*] (*At'ropa*[†] *Belladon'na*), an herbaceous perennial plant of the natural order Solanaceæ, is sometimes called **Deadly Nightshade.** It is a native of Europe, has ovate leaves, bell-shaped flowers of a lurid, purple color, and berries which when ripe are black, shining, and sweetish in taste. All parts of the plant are narcotic and very poisonous, and contain an alkaloid called *atropia* or *atropine*, on which its active properties depend. The belladonna is considered a valuable medicine and a powerful remedy for certain nervous diseases, neuralgia, paralysis, etc. It is administered both internally and externally. It is a physiological antidote for opium-poisoning. When applied to the eye it has the remarkable property of greatly dilating the pupil, and it is often used by oculists both in examinations and operations. The medicinal preparation of belladonna commonly used in the U. S. is an extract from the leaves.

Belladonna Lily (*Amaryl'lis Belladon'na*), a beautiful rose-colored flower which grows wild about the Cape of Good Hope, and is cultivated in the gardens of England and France. The drooping flowers are clustered at the top of a leafless stem, which is about eighteen inches high.

Bellaire, capital of Antrim co., Mich. (see map of Michigan, ref. 4–I, for location of county). Pop. in 1880, 65.

Bellaire, city and R. R. centre, Belmont co., O. (see map of Ohio, ref. 5–I, for location of county), on the Baltimore and Ohio, the Bellaire Zanesville and Cincinnati, the Cleveland and Pittsburg R. Rs., and the Ohio River, 5 miles S. of Wheeling and 137 miles E. of Columbus. It has water and gas works, and manufactures of glass and nails, etc. Coal, iron, and limestone are abundant. It is a rapidly growing city. Pop. in 1870, 4033; in 1880, 8025.

Bel'lamy (Jacobus), an eminent Dutch poet, born at Flushing Nov. 12, 1757. He published a collection of verses in 1782, and on the occasion of the war of 1785 a volume of patriotic poems ("Vaderlandsche Gezangen"). Among his most popular works is "Roosje," a poem. He had good taste and a glowing fancy, and contributed largely to the improvement of the national literature. Died Mar. 11, 1786. (See Q. Knipers, "Notice sur Bellamy.")

Bel'lamy (Joseph), D. D., born in North Cheshire, Conn., in 1719, graduated at Yale College (1735), and was pastor of the Congregational church at Bethlehem, Conn. (1740–90). He was a powerful preacher and a renowned teacher of theology. Among his published works are "True Religion Delineated" (1750), "Letters and Dialogues" (1761), and "Complete Works" (3 vols., 1811). Died Mar. 6, 1790.

Bel'larmine (Robert), [It. *Roberto Bellarmino*], a celebrated theologian and cardinal, born in Tuscany Oct. 4, 1542. He entered the order of Jesuits in 1560, and became professor of theology at Louvain in 1569. He was a zealous champion of orthodoxy, and was highly distinguished as an able controversial writer against heretics. His principal work is "Disputationes de Controversiis Fidei adversus hujus Temporis Hæreticos" (3 vols., 1581). He became a cardinal in 1598, archbishop of Capua in 1601, and librarian of the Vatican in 1605. Died at Rome Sept. 27, 1621. Complete editions of his works appeared in 1619 (7 vols.) and in 1874 (12 vols.). He was a man of mild and pacific disposition. "The Church of Rome," says Hallam, "brought forward her most renowned and formidable champion, Bellarmin. . . . His abilities are best tested by Protestant theologians, not only in their terms of eulogy, but indirectly in the peculiar zeal with which they chose him as their worthiest adversary." (*Introduction to the Literature of Europe.*) (See G. Fuligati, "Vita del Cardinal R. Bellarmino," 1624, a work based upon an autobiography; Daniello Bartoli, "Della Vita di R. Bellarmino," 1678; P. Frizon, "Vie du Cardinal Bellarmin," 1708.)

Bella'ry, a town of India, in the province of Madras, 135 miles N. of Seringapatam, is one of the chief military stations in the province, and has a fort on a rock 450 feet high. Pop. 51,766.

Bell Bird [Sp. *campane'ro*], (*Arapunga alba* or *Casmarynchus carunculata*), found in Guiana and other parts of South America, is nearly as large as a pigeon. It utters a note of metallic sound, resembling the tolling of a bell, which, it is said, can be heard at a distance of three miles. It is distinguished by a broad and depressed bill, which is soft and flexible at the base. The plumage of the male is snowy white. From its forehead grows a curious horn-like and tubular appendage, which when empty is pendulous, but when the bird is excited is filled with air and rises to the height of three inches. The Australian bell bird (*Myzantha melanophrys*), "one of the honey-eaters," produces a peculiar tinkling sound; it is an entirely different species from the above.

Bell, Book, and Candle. The excommunication by bell, book, and candle is a solemnity belonging to the Roman Catholic Church. The priest pronounces the formula of excommunication, consisting of maledictions on the head of the person anathematized, and closes the sentence by shutting the book from which it is read, taking a lighted candle and casting it to the ground, and tolling the bell as for the dead. This mode of excommunication appears to have existed in the Western churches as early as the eighth century. The form of excommunication concluded substantially as follows: "Cursed be they from the crown of the head to the sole of the foot. Out be they taken of the book of life. And as this candle is cast from the sight of men, so be their souls cast from the sight of God into the deepest pit of hell. Amen."

Bellefontaine, R. R. junction, capital of Logan co., O. (see map of Ohio, ref. 4–D, for location of county), is about 110 miles N. of Cincinnati and 55 miles N. W. of Columbus. It has the highest elevation of any town in the State, has a good trade, a fine court-house, and is noted for its health and beauty. Pop. in 1870, 3182; in 1880, 3998.

Bellefonte, R. R. junction, capital of Centre co., Pa. (see map of Pennsylvania, ref. 4–E, for location of county), is beautifully situated at the foot of Bald Eagle Mountain, 87 miles N. W. of Harrisburg. Of late it is a place of summer resort. It has a celebrated spring, and the surrounding scenery is very fine. It has two furnaces, three rolling-mills, two foundries, an axe-factory, extensive car-works, glass-works, a number of smaller manufactories, and an academy. Pop. in 1870, 2655; in 1880, 3026.

Belle-Isle-en-Mer, an island belonging to the French department of Morbihan, is in the Atlantic. It is 8 miles from the shore, and has an area of 12 square miles. Pop. 10,076, mostly engaged in the pilchard-fishery. Excellent horses and grain are raised here. Here is a fortified seaport named Le Palais.

Belle Isle, North. (1) An island in the strait of the same name, between Newfoundland and Labrador, is 21 miles in circuit, and has a small harbor; lat. 52° 13′ N., lon. 55° 19.1′ W. (2) Belle Isle, South, an island at the entrance of White Bay, on the N. E. side of Newfoundland; lat. 50° 49′ N., lon. 55° 29′ W. It is a fishing-station. Pop. 53. (3) Belle Isle, a fertile island, 9 miles long and 3 broad, in Conception Bay, Newfoundland. It has considerable fishing interests. Pop. 500.

Belle Isle, Strait of, between Labrador and Newfoundland, is 80 miles long, 12 miles wide, and dangerous of navigation.

Bel'lenden (William), a Scottish author of whose personal history little is known. He was a professor in the University of Paris, and was distinguished for the elegance of his Latinity. He published in 1608 at Paris a compilation from the works of Cicero, entitled "Ciceronis Princeps." Among his other works are "De Statu Prisci Orbis" ("On the Condition of the Primitive World," 1615), and "De Tribus Luminibus Romanorum" (1634). Died before 1633. His three principal works were reprinted in 1787, with a Latin preface by Dr. Parr. The preface was noted for its elegant Latinity and its allusions to contemporary politics, and attracted much more attention than the reprint.

Belle Plain, capital of Callahan co., Tex. (see map of Texas, ref. 3–G, for location of county). Pop. in 1880, 47.

Belle Plaine, on R. R., Benton co., Ia. (see map of Iowa, ref. 5–I, for location of county), 116 miles W. of Clinton. It has a round-house and shops of the R. R., and four grain-elevators. Pop. in 1870, 1488; in 1880, 1689; in 1885, 2092.

Beller'ophon [Gr. Βελλεροφόντης, "slayer of Bellerus"], originally called **Hippon'ous,** a personage of the Greek mythology, was a son of Glaucus, king of Corinth. Having killed Bellerus by accident, he fled to Prœtus, king of Argos, who was instigated by his wife to send him to Iobates, king of Lycia. He carried a sealed letter requesting Iobates to kill him, but that king imposed on him the dangerous mission of fighting with the Chimæra. He killed this monster and defeated the Amazons. He attempted to soar to Olympus on the winged horse Pegasus, but fell to the earth.

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[*] The name *Belladonna*, an Italian phrase signifying "beautiful lady," is said to have been given to this plant from its having been used to improve the complexion, as well as to make the eye appear dark and lustrous.

[†] From *Atropos*, the name of one of the Fates.

Bellerophon, a genus of fossil univalve gasteropod mollusks. The shell is symmetrically convolute, with few and occasionally sculptured whorls, globular or discoidal, and having a dorsal keel, which terminates in a deep notch. Many species of it have been found in the Silurian, Devonian, and carboniferous rocks in various parts of the world.

Belles-Lettres, a French term often used in English and other languages as synonymous with polite literature or the more refined departments of learning, including poetry, rhetoric, history, and fiction. It is a term of mediæval origin, and is used in a vague manner. Authorities are not agreed in respect to its exact definition and application.

Belleville, a port of entry, the capital of Hastings co., Ontario (Canada), on the Bay of Quinté, and on the Grand Trunk Railway, 113 miles E. N. E. of Toronto. It is a beautiful city, and has fine public buildings, including a court-house, a jail, numerous public and private schools, churches, and a custom-house. It is the seat of Albert University (Methodist Episcopal), which consists of Albert College for young men and Alexandra College for ladies. One mile W. of the town is the deaf and dumb asylum, a fine building, opened in 1870. The river Moira furnishes water-power, and the lumber trade is very extensive. There are two woollen mills and various other manufactories. Pop. in 1881, 9516.

Belleville, city and R. R. centre, capital of St. Clair co., Ill. (see map of Illinois, ref. 9–D, for location of county), 14 miles S. E. of St. Louis. It contains numerous manufactories of almost every description, and one of the largest rolling-mills in the West; also a fine convent, many churches, and splendid school-houses. It is in a region abounding in coal. Pop. in 1870, 8146; in 1880, 10,683.

Belleville, city, capital of Republic co., Kan. (see map of Kansas, ref. 4–G, for location of county), is situated in a rich mining district. Pop. in 1880, 238; in 1885, 719.

Bellevue, Idaho. See Appendix.

Bellevue, town and R. R. junction, Jackson co., Ia. (see map of Iowa, ref. 4–L, for location of county), pleasantly situated on the Mississippi River, 24 miles below Dubuque and 13 miles S. of Galena. It stands on a high bank, and has a good landing, with a gravelly beach. Produce is shipped here in steamboats and by R. R. It is a summer resort and noted for beautiful scenery. The population is largely German. It has an extensive railroad trade in grain, stock, produce, etc. Pop. in 1870, 1353; in 1880, 1581; in 1885, 1398.

Bellevue, capital of Bossier parish, La. (see map of Louisiana, ref. 6–B, for location of parish). Pop. not in census of 1880.

Bellevue, on R. R., Eaton co., Mich. (see map of Michigan, ref. 7–I, for location of county), 32 miles S. W. of Lansing. It has important manufactures and produces excellent lime. Pop. in 1880, 628; in 1884, 736.

Bellevue, Sarpy co., Neb. (see map of Nebraska, ref. 7–K, for location of county), on R. R. and Missouri River, 15 miles by water below Omaha, and 57 miles by R. R. N. E. of Lincoln. It has a court-house and several churches. Pop. in 1880, 211; in 1885, 303.

Bellevue, R. R. junction, Huron co., O. (see map of Ohio, ref. 2–F, for location of county), 45 miles S. E. of Toledo. It is largely devoted to manufacturing, and is a good grain-market. Pop. in 1870, 1219; in 1880, 1432 in Huron, and 737 in Sandusky co.

Bellew' (John Chippendall Montesquieu), a celebrated reader, was born in Lancaster, England, in 1823, of an ancient and noble Irish stock. His name in youth was Higgin, but he assumed his mother's maiden-name on coming of age. He was educated at Oxford, and entered the Anglican ministry in 1848, and won great distinction as a preacher. In 1868 he joined the Roman Catholic Church, and afterward gave with great success public readings in Great Britain and the U. S. Died June 19, 1874.

Bellingham (Richard), a lawyer, born in England in 1592, emigrated to America in 1634. He was lieutenant-governor of Massachusetts for thirteen years, and governor for ten years, first elected in 1641, in opposition to Gov. Winthrop. Died Dec. 7, 1672.

Bellingham Bay, in almost the extreme northern part of Washington Territory, in Whatcom co., is 14 miles long, 3 miles wide, with a depth of from 3 to 20 fathoms. Great quantities of lignitic bituminous coal are mined here, the shaft being only one-quarter of a mile from the harbor. It is generally considered the best coal on the Pacific coast. Whatcom is the chief point of this coal-trade.

Bellini (Giovanni), an excellent painter, was born at Venice in 1426. He was the master of Titian, and was called the founder of the Venetian school. Among his best works are a "Madonna and Child," "The Coronation of the Virgin," and "Christ Talking to the Woman of Samaria." Died Nov. 29, 1516.

Bellini (Vincenzo), a celebrated Italian composer, son and grandson of musicians of moderate ability, was born at Catania, Sicily, Nov. 3, 1802. He was a pupil of Zingarelli. In 1827 he produced "Il Pirata," an opera which was performed at Milan with great success. His fame was widely extended by "La Straniera" (1828), "La Sonnambula" (1831), and "La Norma" (1831), which latter two works were represented on every opera-stage in Europe. He afterward went to Paris and London, where he was warmly applauded, and composed "I Puritani" (1834). D. in Paris Sept. 24, 1835. (See Pongin, "Bellini," 1868.)

Bellinzo'na [Ger. *Bellenz*], a town of Switzerland, and one of the capitals of the canton of Ticino, is on the river Ticino, here crossed by a bridge, 16 miles N. of Lugano. It is defended by several old castles, and has an active transit trade. Pop. 2501.

Bellman (Karl Michael). See Appendix.

Bell Metal, a hard, dense, brittle, and sonorous alloy of copper with tin, zinc, or some other metal. The proportion in English bells is usually 75 per cent. of copper and 25 of tin. The bell metal of commerce usually contains 80 of copper to 20 of tin, or else 78 of copper to 22 of tin.

Bellona, the goddess of war in the ancient Roman mythology, was represented as the companion and sister or wife of Mars. She was described by the poets as armed with a scourge and holding a torch in her hand. Her priests were called *Bellonarii*.

Bel'lows [from Anglo-Saxon *bylig*, a "bag;" Ger. *Bälgen*], a very ancient contrivance for producing a blast of air. It consisted, in its rudest form, of a bag which was compressed, allowed to become full, compressed again, and so on. Representations of bellows have been found in some of the earliest Egyptian sculptures, and Sir Gardiner Wilkinson believes he has found a valve as early as the time of Moses. The natives of India and China have employed the bellows from time immemorial. Rude forms of the bellows are found in many of the lowest tribes of Africa. Ordinary bellows, as now used, are practically leather bags which are compressed and then expanded so as to allow air to enter through a valve opening inward, which on compression of the bellows allows no air to escape, except through the nozzle. In modern manufactories, furnaces, etc., the bellows has been partly superseded by machines of different kinds which produce the blast of air with greater efficiency and uniformity than ordinary bellows.

Bellows (Albert F.). See Appendix.

Bel'lows (Henry Whitney), S. T. D., LL.D., an eminent Unitarian minister, born in Walpole, N. H., June 11, 1814, graduated at Harvard in 1832, and became pastor of a church in the city of New York in 1838. He gained distinction as an eloquent public speaker, and lectured on a variety of subjects, especially social, educational, and patriotic enterprises. In 1846 he was one of the founders of the "Christian Inquirer." Among his works are "Lectures on the Treatment of Social Diseases" (1857) and "The Old World in its New Face" (1868). He was the principal promoter and first president of the U. S. Sanitary Commission, established in 1862. Died Jan. 30, 1882.

Bellows Falls, R. R. junction, Windham co., Vt. (see map of Vermont, ref. 9–C, for location of county), on the W. bank of the Connecticut River, 53 miles S. E. of Rutland. The river here falls 44 feet in half a mile. The village has a medicinal spring. The water-power is very great, and is being improved. There are several paper-mills and other manufactories. It is the seat of St. Agnes' Hall, a seminary for young ladies. Pop. in 1870, 697; in 1880, 2229.

Bellows Fish, or **Trumpet-Fish,** the *Centriscus scolopax*, a spiny-finned fish of the family Aulostomidæ, feeds upon small animals found at the bottom of the sea, chiefly in the Mediterranean and on the W. coasts of Europe. It is good eating, though small, seldom exceeding five inches in length.

Bells, in nautical language, is a term having a peculiar meaning, and is used as a substitute for those expressions by which people on land indicate the hour. The sailor's day or night is divided into watches or periods, each of four hours' duration, and the bell is struck once at the expiration of each half hour. The number of strokes denotes the number of half hours that have elapsed in that particular watch. If the watch commences at 6 P. M., eight bells would be a signal for the end of the watch at 10 P. M.

Bellu'no (anc. *Bellu'num*), a city of Italy, capital of province of same name, on the Piave, 49 miles N. of Venice. It is a bishop's see, and has a cathedral designed by Palladio, a rich hospital, a public library, a handsome aqueduct, and a beautiful triumphal arch; also manufactures of silk stuffs, hats, leather, and earthenware. Pop. in 1880, 15,660.

Bellville, on R. R., capital of Austin co., Tex. (see map of Texas, ref. 5–I, for location of county), near the Brazos River, 55 miles W. N. W. of Houston. Pop. in 1880, 500.

Bel'mond, Wright co., Ia. (see map of Iowa, ref. 3–G, for location of county), is finely situated on R. R. and the Iowa River. It is in a good and well-settled farming region. Pop. in 1885, 727.

Belmont, a post-village of Mississippi co., Mo. (see map of Missouri, ref. 7–K, for location of county), on R. R. and the Mississippi River, opposite Columbus, Ky., 197 miles S. S. E. of St. Louis. In 1861 this place was occupied as a Confederate camp. On Nov. 6, Gen. Grant, in command at Cairo, descended the river with about 4000 troops, remaining over-night about 10 miles above Columbus, Ky. On the morning of the 7th this force was debarked on the Missouri shore a short distance above Belmont, and at once moved forward to the capture of the Confederate camp, supposed to contain about 3000 men. After several hours' severe fighting, the Federal troops forced their way through the obstructions on either side. An irresistible charge carried the camp, drove the Confederates in all directions, and left the field in possession of the Federals. The Confederate camp, with all its supplies, ammunition, and baggage, was fired and destroyed. The defeated Confederates were, however, strongly reinforced by Maj.-Gen. Polk from Columbus, and in turn drove the Federal troops back to their boats, fighting all the way against a now vastly superior Confederate force, while the batteries on the Kentucky side kept up a damaging fire which could not be returned. By 5 P. M. the troops were all on board their boats without the loss of a gun, while they had with them two guns captured from the Confederates. The Federal loss was 84 killed, 150 wounded, and a similar number missing; the Confederate loss is stated at from 500 to 600, killed and wounded.

Belmont, capital of Nye co., Nev. (see map of Nevada, ref. 3–E, for location of county), about 150 miles in a direct line E. S. E. of Carson City. Pop. in 1880, 284.

Belmont, capital of Allegany co., N. Y. (see map of New York, ref. 6–D, for location of county), on the Genesee River and on the Erie R. R., 92 miles W. by N. of Elmira, and 94 miles E. S. E. of Dunkirk. It contains a court-house and several barrel factories. Pop. in 1870, 795; in 1880, 804.

Belmont (AUGUST), born at Alzey, in Germany, in 1816, emigrated to America in 1837 as the representative of the Rothschilds, and became an active politician of the Democratic party. He was chairman of the executive committee at the national Democratic convention at Charleston in 1860. He is a prominent man in the financial world of New York.

Beloit', city and R. R. junction, capital of Mitchell co., Kan. (see map of Kansas, ref. 4–F, for location of county), on the N. bank of Solomon River, 184 miles W. of Missouri River, has excellent graded and high schools, extensive mills and manufactures, and is an important business-centre. Pop. of township in 1870, 173; in 1880, 2793, including 1835 in city; of city in 1885, 2003.

Beloit, a city and R. R. centre, Rock co., Wis. (see map of Wisconsin, ref. 7–E, for location of county), on Rock River, 91 miles N. W. of Chicago and 47 miles S. S. E. of Madison, is on the S. boundary of the State. It is partly built on a plain which is about seventy feet higher than the river, and is the seat of Beloit College. It has considerable manufactures of paper, reapers and mowers, ploughs, water-wheels, etc. Pop. in 1870, 4396; in 1880, 4790; in 1885, 5359.

Beloit College, at Beloit, Wis., originated in the deliberations of ministers and laymen of Congregational and Presbyterian churches in Wisconsin and Northern Illinois. In May, 1845, a convention of sixty-nine members unanimously decided that a college of the highest order for young men ought to be established at Beloit. A self-perpetuating board of trustees then elected was incorporated by charter from the Territorial legislature of Wisconsin in 1846. The corner-stone of the first building was laid in June, 1847, and in the fall of the same year five young men were received to the first college class. Jackson J. Bushnell, A. M., and Joseph Emerson, A. M., both graduates of Yale College in the class of 1841, were the first regularly appointed professors. Rev. Aaron L. Chapin of Milwaukee, also a graduate of Yale, was elected first president in 1849; succeeded in 1886 by Rev. Edward D. Eaton. The institution embraces a collegiate department and a preparatory academy. The collegiate department offers two parallel courses of four years, called respectively the classical and the philosophical course. In the classical course the branches of study and the standard of scholarship correspond with those of the best colleges of New England. The philosophical course combines, with such an amount of Latin and Greek as is considered essential to the best proficiency in any art or science, a more varied range of study and a more extensive culture of science. In the preparatory academy also two parallel courses are defined, called respectively the classical course and the elementary scientific course. These courses occupy three years, and are adapted to meet the requisitions for admission to the two courses of the collegiate department. For such as do not contemplate entering college they offer opportunities for advanced general culture, well balanced and thorough as far as it goes.

The faculty of the college is now (1883) composed of the president, 9 professors, and two instructors of the preparatory school. About 2000 young men have received more or less of culture in the institution, and graduates of the full course number 311. Its graduates occupy positions of influence in our own country and many foreign lands. For its endowment and support Beloit College depends entirely on private benefactions. It has received generous donations from friends in both the East and the West, but large additions to its resources are much needed. The college is beautifully situated on the banks of Rock River. Its most prominent building is the Memorial Hall, erected in honor of the sons of the college who fell in the late war, and devoted to the collections of the cabinet and library. It is also furnished with a well-equipped astronomical observatory. AARON L. CHAPIN.

Beloochistan', or **Belujistan** (anc. *Gedrosia*), a country of Southern Asia, bounded on the N. by Afghanistan, on the E. by Sinde, on the S. by the Arabian Sea, and on the W. by Persia. Its area is estimated at 106,735 square miles, and the pop. at 350,000.

This region, which is almost destitute of rivers or permanent streams, consists of high mountains and barren, sandy plains. The peak of Takkatoo, in the N. part, is said to be 11,000 feet high, and some of the plains or valleys have an elevation of 6000 feet above the sea. The largest river is the Doostee, which has been found only twenty inches deep and twenty yards wide at its mouth. It enters the Arabian Sea. The climate presents great extremes of heat and cold. Most of the fruits known in Europe, as well as plantains and guavas, are common. Melons attain such size that a man cannot lift them. Some of the valleys produce rice, cotton, tobacco, indigo, barley, pulse, etc. Among the mineral resources are copper, antimony, lead, iron, sulphur, and alum. The inhabitants are divided into the Beluches in the N. and W., who are a mixture of Persians, Hindoos, and Semitic tribes, and are indolent, warlike, and cruel; the Brahuis, the remains of the original inhabitants, in the E.; and the Lamri in the S. E. The entire population consists of Sunnite Mohammedans. They mostly subsist by pastoral pursuits, raising sheep, goats, and camels or dromedaries. They are subject to a khan, who rules with despotic power. Kelât was stormed and taken by the British in 1839, and the khan was killed.

Bel'per, a market-town of England, in Derbyshire, on the Midland Railway, 10 miles by rail N. of Derby. It has several churches, a public library, and a stone bridge over the river Derwent. It has large manufactures of silk and cotton hosiery. Pop. in 1881, 9875.

Belshaz'zar (*Bel-shar-uzur*; Fr. *Balthasar*], son of Nabonadius (Labynetus), who was the sixth and last king of the second Babylonian period. His mother was a daughter of Nebuchadnezzar, and probably the widow of Neriglissar, the fourth king of the period. When of sufficient age he was associated with his father on the throne, and in the book of Daniel is therefore called king. At the fall of Babylon in 538 B. C. he was slain, and his father, Nabonadius, then at Borsippa, was taken prisoner.

Belton, on R. R., capital of Bell co., Tex. (see map of Texas, ref. 4–H, for location of county), situated on Leon River, 60 miles N. N. E. of Austin City. Pop. in 1870, 281; in 1880, 1797.

Belton (Rev. James S.). See Appendix.

Belts, Great and **Little,** are two straits which connect the Baltic with the Cattegat. The former separates the island of Fünen from Seeland, is 36 miles long, and has an average width of about 18 miles. The depth ranges between 6 and 26 fathoms, and the current is so strong that the Belt is seldom frozen over. The navigation of both Belts is dangerous or difficult. The Little Belt separates Fünen from Jutland. It is 32 miles long. The widest part of it is about 10 miles, and the narrowest about 2500 feet. From these Belts (Lat. *baltei*) the Baltic Sea is supposed to take its name.

Belu'ga, a genus of Mammalia, of the order Cetacea and of the family Delphinidæ or dolphins. They are distinguished by a blunt and broad head and the absence of a dorsal fin. They abound in the Arctic seas, are gregarious, and afford to the Greenlanders an important article of food. The *Beluga globiceps* sometimes attains a length of thirteen feet. *Round-headed cachalot* is one of the synonyms of this animal. The white whale of the St. Lawrence (*Beluga borealis*) is common in northern waters, both salt and fresh. It is caught in the St. Lawrence and the Saguenay, is from ten to twenty feet long, and is prized for its excellent oil and its skin, which makes a very fine leather.

The name Beluga is often applied to a large sturgeon of Southern Russia (*Acipenser huso*), which affords great quantities of isinglass and caviare. (See Sturgeon.)

Be'lus [Gr. Βῆλος], in classic mythology, a king of Phœnicia, was said to be a son of Neptune, a brother of Agenor, and the father of Egyptus. He is considered by some persons as identical with Baal (which see).

Belus [Βῆλος, now called *Nahr Naaman;* perhaps the *Bealoth* of the Hebrew text of the Bible], a small stream of Palestine, which enters the sea near Acre. On its banks it is said that the art of glass-making was discovered.

Belus, Temple of, a famous temple of enormous size in the city of Babylon, rebuilt by Nebuchadnezzar shortly after 604 B. C. According to some authorities, it was destroyed by Xerxes, king of Persia. Some writers identify its ruins with *Birs-Nimrud* (a huge mound 6 miles S. W. of Hillah), which appears to have been originally about 156 feet high. Others identify its ruins with *Babil* (another mound some 6 miles N. of Hillah), whose height is about 140 feet.

Belvede're (*i. e.* "fair view"), an Italian word applied to a pavilion on the top of a house, or a structure designed to afford a fine prospect of the surrounding country; also an artificial eminence in a garden. In France and other countries of Europe the term is often used as the name of a palace, villa, or summer-house. The famous statue of Apollo Belvedere derived its name from a gallery of the Vatican called Belvedere.

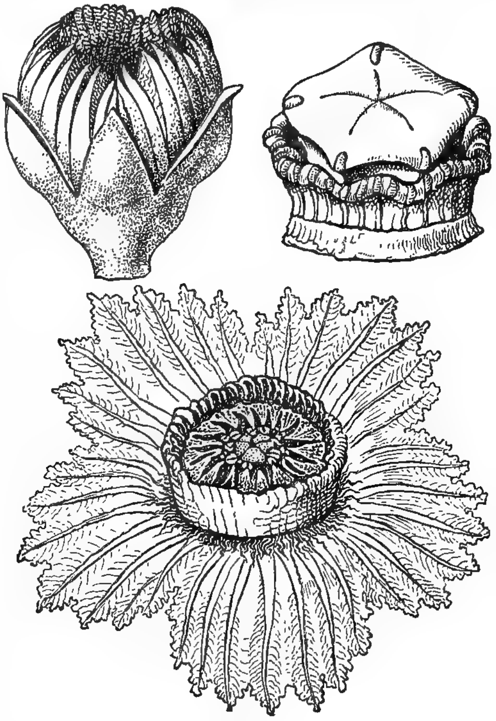
Bel'vedere (*Chenopodium scoparium*, or *Salsola scoparia*), an annual plant of the order Chenopodiaceæ, is a native of Europe and Asia, and is sometimes called summer cypress. It is cultivated in gardens, but not for its flowers, which have no beauty. It has a close, pyramidal, rigid form and narrow leaves, and resembles a miniature cypress.

Belvedere, a town of Southern Italy, province of Cosenza, 26 miles N. N. W. of Cosenza, has a trade in wine and raisins. Pop. 5600.

Bel'videre, R. R. junction, capital of Boone co., Ill. (see map of Illinois, ref. 1–E, for location of county), on the Kishwaukee River, 78 miles W. N. W. of Chicago. It has a number of mills, elegant churches, and fine schools. Pop. in 1870, 3231; in 1880, 2951.

Belvidere, R. R. junction, capital of Warren co., N. J. (see map of New Jersey, ref. 2–C, for location of county), on the Delaware River, 13 miles above Easton and 95 miles N. of Philadelphia. The Pequest Creek enters the river here, and affords a valuable water-power. Belvidere has an academy, several mills, and a cotton factory. Pop. of the township in 1870, 1882; in 1880, 1773.

Belvis'ia (also called **Napoleo'na**), a genus of exogenous plants, the type of the natural order Belvisiaceæ. The few species of this order which are known are natives of tropical Africa, and are large shrubs with simple alternate, coriaceous leaves. The flowers, each of which has twenty stamens, are sessile, beautiful, and have a very singular form. The calyx is a leathery cup, divided into five ovate segments. The corolla consists of three concentric and distinct rings, each of which is monopetalous; the lower or outer one, 5-lobed and furnished with thirty-five stiff ribs, by means of which it is strongly plaited; when fully blown it turns back over the calyx so as to hide it completely; the second, a narrow membrane, is divided into many fine regular segments like a fringe; the third, an erect, cup-shaped membrane, whose edge is cut into many fine segments turned downward. The fruit is a large berry, similar to a pomegranate in size and form, enclosing several reniform seeds, one inch long. One species of *Belvisia* bears an edible fruit. According to Lindley, this order belongs to the Myrtal alliance, and is allied to Rhizophoraceæ.



Belvisia.

Belzo'ni (Giovanni Battista), an Italian traveller, born at Padua Nov. 5, 1778, emigrated to England in 1803, and gained a subsistence by exhibiting himself as an athlete. In 1815 he visited Egypt at the invitation of Mehemet Ali, who desired him to construct a hydraulic machine. He soon directed his attention to the exploration of Egyptian antiquities. He removed to England the colossal bust called "Young Memnon," which is now in the British Museum. He opened the temple of Ipsambool and the pyramid of Cephren (or the second pyramid of Gizeh). He published in 1821 a very interesting "Narrative of the Operations and Recent Discoveries within the Pyramids, Temples, Tombs, etc. in Egypt and Nubia." He undertook a journey to Timbuctu, but died near Benin Dec. 3, 1823.

Bem (Joseph), a Polish general, born at Tarnov, in Galicia, in 1795. He served in the Polish army in the revolution of 1830, after which he passed some years in France. In 1848 he joined the Hungarian patriots, and obtained command of the army of Transylvania. He defeated the Austrians in several actions, and took part in the battle of Temesvár (1849), which was disastrous to Hungary. Having fled to Turkey and conformed to Islamism, he was raised to the rank of pasha. Died Dec. 10, 1850. (See Pataky, "Bem in Siebenbürgen," 1850; N. N. Lájos, "Le Général Bem," Paris, 1851.)

Bembeç'idæ [Gr. βέμβιξ, a "top"], a family of hymenopterous insects, the popular name of which is "sand-wasps," are mostly natives of warm climates. They resemble wasps or bees in appearance, and the females make burrows in sandy banks, in which they deposit their eggs. Some of them emit an odor like that of roses. The U. S. have several species.

Bem'bo (Pietro), a celebrated Italian scholar and cardinal, born at Venice May 20, 1470. He removed to Rome in 1512, and became secretary to Pope Leo X. In 1539 he was raised to the dignity of cardinal. He wrote, besides other works, a Latin "History of Venice" (1551). Died Jan. 18, 1547. He was eminent as a restorer of pure Latinity. His collected works were published at Venice in 4 vols., 1729. (See Beccadelli, "Vita di P. Pembo;" J. D. la Casa, "Vita Bembi.")

Bem'bridge Beds, a division of the upper eocene strata found in the Isle of Wight, and containing many fossil shells of the *Paludina, Planorbis*, etc. This division comprises, besides several beds of marl and clay, the Bem-bridge limestone, a cream-colored stone, often compact and sometimes vesicular and concretionary. Here are found remains of the *Anoplotherium*, an extinct animal.

Bement, Ill. See Appendix.

Bemiss (Samuel Merrifield), M. D. See Appendix.

Be'mis's, or **Bemus', Heights,** a post-village of Stillwater township, Saratoga co., N. Y. (see map of New York, ref. 4–J, for location of county), on the Champlain Canal and near the Hudson River, was the scene of the first battle of Stillwater, Sept. 19, 1777.

Ben, a Gaelic term prefixed to the names of many mountains of Scotland, as Ben Lomond, Ben Nevis, etc. It signifies "head" or "summit."

Ben, a Hebrew word signifying "son," and equivalent to the Arabic *Ibn*, forms the first syllable of many scriptural names, as Ben-hadad, Benjamin, etc. *Beni,* the plural of Ben, occurs in the names of many Arabian tribes.

Ben, Oil of, a fixed oil extracted by pressure from the fruits of *Moringa aptera* and other species, leguminous trees growing in the Levant and the East and West Indies. It is colorless or slightly yellow, and odorless. It is used to extract the odoriferous principles of fragrant plants.

Bena'res (anc. *Varanashi* and *Kasi*), a famous and populous city of Hindostan, situated on the left bank of the Ganges, about 428 miles by rail N. W. of Calcutta, and 477 miles by rail S. E. of Delhi. It is the holy city of the Brahmans, the chief seat of their science, and may be called the Hindoo capital of India. Flights of stone steps called *ghâts* lead down the steep banks of the Ganges, which is here about half a mile wide. The external appearance of the city, as seen from the river, is rendered very imposing by the minarets of about 300 mosques and the pinnacles of nearly 1000 pagodas. The streets are very narrow, and the houses, which are mostly built of stone, are generally lofty, some of them six stories high. Among the remarkable public edifices are the great mosque of Aurungzeb, 232 feet high, many Hindoo temples, a vast and old astronomical observatory, and the Hindoo Sanscrit college, the chief seat of native learning in India. As the holy city of the Hindoos and the central seat of Brahmanical learning, Benares attracts on the occasion of certain festivals an immense multitude of pilgrims, estimated at 100,000. The permanent population was, in 1881, 207,570. Benares is a wealthy and industrious city, having extensive manufactures of silk, cotton, and woollen stuffs. It is a great emporium for the shawls of the north, the diamonds of the south, and the muslins of Dacca and the eastern provinces. The Hindoo Sanscrit college was founded here in 1791, and an English department was added to it about 1827. The residences of the Europeans are mostly at Secrole, which is three miles from Benares, and contains many fine mansions. It is connected by a railway with Calcutta and Delhi. A mutiny of Sepoys broke out here in June, 1857, but was soon quelled.

Ben'bow (John), a brave English admiral, born in Shropshire in 1650, served first under James II. He became a rear-admiral in the reign of William III., who reposed great confidence in him. In Aug., 1702, he encountered a superior force under the French admiral Ducasse, near Jamaica. He maintained a running fight for four days, was mortally wounded, and died Nov. 29, 1702. (See Campbell, "Lives of the British Admirals.")

Bench, or **Banc** [Law Lat. *bancus*], in law, has several significations: 1. A court or tribunal for the administration of justice. The word originally meant the seat occupied by the judges in court. In England two of the leading courts are termed king's or queen's bench and common bench. The latter tribunal is also called the court of common pleas. 2. The word is also used to designate the judges as contrasted with the practitioners in their court, as in the phrase "the bench and the bar." 3. Another signification is the full number of judges acting as a court of review, as distinguished from a single member of their body, also acting judicially. Thus, decisions rendered by a single judge at a trial are said to take place at *nisi prius*, while those which are made by members of the court sitting together are said to be made in bench or in *banc* or in *banco*.

Bench Warrant, an order issued by or from a bench for the arrest of a person, either in case of contempt or after an indictment has been found, or from a judge to apprehend a person charged with an offence.

Bench'ers, the principal officers of the English inns of court, entrusted with their government and with the power of admitting persons to the bar, and of disbarring practitioners, though the exercise of these powers is subject to the supervision of the judges of the higher courts.

Ben'der, or **Ben'dery,** a fortified town of Russia, in Bessarabia, on the right bank of the Dniester, 65 miles N. W. of Odessa. Here is a strong citadel on an eminence. Bender has several paper-mills, forges, and tanneries. Pop. in 1882, 26,842.

Bendix (John E.), b. on board the steamer Sarah on the St. Lawrence River, Aug. 28, 1818; learned the trade of a machinist in New York; joined the 9th regiment, State militia, in 1847; organized the 7th regiment of volunteers in 1860; took part in the battles of the Wilderness, Antietam, Fredericksburg, etc., and was made a brigadier-general in 1865. Died in New York Oct. 8, 1877.

Bend'sin, a town of Russian Poland, in the government of Petrokov, 100 miles by rail S. of Petrokov. Pop. 6231.

Be'ne, a town of Northern Italy, in the province of Cuneo, on a hill 16 miles N. E. of Coni. It has an old castle. Pop. 6127.

Ben'edek, von (Ludwig), an Austrian general, born at Odenburg, in Hungary, in 1804. He fought with the rank of colonel against the Italians in 1848, and became a major-general in April, 1849, after which he served with distinction against the Hungarian patriots. He directed a corps in the Italian campaign of 1859 and at Solferino. In June, 1866, he took the command of the grand Austrian army, and remained on the defensive in Bohemia. He was defeated by the Prussians at the decisive battle of Sadowa, July 3, 1866. D. Apr. 27, 1881.

Benedet'ti (Vincent), Count, a French diplomatist, born in Corsica about 1815. He was sent as ambassador to the kingdom of Italy in 1861. In 1870 he was employed by Napoleon III. in important negotiations with the court of Prussia, and had a personal interview with King William at Ems just before the emperor declared war against Prussia.

Ben'edict [Lat. *Benedic'tus*], Saint, a celebrated Italian religionist, called the founder of monachism in the West, was born at Nursia, in Umbria, in 480 A. D. He renounced the world in early youth, passed some years in solitude, and acquired a wide reputation for sanctity. He founded a famous monastery on Monte Cassino, near Naples, and composed a system of monastic rules which was largely adopted by the Western monks, and was known as the Rule of Saint Benedict. Under this system the monks were employed in manual labor and in the instruction of the young. (See Benedictines.) Died Mar. 21, 543 A. D. (See Juan de Castaniza, "Vida de S. Benito," 1583; J. B. Planchette, "Vie du grand S. Benoît," 1652; Anton Sulger, "Vita divi Benedicti," 1691; J. G. Waitzmann, "Leben und Wirken des heiligen Benedict," 1825.)

Benedict I. became pope of Rome in 574 A. D. Died in 578.—Benedict II., a native of Rome, was elected pope in 683 A. D., and died in 685.—Benedict III. succeeded Pope Leo IV. in 855. He died in 858, leaving a good reputation for piety.—Benedict IV. was elected pope in 900, as the successor of John IX. Died in 903.—Benedict V. was chosen pope in 964, but was banished from Rome by the emperor Otho I. Leo VIII. was pope at the same time with him, and both are recognized by Roman Catholic historians. Died in 965.—Benedict VI. was elected pope in 972, and was killed by the rebellious Romans in 974.—Benedict VII. succeeded Pope Benedict VI. in 975. He is said to have ruled with ability. Died in 984.—Benedict VIII., a son of the count of Tusculum, became pope in 1012. He crowned the emperor Henry II. in 1013, and defeated the Saracens, who had invaded the Papal States. Died in 1024.—Benedict IX. (Theophlactus of Tusculum), sometimes called the "boy-pope," was chosen pope in 1033. He was extremely licentious, and was expelled by the Romans. Sylvester III. became antipope. Benedict was deposed by the emperor Henry III. about 1046.—Benedict X., called the Stupid, was chosen pope in 1058, removed through the influence of Hildebrand in 1059, and died in prison in the same year.—Benedict XI. (Saint), born in 1240, a native of Treviso, succeeded Boniface VIII. in 1303. He was noted for humility. Died in 1304.—Benedict XII. (originally Jacques Fournier), a native of France, was chosen pope in 1334. He was the third pope who reigned at Avignon, and was eminent as a canonist and theologian. He wrote several works. He died in 1342, and was succeeded by Clement VI. Pope Benedict XII. was an excellent man.—Benedict XIII. succeeded Innocent XIII. in 1724. He was distinguished for moderation and other virtues, and promoted the peace of Europe. Died in 1730. (See Clemente da Cruz, "Vida de Benedicto XIII.," 1739.)—Benedict XIII. (anti-pope), (Pedro de Luna), was born in Aragon, and was elected pope by certain cardinals at Avignon in 1394. Another party elected Boniface IX. at Rome, and a schism of the Church ensued. He was deposed by the Council of Constance in 1417. Died in 1424. Benedict XIV. (Pros-pero Lambertini), born at Bologna in 1675, was a man of superior talents. He was well versed in history, theology, and classical learning. He succeeded Clement XII. in 1740, and showed himself a liberal patron of literature and science. He was also distinguished for his moderation and enlightened piety, and was the author of several esteemed religious works. Died in 1758. (See Fabroni, "Vita di Benedetto XIV.," 1787.)

Benedict (David), D. D., born at Norwalk, Conn., Oct. 10, 1779, graduated at Brown University in 1806, and was for twenty-five years pastor of the First Baptist church in Pawtucket, R. I. He has written a "History of the Baptists" (2 vols., 1813; 3d vol., 1848), "History of All Religions" (1824), "Compendium of Church History," and other works. Died Dec. 5, 1874.

Benedict (Erastus Cornelius), LL.D., was born at Branford, Conn., Mar. 19, 1800, and graduated in 1821 at Williams College. In 1824 was called to the bar, and has been president of the New York Board of Education and a regent of the university, etc. He published "American Admiralty" (1850), "A Run through Europe" (1860), "The Hymn of Hildebert" (1867), etc. D. Oct. 22, 1880.

Benedict (Sir Julius), a musical composer, born at Stuttgart Nov. 27, 1804, one of the most eminent of the many foreign musicians that have settled in England since Handel's time. He has written, among other works, "The Gypsy's Warning" (1838), "Brides of Venice," "Lily of Killarney" (1862), all popular operas; "Undine," a cantata, and "St. Peter" (1870), an oratorio. The latter was produced at the festival of 1870 in Birmingham, England. He was knighted in 1871. D. June 5, 1885.

Benedict (Lewis), an American lawyer and general of volunteers, born in Albany, N. Y., Sept. 2, 1817, graduated at Williams College, studied law, and was admitted to the bar in 1841. He was actively engaged in politics for many years, and held various important local offices. He entered the army as lieutenant-colonel Seventy-third N. Y. Volunteers, engaged at Yorktown, captured at Williamsburg, exchanged Sept., 1862, appointed colonel One-Hundred-and-Sixty-second N. Y. Volunteers, and was attached to the Army of the Gulf. He was in command of a brigade at the battle of Port Hudson and during the Red River expedition, where he greatly distinguished himself. Killed at battle of Pleasant Hill, La., April 9, 1864, while leading his brigade to a charge. (Brevet brigadier-general U. S. volunteers for gallant conduct.) G. C. Simmons.

Benedic'tine Editions of the Fathers. The following is a complete list of these highly esteemed and now very costly works: 1, Barnabas (Menard), 4to, 1642; 2, Lanfranc (D'Achery), fol., 1648; 3, Bernard (Mabillon), 2 vols. fol., 1667; 4, Anselm (Gerberon), fol., 1675; 5, Augustine (Delfan and others), 11 vols. fol., 1679–1700; 6, Cassiodorus (Garet), 2 vols. fol., 1679; 7, Ambrose (Du Frische and Le Nourri), 2 vols., 1686–90; 8, Hilary (Constant), fol., 1693; 9, Jerome (Martiany and others), 5 vols. fol., 1693–1706; 10, Athanasius (Montfaucon), 3 vols. fol., 1698; 11, Gregory of Tours (Ruinart), fol., 1699; 12, Gregory the Great (De Sainte-Marthe), 4 vols. fol., 1705; 13, Hildebert (Beaugendre), fol., 1708; 14, Irenæus (Massuet), fol., 1710; 15, Lucius Cæcilius (Le Nourri), 8vo, 1710: 16, Prosper Aquitanus (Marette and Mangeant), fol. 1711; 17, Chrysostom (Montfaucon), 13 vols. fol., 1718–38; 18, Cyril of Jerusalem (Toultée and Maran), fol., 1720; 19, Basil (Garnier and Maran), 3 vols. fol., 1721–30; 20, Cyprian (Maran), fol., 1726; 21, Justin Martyr (Maran), fol., 1742; 22, Origen (De la Rue), 4 vols. fol., 1733–59; 23, Gregory Nazianzen (Clemencet), 1 vol. fol., 1778; 2d vol., 1842.

Benedic'tines, or **Benedictine Order,** the name of the monks who observe the rule of Saint Benedict. This order was one of the most ancient and learned religious orders of Western Europe. The first Benedictine monastery was that founded by Saint Benedict on Monte Cassino, near Naples, in 528 A. D. The order spread rapidly and widely in several countries of Europe, and it is said had at one period 37,000 monasteries. The Benedictines boasted that their order had produced 24 popes, 200 cardinals, 4000 bishops, and 1500 saints. The rule of Saint Benedict was less severe than that which the Eastern ascetics practised. It required that the monks should live frugally, avoid laughter, hold no private property, and be industrious. To them we are especially indebted for the preservation and transmission of many of the ancient classics through the Dark Ages down to the present time. Among the most celebrated houses or societies of this order was the Congregation of Saint-Maur (dating from 1621), on the river Loire, to which all the Benedictine houses in France were affiliated. Connected with it were many learned men, including Mabillon, Montfaucon, and Sainte-Marthe. They published good editions of the Fathers (see above) and numerous valuable works, among which are "L'Antiquité Expliquée" (15 vols. fol., 1719–24), "Veterum Scriptorum Spicilegium" (13 vols., 1653–77), "Acta Sanctorum S. Benedicti" (9 vols., 1688–1702), and "Histoire Littéraire de la France" (9 vols. 4to, 1733–49). The Cistercians, Carthusians, Camaldules, Clunians, Celestines, and Trappists were branches of the Benedictine order. In 1870 the order numbered 3089 monks, in eight congregations, two of which comprise the monasteries in the U. S. There are also Benedictine nuns, with twelve convents, in the U. S. (See "Annales Ordinis S. Benedicti," 6 vols., 1713–39; Tassin, "Histoire de la Congregation de St.-Maur," 1770; Montalembert, "The Monks of the West," 5 vols., 1860.)

Ben'edix (Julius Roderick), a German author, was born Jan. 21, 1811. He has written many successful plays, among them, "Bemoostes Haupt," "Der Steckbrief," "Der Störenfried," "Mathilde," etc., and a novel, "Bilder aus dem Schauspielerleben." Died Sept. 27, 1873.

Ben'efice [Lat. *beneficium*, a "favor"], originally, a bounty in land given to a meritorious Roman soldier. In mediæval history the term denoted an estate in land conferred by a superior by way of recompense for service. As late as the twelfth century the word was used synonymously with *fœdum*. The earlier historians of the Middle Ages adopted the view that benefices were given successively, as revocable, as temporary, as estates for life, and finally as estates in perpetuity. This view has been refuted by Guizot (see "Civilization in France," vol. iii.). In the canon law it designates a right inhering in a clergyman of sharing the income of church property in return for the performance of spiritual duties. The Roman Catholic Church includes all clerical offices, even the papal, among benefices; but the Church of England, which long made the term include all preferments except bishoprics, now excludes also all cathedral preferments, such as deaneries, canonries, arch-deaconries, etc.

Ben'efit of Cler'gy, in English criminal law, the privilege of the clergy, a clerk's privilege. During the Middle Ages benefit of clergy in various European countries extended to a total exemption in favor of clergymen from the process of a secular judge in criminal cases. In England, however, it was not carried beyond an exemption from capital punishment in felony and petit treason. It was never granted in cases of high treason or offences below felonies. Offences were thus divided into those which were clergyable and not clergyable. This exemption, at first allowed only to clergymen, soon was extended to all the officers and clerks of the Church, and then to every one who could read, an ability to read being confined almost wholly to those in the service of the Church. But when learning became more generally diffused, a distinction was made between those in orders and laymen who could read, the latter being allowed the privilege only once, and then (unless they were peers or peeresses) being branded in the left thumb. A woman, unless she was a peeress, could not claim this exemption, though this inequality was rectified by statute. At first, the criminals who were allowed this privilege were handed over to the ordinary or bishop to be dealt with according to the canons of the Church; but in the reign of Elizabeth it was enacted that they should be discharged from prison, with the proviso that the court might in its discretion keep the offender in prison for a year; and by subsequent statutes various punishments, such as whipping, fine, and imprisonment, were imposed on criminals entitled to benefit of clergy, who were practically all convicts. Whenever Parliament desired to make an offence strictly capital, the practice was to introduce into the enactment the words "without benefit of clergy." By statute of 7 Geo. IV., c. 28, s. 6, benefit of clergy was abolished. Its retention for so long a time was plainly owing to the fact that it could be used to mitigate the rigor of the English criminal law. (For details as to this exemption, consult 4 Blackstone's "Commentaries," 365.) T. W. Dwight.

Be'neke (Friedrich Eduard), a German philosopher, born in Berlin Feb. 17, 1798. He became extraordinary professor of philosophy in the University of Berlin in 1832. Among his works are "Psychological Sketches" (2 vols., 1825–27), a "System of Logic" (2 vols., 1842), and "Pragmatic Psychology" (1850). His system of psychology is called "empirical." He disappeared Mar. 1, 1854, and his body was found in a canal in June, 1855.

Benét (Stephen Vincent). See Appendix.

Beneven'to, a province of Italy, is bounded on the N. by Campobasso, on the E. by Foggia, on the S. by Avellino, and on the W. by Caserta. Area, 676 square miles. The country is level, and the soil generally fertile. The chief articles of export are cattle, grain, wine, oil, etc. It has changed masters very often, and was annexed by Italy at the same time as Naples. Pop. in 1879, 243,676.

Benevento [Lat. *Beneven'tum*], a walled city of Southern Italy, capital of the above province, is situated on a hill or declivity and on the river Calore, 33 miles N. E. of Naples. Pop. in 1881, 21,631. It has a citadel or castle, a fine old cathedral, several palaces and churches. It is the see of an archbishop, and has several annual fairs. Among the many ancient remains found here is the magnificent Arch of Trajan, erected in 114 A. D., now nearly perfect. *Beneventum* was a place of great antiquity, having become a Roman town as early as 274 B. C., and it was an important city during the Roman empire. It was conquered in the sixth century by the Lombards, under whom it continued to flourish, and became the capital of the powerful duchy of Benevento. The city, with some adjacent territory, was given to the pope in 1053. In 1806 it was erected into a principality by Napoleon, who gave Talleyrand the title of prince of Benevento.

Ben'ezet (ANTHONY), a French philanthropist, born at Saint-Quentin Jan. 31, 1713. He joined the Society of Friends, and emigrated in 1731 to Philadelphia, where he taught school for many years. He was eminent as an opponent of the slave-trade and slavery, and a benefactor of the negroes. He wrote several tracts on slavery and the slave-trade, etc. Died May 3, 1784. (See VAUX, "Memoir of A. Benezet," 1817.)

Ben'fey (THEODOR), born at Noerten, near Göttingen, Jan. 28, 1809, became in 1834 professor of Sanscrit and comparative grammar at Göttingen. He published "The Cuneiform Inscriptions" (1847), "The History of Oriental Philosophy in Germany" (1869), a "Sanscrit-English Dictionary," etc. Died July, 1881.

Bengal', the largest and most important province of British India, is bounded on the N. by Nepaul and Bootan, on the E. by Burmah, on the S. by the Bay of Bengal, and on the W. by the North-western and the Central Provinces. It has an area of 194,188 square miles. The greater part of Bengal consists of the great alluvial plain or valley of the Ganges and Brahmapootra. The combined delta of these great rivers commences 280 miles from the sea, near which the delta-islands, here called Sunderbunds, are covered with a very dense vegetation, and infested by serpents, crocodiles, and tigers. Farther N. the country is marvellously prolific of rice, cotton, opium, sugar, indigo, and a great variety of tropical fruits. The chief exports are opium, saltpetre, rice, hides, and indigo. The climate of Bengal is subject to great extremes of heat, and is very destructive to the health of both Europeans and natives, but in this respect great improvement is reported in the last few years. Pop. in 1881, 68,829,920.

Among the most important cities of Bengal presidency are Calcutta, the capital, Delhi, Benares, Patna, Agra, and Moorshedâbâd. The people are Hindoos, Mohammedans, Sikhs, and various wild tribes in the hill-country. The native Bengalese are a facile, deceitful, cowardly race. Their morals are much debased. The English first established themselves in Bengal in 1656. From the smallest beginnings their great empire of the East has grown up. The Bengalese language has a basis of Sanscrit, but is modified by words of Arabic, Malay, and Persian origin. Its literature has been much neglected till of late. Since 1858 the history of Bengal has been one of steady and peaceful progress. Its external trade is practically confined to Calcutta. Chittagong is the rice port.

Bengal, Bay of (anc. *Ganget'icus Si'nus*), a part of the Indian Ocean extending between Hindostan and Farther India. Its southern boundary is variously placed by geographers, according to some of whom it is a line about 1200 miles long, drawn from Coromandel to the peninsula of Malacca. Others assign as its southern limit a line drawn from the delta of the Godavery to Cape Negrais. Its chief affluents are the Ganges, the Brahmapootra, and the Irrawaddy. There are no good harbors on the western coast, but several safe ports occur on the E. side, at Aracan, Cheduba, Negrais, etc. The tide sometimes rises to the height of seventy feet in this bay. The north-east monsoon prevails here in summer and the south-west monsoon in winter. In this bay are the Andaman and the Nicobar Islands.

Bengal Light, or **Blue Light,** a brilliant signal-light used at sea during shipwreck, and in ordinary pyrotechny for illuminating a tract of country. It is produced by the combustion of a mixture of nitre, sulphur, and tersulphide of antimony. These materials are first reduced to a fine powder, then dried, and mixed in the proportions of 6 pounds of nitre, 2 of sulphur, and 1 of the tersulphide.

Benga'zi, or **Benghasy** (anc. *Bereni'ce*), a seaport-town of Northern Africa and the capital of Barca, on the E. coast of the Gulf of Sidra, 420 miles E. S. E. of Tripoli. The port is shallow, and nearly filled with sand. It has some trade in oxen, sheep, corn, and wool. It is supposed by some to be the site of the ancient *Hesperis* and the Gardens of the Hesperides. Pop. estimated at from 6000 to 7000.

Beng'el (JOHANN ALBRECHT), D. D., a German Lutheran theologian, was born at Winnenden, in Würtemberg, June 24, 1687. He was probably the first Protestant who treated the exegesis of the New Testament in a thoroughly critical spirit. His edition of the Greek Testament (1734) is highly esteemed. He wrote the celebrated "Gnomon Novi Testamenti" (1742) and an "Exposition of the Revelation of St. John" (1740), etc. Died Nov. 2, 1752.

Bengue'la, a country of Western Africa, the limits of which cannot be accurately defined. It is bounded on the N. by the Coanza River, which separates it from Angola, on the S. by Mossamedes, and on the W. by the Atlantic Ocean. It is watered by numerous small rivers, which flow westward into the Atlantic. The surface is mountainous. The soil is fertile, and produces a very luxuriant and varied vegetation. The climate is hot, humid, and unhealthy, especially near the coast. The forests are infested by lions and other beasts of prey. Benguela is nominally subject to Portugal. Capital, São Felipe de Benguela.

Ben'ham (A. E. K.), U. S. N., born April 15, 1832, in Pennsylvania, entered the navy as a midshipman Nov. 24, 1847, became a passed midshipman in 1853, a lieutenant in 1855, a lieutenant-commander in 1862, and a commander in 1867. On Nov. 7, 1861, while attached to the steamer Bienville, he took part in the battle of Port Royal; commanded steamer Penobscot, Western Gulf blockading squadron (1863–65); is now (1883) captain.

Benham (HENRY W.), b. at Cheshire, Conn., 1816; graduated first at West Point in 1837; col. of engrs., bvt. maj.-gen. U. S. army; has had charge of the principal engineer works on the Atlantic coast, including Potomac aqueduct, and of Coast Survey office; member of commission for New York docks 1855, and engineer of New York quarantine commission 1859; was wounded and bvtd. cap. at Buena Vista 1847; bvtd. col. as commanding at the rout of Garnett, Carrick's Ford, July, 1861; as brig.-gen. vols. commanded leading brigade at Carnifex Ferry, Sept., and at rout of Floyd through Fayetteville Nov., 1861; commanded district and troops at capture of Fort Pulaski, Apr., 1862; commanding engineer brigade, laid several ponton-bridges under fire during Chancellorsville battles, his horse being shot under him; constructed and commanded defences City Point, 1864; bvtd. maj.-gen. vols. and brig. and maj.-gen. U. S. army for "gallant conduct," etc., Mar., 1865; senior engineer Boston; pres. of engineer boards; devised picket shovel and rapid construction of ponton-bridges by "simultaneous bays." Retired 1882. D. June 1, 1884.

Be'ni, a river of South America, in Bolivia, rises on the E. slope of the Andes, and is formed by the junction of the Chuqueapo and Mapiri. It flows northward into the Madeira or Mamore after a course of about 650 miles.

Beni, a department of Bolivia, is bounded on the N. and E. by Brazil, on the S. by La Paz, Cochabamba, and Santa Cruz, and on the W. by Peru. It comprises the whole northern part of the republic, and with the exception of a small part in the S. W. corner, and a part of the province of Menos in the E., is entirely an unknown region, inhabited only by wild Indians. Chief town, Trinidad. Pop. 72,200, exclusive of about 100,000 Indians.

Benicar'lo, a seaport-town of Spain, in the province of Valencia, on the Mediterranean, about 82 miles N. N. E. of Valencia. It is meanly built, and has a ruined castle and a fishing port. A strong wine is made here and exported to Bordeaux, where it is used to adulterate claret. P. 7922.

Beniç'ia, city, on R. R., Solano co., Cal. (see map of California, ref. 4–B, for location of county), is on the N. side of the Strait of Carquinez (which connects San Pablo and Suisun bays), about 33 miles by water N. E. of San Francisco. It was formerly the capital of the State. The strait is nearly two miles wide, and is navigable for large vessels. Benicia has a law school, a U. S. arsenal and barracks, a ladies' seminary, a convent, and important manufactures. It is the seat of St. Augustine College (Episcopalian). Here are quarries of limestone, producing good hydraulic cement. Pop. in 1880, 1794.

Ben'i-Has'san, a village of Central Egypt, on the right bank of the Nile, 23 miles S. S. E. of Minieh. Here are twenty-two grottoes or catacombs excavated in a calcareous bank or hill. They are supposed to have been used as tombs by the people of Hermopolis, which stood on the opposite side of the river. Here are apartments sixty feet long and forty feet wide, in which are pillars of the native rock sixteen feet eight and a half inches in height and five feet in diameter. The sides of the grottoes are covered with paintings designed with skill and good taste. These tombs are among the most remarkable in Egypt. The earliest bears the date of the forty-third year of Ositarsen I., not far from 1800 B. C. Says J. P. Thompson, "I found one tomb, some 200 feet above the level of the river, almost a Doric temple hewn from the solid rock. . . . This chamber was cut from the solid rock with perfect precision; no modern square or line or plummet could make it more true."

Be'ni Khaibir', a tribe in Arabia, supposed by some, but without sufficient reason, to be a remnant of the ancient ascetic Rechabites. They number about 60,000. (See Rechabites.)

Benin', a kingdom of Western Africa, in Upper Guinea, is bounded on the N. E. and E. by the river Niger, on the S. W. by the Bay of Benin, and on the W. by Dahomey. Its limits in some directions are not well defined or ascertained. The interior is elevated and hilly, and mostly covered with forests. The soil is fertile, and supports a dense population. Sugar, rice, yams, palm oil, and cotton are the staple productions. Many human victims are sacrificed here. The religion of the country is gross fetishism.

Benin, a town of Africa, capital of the above, is on a river of the same name, which is one of the mouths of the Niger. It is about 55 miles from the ocean. The houses are built of clay. Pop. estimated at 15,000. Belzoni died in this town in 1823.

Beni-Sooef', or **Beni-Souef,** a town of Central Egypt, on the Nile, 68 miles S. S. W. of Cairo. It has cotton-mills and quarries of alabaster, and is the entrepôt of the produce of the fertile valley of Fayoom. Pop. 6000.

Ben'jamin, the youngest son of the patriarch Jacob and of Rachel (who called him Benoni). He was his father's favorite child, and the head of one of the twelve tribes of Israel. The territory of this tribe was bounded on the N. by that of Ephraim, on the E. by the Jordan, on the S. by the land of Judah, and on the W. by that of Dan. After the death of Solomon the tribes of Benjamin and Judah remained loyal to his dynasty when the other ten tribes revolted.

Benjamin (Judah Peter), an American politician of Jewish extraction, was born in Hayti in 1812. He practised law in New Orleans, was elected a Senator of the U. S. for Louisiana in 1852, and re-elected in 1859. He acted with the Democrats, and became a secessionist. He was secretary of state of the Confederate States from Feb., 1862, until the collapse of that power in 1865. After the close of the civil war he practised law in London, England. D. in Paris, May 7, 1884.

Benjamin (Park), an American poet, born at Demarara, in Guiana, Aug. 14, 1809. He graduated at Trinity College, Hartford, Conn., in 1829, and in 1840 became associated with R. W. Griswold as editor of the "New York World," a literary journal. He wrote, besides many lyrical poems, a "Poem on the Meditation of Nature." Mr. Benjamin, though physically strong, was never able to walk. Died Sept. 12, 1864.

Benjamin of Tudela, a Jewish rabbi and traveller, commenced about 1160 a journey through Palestine, Persia, and Egypt, in which he passed about twelve years. He wrote an account of his travels, which was translated into Latin, English, and French. Died in 1173. (See Carmoly, "Notice sur B. de Tudéle et ses Voyages," 1837.)

Benkoelen, or **Bencoo'len,** a Dutch seaport-town on the S. W. coast of Sumatra; lat. 3° 48' S., lon. 102° 19' E. Pop. estimated at 5000. It was founded by the English in 1685, but was ceded to Holland in 1825, in exchange for Malacca. The climate of the city is exceedingly unhealthy. Pepper is the chief article of export.

Ben'nett (James Gordon), a journalist, born in Banffshire, Scotland, Sept. 1, 1795, and educated for the Roman Catholic priesthood, emigrated to the U. S. in 1819, was connected with several journals published in the city of New York, and was chief editor in 1833 of the "Pennsylvanian," a daily paper of Philadelphia. In 1835 he founded the "New York Herald." Died June 1, 1872.

Bennett (John Hughes), M. D., an eminent physician and medical writer of Edinburgh, was born in London in 1812, took his degree at Edinburgh in 1837, and in 1848 was made professor of the institutes of medicine in that city. Dr. Bennett was especially distinguished for his studies in histology and therapeutics, and his advocacy of the expectant treatment of disease. Among his works are "Clinical Medicine" (1856), "Practice of Medicine," "Treatment of Pulmonary Consumption," etc. D. 1875.

Bennett (Milo Lyman), LL.D., was born in Sharon, Conn., in 1790, graduated at Yale in 1811, and studied law at Litchfield. He resided at Burlington, Vt., was a judge in Vermont courts (1839–59), and published "Vermont Justice" and other legal works. Died July 7, 1868.

Bennett (Sir William Sterndale), Mus. Dr., D. C. L., an English composer and pianist, born at Sheffield April 13, 1816. He visited Germany, and formed a friendship with Mendelssohn. He composed concertos, overtures, and pieces for the piano. He was knighted 1871. Died 1875.

Ben'nettsville, capital of Marlborough co., S. C. (see map of South Carolina, ref. 5–F, for location of county), 90 miles E. N. E. of Columbia. Pop. in 1880, 343.

Ben Ne'vis, a famous mountain of Scotland, and the highest point in Great Britain, is in the county of Inverness, about 5 miles E. of Loch Eil. It has an altitude of 4406 feet, and is very difficult of ascent. On the N. E. side is a tremendous precipice 1500 feet in height. Granite and gneiss form the base of this mountain, the upper part of which is porphyry. In clear weather most of the Western Islands and the mainland as far as Cairngorm and Ben Macdhui can be seen from the summit.

Ben'nigsen, von (Rudolf), a prominent German statesman, born at Lüneburg in 1824, became in 1867 a member of the Hanoverian provincial diet and of the Prussian house of delegates, and second vice-president of the North German diet.

Bennington, on R. R., capital of Bennington co., Vt. (see map of Vermont, ref. 9–B, for location of county), 55 miles S. W. of Rutland, and 36 miles from the Hudson River at Troy. The town contains three villages—Bennington, North Bennington, and Bennington Centre—each of which has a separate post-office. Gen. Stark, at the head of a column of "Green Mountain Boys," defeated a British detachment in force, commanded by Col. Baum, sent from Gen. Burgoyne's army to capture the public stores at Bennington, Aug. 16, 1777; 600 British prisoners were captured. The town contains extensive graded schools, large manufactories of knit goods, and one of the largest shawl factories in the country. Bennington is the largest manufacturing village in the State. Pop. of township in 1870, 5760; in 1880, 6333.

Ben'son, capital of Swift co., Minn. (see map of Minnesota, ref. 9–B, for location of county), is on R. R. and the Chippewa River, 134 miles W. of St. Paul. Pop. in 1880, 456; in 1885, 597.

Benson (Edward White), D. D., born at Birmingham, England, 1829, graduated at Trinity College 1852; was for several years assistant in Rugby school; head-master of Wellington College from its establishment in 1858 to 1872; chancellor of Lincoln Cathedral 1872; consecrated bishop of Truro 1877; became archbishop of Canterbury, England, 1882; author of a great number of sermons.

Benson (Egbert), LL.D., born in New York City June 21, 1746, graduated at Columbia College in 1765, was an eminent lawyer, a member of Congress (1784–88, 1789–93, and 1813–15), a regent of the university (1789–1802), judge of the supreme court of New York (1794–1801), and of the U. S. circuit court. He published a "Vindication" of the captors of André (1817), and a "Memoir on Dutch Names." Died Aug. 24, 1833.

Benson (Henry C.), D. D., an eminent preacher and writer in the Methodist Episcopal Church, was born near Xenia, O., in 1815, joined the Indiana Conference in 1842, was elected professor of Greek in Indiana Asbury University in 1850, went to California in 1852, was editor of the "Pacific Christian Advocate" at Portland, Or., from 1864 to 1868, and elected editor of the "California Advocate" in 1868, in which office he long continued. He is author of "Life among the Choctaws," among whom he labored some time as a missionary.

Benson (Joseph), an English Methodist minister, born in Cumberland Jan. 25, 1748, acquired much influence in the Church. He was a popular preacher, and author of numerous works, among which are an "Apology for the Methodists" (1801), a "Life of the Rev. John Fletcher," and a "Commentary on the Holy Scriptures" (5 vols., 1811–18), which is highly esteemed. Died Feb. 16, 1821.

Bent Grass (*Agros'tis*), a genus of grasses comprising numerous species which are natives of Europe, the U. S. and many other countries. The *Agrostis vulgaris* forms a principal part of the pasture in the more elevated districts of England, and resists drought better than some other grasses. It is considered suitable for lawns. It is called "herd's grass" or "red top" in Pennsylvania. The *Agrostis alba*, sometimes called "marsh bent grass," is valuable for pasture, and is common in England. It is also naturalized in some of the U. S. The *Agrostis spica venti*, a native of Europe, is a beautiful grass, with very slender branches of its panicle, which, waving in the wind, presents a glossy and silky appearance.

Ben'tham (Jeremy), an English philosopher and reformer, eminent as a writer on ethics and jurisprudence, was born in London Feb. 15, 1748. He graduated at

Queen's College, Oxford, in 1766, studied law, and was called to the bar in 1772, but he never practised that profession. He published in 1776 an acute and critical "Fragment on Government," which abounds in sound and original ideas, and in 1787 an exhaustive argument entitled a "Defence of Usury." His next important work was his "Introduction to the Principles of Morals and Legislation" (1789). He adopted the theory that "utility is the test and measure of virtue," and that laws should promote "the greatest happiness of the greatest number." He devoted his time and talents chiefly to the reform of legislation and government, and advocated universal suffrage, the vote by ballot, etc. He inherited from his father an easy fortune. About 1792 he formed a friendship and literary partnership with M. Dumont, who translated into French several of Bentham's works—namely, "Treatise on Civil and Penal Legislation" (3 vols., 1802), and "Theory of Penalties and Rewards" (1811). Among his other works are "Panopticon" (1791), which treats on prison discipline, and "The Rationale of Judicial Evidence" (5 vols., 1827). By habitual temperance, activity, and self-control he prolonged his life to the age of eighty-four. Died June 6, 1832. He has great merits in the English jurisprudence, "which," as Macaulay says, "he found a gibberish and left a science." But on the public in general his influence was small, on account of the unreadableness of his writings. He represents French ideas, especially those of the French Revolution, and he is the real founder of the utilitarian school of philosophy. His works were more admired on the Continent than in England. (See "Memoirs of Jeremy Bentham," prefixed to his works by Dr. Bowring; John Hill Burton, "Benthamiana;" Sir James Mackintosh, "View of the Progress of Ethical Philosophy;" "Edinburgh Review" for Oct., 1843.)

Bentley (Richard), D. D., a celebrated English critic and classical scholar, born at Oulton, in Yorkshire, on the 27th of Jan., 1662. He entered St. John's College, Cambridge, in 1676, and having taken the degree of bachelor, became, in 1683, tutor to Dr. Stillingfleet's son, with whom he went to Oxford. He was ordained a priest in 1690. In 1692 he was appointed to deliver the Boyle lecture on the evidences of religion, and in 1694 became keeper of the Royal Library. He published in 1699 a celebrated "Dissertation on the Epistles of Phalaris," which procured for him a European reputation. He maintained that these Epistles were spurious, and was involved in a controversy with Atterbury, Charles Boyle, Pope, and other writers, who resorted to sarcasm and personality. Bentley defended himself in another "Dissertation on the Epistles of Phalaris" (1699). He was appointed master of Trinity College, Cambridge, in 1700, and married Joanna Bernard in 1701. In 1711 he published a good edition of Horace. His arrogance provoked a series of quarrels and litigations with the fellows of Trinity College. He was appointed regius professor of divinity in 1717, and was deprived of all his academic degrees and honors by the senate of the University in 1718, but he was reinstated by a mandamus of the court of king's bench in 1724. Among his productions was an edition of Homer, which he left unfinished. He proposed to revise and correct the text of the Greek Testament by comparing it with all the manuscripts. He failed to perform this task, but his principles of criticism have since been adopted, and have triumphed over all opposition. He died July 14, 1742. His daughter was the mother of Richard Cumberland, the dramatist. (See Monk, "Life of R. Bentley," 1830; Hartley Coleridge, "Worthies of Yorkshire and Lancashire;" "Edinburgh Review" for July, 1830.)

Benton, on R. R., capital of Saline co., Ark. (see map of Arkansas, ref. 4–C, for location of county), is 25 miles S. W. of Little Rock. Pop. in 1880, 452.

Benton, on R. R., capital of Franklin co., Ill. (see map of Illinois, ref. 10–E, for location of county), 77 miles N. N. E. of Cairo, has a high school, steam flouring mills and other manufactories, a county court-house, and a jail. Pop. in 1870, 615; in 1880, 984.

Benton, on R. R., capital of Marshall co., Ky. (see map of Kentucky, ref. 5–C, for location of county), on Clark's River. Pop. in 1880, 277.

Benton, capital of Scott co., Mo. (see map of Missouri, ref. 7–K, for location of county). Pop. in 1880, 109.

Benton, capital of Polk co., Tenn. (see map of Tennessee, ref. 7–I, for location of county), is about 75 miles S. S. W. of Knoxville. Pop. in 1870, 250; in 1880, 183.

Benton (James G.), an American officer, born in 1820 in New Hampshire, graduated at West Point in 1842; major of ordnance Sept. 15, 1863. He served at various arsenals and on special duties 1842–57, as member of the ordnance board 1854–56, at Military Academy as instructor of ordnance and gunnery 1857–61. In the civil war he was an assistant in the ordnance bureau at Washington 1861–63, in command of Washington Arsenal till June 14, 1864, and since of Springfield Armory, Mass. Brevet lieutenant-colonel and colonel Mar. 13, 1865, for faithful and meritorious services in the ordnance department. He was author of "A Course of Instruction in Ordnance and Gunnery for the use of the Cadets of the U. S. Military Academy" (1860). D. Aug. 23, 1881. George W. Cullum.

Benton (Thomas Hart), an American Senator and statesman, born near Hillsborough, N. C., Mar. 14, 1782. He removed to Tennessee, studied law, and began to practise at Nashville about 1810. In the war of 1812 he served as colonel under Gen. Jackson. He became a resident of St. Louis, Mo., in 1815, and was elected a Senator of the U. S. for Missouri in 1820. Having been re-elected in 1826, he supported Gen. Jackson, opposed the U. S. Bank, and advocated a gold and silver currency, for which reason he was often called "Old Bullion." For many years he was the most prominent public man of Missouri. He was a member of the national Senate for 30 years, and opposed the extreme State Rights policy of Calhoun. In 1852 he was elected to the House of Representatives, in which he opposed the repeal of the Missouri Compromise. He was opposed by a powerful party of State Rights Democrats in Missouri, who defeated him as a candidate for governor in 1856. He published a "Thirty Years' View, or a History of the Working of the American Government for Thirty Years, 1820–50" (2 vols., 1854–56). Died April 10, 1858.

Ben'ton Har'bor, R. R. junction, Berrien co., Mich. (see map of Michigan, ref. 8–G, for location of county), is on the E. side of St. Joseph's River, and the Benton Harbor ship canal, 1½ miles from Lake Michigan, in Benton township, and about 60 miles E. by N. from Chicago. It has a large trade in grain and lumber, and an immense one in fruit, large manufactories of fruit packages, washboards, and canned fruit, and an undeveloped water-power. Regular lines of steamers and sailing vessels connect it with Chicago and Milwaukee. Pop. in 1870, 661; in 1880, 1230; in 1884, 1388.

Ben'tonsville, a post-village of Johnston co., N. C., in a township of its own name, about 17 miles W. of Goldsboro'. After the battle of Averysboro' (Mar. 16, 1865) the army of Gen. Sherman marched towards Goldsboro', not anticipating any further contest before reaching that destination; but Gen. Johnston, who had been concentrating the Confederate forces from Georgia, South Carolina, and Tennessee at Smithfield, N. C. (now amounting to 40,000), slipped out at night in light marching order, expecting to fall upon the left wing of Sherman's army, under Gen. Slocum, and crush it before support could reach him. Gen. Slocum was at first driven back, but hastily throwing up rifle-pits, assumed the defensive, Kilpatrick with his cavalry supporting his left. Six assaults were made by Johnston, which failed to dislodge the veterans of Slocum from their position, while the artillery fire upon the Confederates was very damaging. Night caused a cessation, Gen. Slocum still holding his ground. By morning of the next day the right wing had arrived to Slocum's aid, and Johnston's army had intrenched itself in a strong position. An attempt was made to cut off the line of the Confederates' retreat, but Johnston hastily retreated during the night of Mar. 21 on Smithfield and Raleigh. The Federal loss was upwards of 1600, killed and wounded; the Confederate loss is not known: 267 dead, however, were left on the field, and 1600 prisoners were taken. Pop. of township in 1870, 922; in 1880, 1076; of village, 27.

Ben'tonville, on R. R., capital of Benton co., Ark. (see map of Arkansas, ref. 1–A, for location of county), 170 miles N. W. of Little Rock. It has an active trade in tobacco, and has several manufactories. Pop. in 1880, 696.

Bent Timber. Of late years much attention has been paid to the subject of bent timber on account of its strength and economy. This operation is effected either by bending the timber whole or by bending it in planks, which are then put together in pieces of any required thickness; both of them have been used for ship- and for bridge-building. When timber is bent whole, the requisite curvature is given by steaming the beam and weighing down the side intended to receive the curvature; but the objection to this plan is, that steaming is apt to impair the durability of the wood, and the radius of curvature must be always very flat. It was to avoid these objections that the system was introduced of cutting the logs into planks, and bending them to the required curvature, as is often done in railway-bridges and station-roofs. It has been found that the timber so bent remains sufficiently elastic to admit of considerable movement under the weight of a train, and consequently opens at the joints and allows water to act upon the interior. Many bridges where these beams have been used have decayed; but in sheltered positions they have stood admirably. It is to be observed that bent planks retain a much greater degree of elasticity than the whole timber so managed, and that they are also more likely to retain the original strength of the wood itself. (See Emy, "Sur la Charpenterie.") Bent timber was formerly much used in shipbuilding in the form of natural-grown timber, but its use is becoming more and more rare, on account of the difficulty of obtaining natural-growth wood for that purpose.

Benu'e (*i. e.* "the mother of waters"), a large river of Central Africa, is the principal tributary of the Niger or Quorra. Its source has not been explored. It flows nearly westward through Sokoto, and enters the Niger at Lokoya, which is about 300 miles from the mouth of the Niger. Dr. Barth in 1851 crossed it near lon. 12° 30′ E., and found it there about 800 yards wide. Dr. Baikie in 1850 ascended the Benue to Dulti or Dolti, which is about 400 miles from its mouth. A second expedition to explore this river was undertaken by Dr. Baikie in 1861. In 1867, Gerhard Rohlfs travelled up this river from Dagbo to its entrance into the Niger at Lokoya, a distance of about 150 miles.

Ben'zamide, $C_7H_7NO = N.C_7H_5O.H_2$, a primary amide obtained in beautiful white crystals by several different processes.

Benzel [Lat. *Benzelius*] (Eric), born about 1632, was made archbishop of Upsal by Charles XII. in 1700; superintended Swedish translation of the Bible. Died in 1709.

Benzel [Lat. *Benzelius*] (Eric), son of the above, born at Upsal, Sweden, in 1675, was consecutively bishop of Gottenburg and of Linköping, and archbishop of Upsal; wrote valuable antiquarian works. Died in 1743.

Benzene. See Benzole.

Ben'zidine, $C_{12}H_{12}N_2 = N_2.(C_{12}H_8)''.H_4$, an organic base, diamine, formed by the reduction of azobenzene or azoxybenzene.

Benzine. See Petroleum.

Benzo'ic Acid, or **Flowers of Benzoin,** a substance which exists in many balsams and is obtained from benzoin. It is artificially made on a large scale from naphthaline and the urine of animals. It occurs in the form of snow-white acicular or feathery crystals, and has a pleasant aromatic odor. It is readily soluble in alcohol and ether, and is one of the ingredients of elixir paregoric (*Tinctura camphoræ composita*). Combined with oxide of zinc, it is a most valuable application in many cases of eczema. It is also used in the arts for various purposes. The chemical formula of this acid is $H.C_7H_5O_2$.

Benzoin', or **Ben'jamin, Gum** [Lat. *benzoi'num*], a fragrant resinous substance, is the concrete juice of a tree called *Styrax benzoin,* which is a native of Sumatra, Siam, and Borneo, and belongs to the natural order Styracaceæ (which see). The resin is obtained by making incisions in the bark of trees which are cultivated for that purpose. It is extensively used as incense in Roman Catholic and Greek churches; is also used in perfumery, and in medicine as a stimulant, emetic, and styptic. A tincture of benzoin is sometimes applied to wounds, and is employed in making a cosmetic called virgin's milk.

Benzo'in Odorif'erum, a shrub more correctly called *Lindera Benzoin,* of the natural order Lauraceæ, a native of the U. S., popularly called Benjamin tree, spice bush, etc. Its bark is aromatic, stimulant, and tonic, and has been used as a remedy for intermittent fevers.

Ben'zole, Benzene, Hydride of Phenyl, or **Phene** (symbol C_6H_6), a compound of carbon and hydrogen, is a product obtained by the distillation of coal or coal-tar. It can also be obtained by subjecting oil-gas (carburetted hydrogen) to a pressure of thirty atmospheres, by passing the vapor of benzoic acid through a red-hot iron tube, by the dry distillation of kinic acid, or by distilling benzoic acid with lime. It is usually obtained from the light oil of coal-tar, coal-tar naphtha, by fractional distillation, and purification with nitric and sulphuric acids. Commercial benzole usually contains considerable quantities of the homologous hydrocarbons toluole, C_7H_8, xylol, C_8H_{10}, etc. It is prepared on a large scale for the manufacture of nitrobenzole, aniline, and aniline colors, and for "carbonizing" coal-gas. Benzole may be produced synthetically by heating acetylene, C_2H_2, to a temperature a little below redness. At ordinary temperatures benzole is a thin, limpid, colorless, and volatile liquid, emitting a characteristic ethereal odor. Its specific gravity is 0.85 at 60° F.; its boiling-point is 179.6° F. At 37° F. it becomes solid, or crystallizes into beautiful transparent crystals of fern-like forms. It is not soluble in water, but dissolves readily in alcohol, ether, and turpentine. It is valuable to the chemist as a powerful solvent of caoutchouc, gutta-percha, wax, and fatty substances. It is inflammable, and possesses great illuminating power, which it imparts to gases, and even to atmospheric air, when they are passed through it. With chlorine, bromine, nitric acid, etc., benzole forms interesting substitution products, the most important of which is nitrobenzole or essence of mirbane, $C_6H_5NO_2$. (See Tar.) C. F. Chandler.

Benzo'nia, capital of Benzie co., Mich. (see map of Michigan, ref. 4–H, for location of county), on Betsie River, 5 miles from Frankfort. It is the seat of Grand Traverse College. Pop. of Benzonia township in 1870, 214; in 1880, 322; in 1884, 373.

Benzoyl', C_7H_5O, the hypothetical radical which is supposed to exist in benzoic acid and many kindred bodies. Oil of bitter almonds is supposed to be its hydride.

Ben'zyl, Tolyl, or **Toluenyl,** C_7H_7, a hypothetical radical, isomeric with cresyl, which is contained in benzylic alcohol, toluol ($C_7H_8 = C_7H_7.H$), etc.

Benzylamine, $C_7H_9N = N.C_7H_7.H_2$. (See Toluidine.)

Be'owulf', the title of a celebrated Anglo-Saxon poem, written not later than the eighth century, and having for its subject a semi-fabulous hero of Denmark. An English translation of it appeared in London in 1833.

Béranger, de (Jean Pierre), an eminent French lyric poet, born in Paris Aug. 19, 1780. He passed about three years as an apprentice to a printer, and never received a very liberal education. He was neglected by his father, and spent many of his early years with an aunt, who imbued his mind with virtuous and republican principles. His first essays in verse, which were written under the pressure of poverty, obtained for him in 1804 the patronage of Lucien Bonaparte. He was employed for nearly twelve years as a clerk or subordinate secretary in the University of Paris. He published in 1815 a volume of songs which became very popular. Some of his verses were political, and contained satirical passages which were offensive to the royalists, then the party in power. Having produced another volume of poems in 1821, he was prosecuted and sentenced to an imprisonment for three months. This increased the popularity of his songs, and failed to restrain the freedom of his satire or abate the ardor of his republicanism. He published in 1828 a fourth volume, for which he was sentenced to pay a fine of 10,000 francs and to be imprisoned for nine months. When his friends obtained power by the revolution of 1830, they offered him lucrative places, which he declined. He never published any poems after 1833, the date of his fifth volume. He rejected all the favors and overtures of Napoleon III. Died July 16, 1857. His character was noble and independent. In his poems gayety and pathos are combined with the happiest effect. "His style," says a French critic, "has a limpidity and purity which defy criticism." (See his autobiographic memoirs, "Ma Biographie," 1857; Savinien Lapointe, "Mémoires sur Béranger," 1857; Longfellow, "Poets and Poetry of Europe.")

Berard (Claudius), an eminent educator, born at Bordeaux, France, Mar. 21, 1786. In 1807 he emigrated to the U. S., and in 1812 was appointed a professor at Dickinson College, Carlisle, Pa. In 1815 he accepted an appointment as teacher in French at the U. S. Military Academy at West Point, which position he held till 1846, when under a law of Congress (1846) he was made professor, continuing in this capacity till his death, May 6, 1848.

Berat', a town of European Turkey, in Albania, on the river Ergent, here crossed by a bridge, 30 miles N. E. of Avlona. It contains a citadel, several Greek churches, and a number of mosques. It is the seat of a Greek archbishop. The population is estimated at 10,000, a majority of whom are Greeks.

Ber'ber, or **El Mesherif,** a town of Nubia, on the Nile. Roads lead from here to Egypt and Khartum. It has considerable trade. Pop., according to Heuglin, 45,000.

Ber'bera, a seaport station of Eastern Africa, in Somauli, is on the Gulf of Aden, 130 miles E. S. E. of Zeyla. Here is held an annual fair, which is attended by 100,000 persons from various foreign countries. They bring coffee, gold-dust, ivory, slaves, cattle, etc. to exchange for cotton, rice, and Indian piece-goods. It appears that Berbera has scarcely any permanent population. The fair begins in November, and continues nearly six months.

Berberida'ceæ, a natural order of exogenous plants, comprises more than 100 known species, one of which is the barberry (*Berberis*). They are natives of the temperate regions of both hemispheres. They have alternate leaves, and hypogynous stamens which are equal in number to the petals, with anthers opening curiously by valves or lids hinged at the top. The pistil is single; the fruit is a berry or a capsule. (See Barberry.)

Ber′berine, $C_{20}H_{17}NO_4$, an alkaloid contained in the roots of the barberry (*Berberis vulgaris*), of columbo (*Cocculus palmatus*), and *Menispermum fenestratum*, and in a yellow bark used as a dye in West Africa.

Ber′bers [supposed by some writers to be derived from the word *Barbari*, which the Greeks and Romans applied to all foreigners], a name given to the uncivilized, nomadic tribes of aborigines who inhabit the mountainous regions of Barbary and the northern part of the Desert of Sahara. They are sometimes called Kabyles, but they call themselves Amazeergh, Amazigh, or Amoshagh. They are the descendants of the aboriginal or ancient inhabitants of Northern Africa, who occupied the country before it was conquered by the Arabs, and they are the most numerous part of the present population. The Berbers vary in complexion with situation. Those who inhabit the high valleys of the Atlas have light hair and eyes, while those who occupy the oases of the Sahara are dark, approaching the negroes in complexion, though their features are entirely unlike theirs. Their language is allied to the Semitic in type, and has received from F. W. Newman the name of sub-Semitic. Language, customs, and physical type seem to indicate affiliation with the Semitic races of Asia and Eastern Africa. They are warlike, cruel, and very tenacious of their independence. In religion they are bigoted Mohammedans. They keep cattle and sheep, cultivate fruit trees, and practise agriculture in a rude manner. Many of them live in tents or in clay huts.

Ber′chem, a town of Belgium, in the province of Antwerp. It has factories of linen and tobacco. Pop. 5229.

Berdiansk′, written also **Berdjansk,** a seaport-town of Russia, in the government of Taurida, is on the N. shore of the Sea of Azof, 184 miles N. E. of Simferopol. It has a good roadstead and an active trade, and has been remarkable for its rapid growth. It was founded in 1827, was recognized as a town in 1835, and became capital of a circle in 1842. Its principal industries are the boiling of tallow and the manufacture of bricks, tiles, and macaroni. It derives its prosperity partly from the coal-mines and salt-lakes of the vicinity. Pop. in 1882, 20,849.

Berditchef′, or **Berditschev,** a town of Russia, in the province of Kiev, 194 miles N. W. of Elisabetgrad. It is meanly built, but is an important commercial town, having four annual fairs, held between Aug. 15 and Sept. 15. The value of the goods, cattle, corn, wine, etc. sold here annually is estimated at $3,000,000. Pop. in 1882, 52,563, mostly Jews.

Bere′a, R. R. junction, Cuyahoga co., O. (see map of Ohio, ref. 2–H, for location of county), 12 miles S. W. of Cleveland, noted for its extensive quarries of excellent sandstone, 18,000 carloads having been shipped in a year; is the seat of Baldwin University and German Wallace College. Pop. in 1870, 1628; in 1880, 1682.

Berea College is beautifully situated in the southern part of Madison co., Ky., 40 miles south of Lexington and 140 from Cincinnati, very near the centre of the State. It originated in the labors of Rev. John G. Fee, a native of Kentucky, in the employment of the American Missionary Association. Mr. Fee was the son of a slaveholder, but earnestly embraced the anti-slavery cause while pursuing theology at Lane Seminary, and, disowned by his father and his Church, devoted his life to the salvation of his native State. The school, like its founder, was always noted for its abolitionism; yet, though its teachers were generally from Oberlin, its pupils were often the sons and daughters of slaveholders. Under the administration of Rev. J. A. R. Rogers the institution became widely known and popular, and its influence began to be feared. The John Brown raid gave occasion for its enemies to rally, and a county meeting sent a committee of sixty-five armed men to remove the school and its officers from the State. At the close of the war it was immediately revived. About three-fifths of the students are males, and nearly the same proportion colored. In the four higher departments the white and colored are almost equal. This impartial character of the school causes no collisions among the students, and disturbs only those who have no responsibility in regard to it. They generally acquiesce in silence. The commencement occurs on the first Wednesday of July. Its first senior class of three young men, all Kentuckians and all white, graduated in 1873. A single lady finished the ladies' course. The course of study is the same as in other regular colleges, and the grade of scholarship as high as in young colleges generally.

The present president, Rev. E. H. Fairchild, is the first; he commenced his labors in the spring of 1869. The property of the college consists of 400 acres of land, estimated at $20,000; Howard Hall, a very nice dormitory building for young men, constructed of wood with tin roof, $18,000; the new ladies' hall, of brick, with rooms for 110 ladies, $50,000; other temporary buildings, $2500; and endowments to the amount of $23,000. Deduct from this the debts of the college, and the balance is about $95,000. Tuition is very low. About half the current expenses of the college are paid by benevolent friends.

E. H. Fairchild.

Bere′ans, an obscure sect seceding from the Established Church in Scotland, founded by one Barclay in 1773. They take their name from Acts xviii. 11, deny natural theology, make all the Psalms Messianic, and hold assurance to be of the essence of faith. Their numbers are small and diminishing.

Beregh, a county of Hungary, is bounded on the N. E. by Galicia, on the E. by the county of Marmaras, on the S. by the counties of Ugocsa and Szatmar, on the W. by the county of Szabolcs, and on the N. W. by the county of Ungvear. Area, 1440 square miles. The country is mostly mountainous, and produces wine. Pop. in 1880, 153,235. Chief town, Munkacs.

Beregszasz, a town of Hungary, in the county of Beregh, has large vineyards and quarries. Pop. in 1880, 6930.

Berengarius of Tours, a celebrated mediæval theologian, born at Tours at the close of the tenth or in the beginning of the eleventh century, died in the island of St. Cosme in 1088, was a pupil of Fulbert of Chartres, and became in 1040 the director of the cathedral school in his native place. He was a man of both talent and learning, and he soon brought the school into a most flourishing condition. But he was an independent character, of a somewhat rationalistic turn of mind. Concerning the Lord's Supper he held views very different from those which, since the days of Paschasius Radbertus, had become generally adopted by the Church. He ascribed to this sacrament only the character of a commemorative act, decidedly rejecting the idea of its being a constantly-renewed sacrifice; and the change which the elements were believed to undergo during the celebration he considered to be merely symbolical, declaring the doctrine of transubstantiation an absurdity. People soon became aware that the great teacher of Tours deviated from the commonly-accepted course of the Church, and Berengarius himself contributed much to call forth a conflict by his letter to Lanfranc. The first storm, however, he weathered, chiefly by the aid of Hildebrand; but in 1078 he was by a synod in Rome compelled to retract and keep silent for the rest of his life. He retired to the island of St. Cosme and lived in solitude, but he had, nevertheless, many followers. (See his "Life," by Sudendorf, Berlin, 1850.)

Beren′gelite, or **Berenge′la Resin,** a bituminous mineral found in a kind of pitch lake in Peru (*Phil. Mag.* [3] xiii. 329; xiv. 87).

Bérenger (Alphonse Marie Marcellin Thomas, de la Drôme), a French jurist, born May 31, 1785, exposed the irregularities in the French courts in "De la justice criminelle" (1818). He has written various treatises on the reform of penal law, a "Rapport sur le système penitentiare" (1836), and has labored to that end as magistrate and in the Chamber of Peers.

Berenice, a daughter of Magas, governor of Cyrene, was married to Ptolemy Euergetes, king of Egypt. During his absence on a military expedition she made a vow to sacrifice her hair to Venus for his safe return, which vow she performed. The astronomer Conon reported that Jupiter had transformed this hair into the constellation now called *Coma Berenices* ("Berenice's Hair"). She was put to death by her son, Ptolemy Philopator, in 222 B. C. (See Carl W. Ramler, "Ptolemäus und Berenice," 1765.)

Berenice (called **Bernice** in the New Testament), a daughter of Agrippa I., king of Judea, was born in 28 A. D. She was married to Herod, king of Chalcis, and after his death to Polemon, king of Cilicia. During a visit to Rome she captivated Titus, the son of the emperor Vespasian. She was a sister of King Agrippa, before whom Saint Paul spoke in his own defence. (See Acts xxv.)

Berenice, an ancient city of Egypt, on the Red Sea, 20 miles S. W. of Ras Bernass. It was founded by Ptolemy Philadelphus, who named it after his mother, and was a great emporium of the trade with India. The modern name is *Sakayt-el-Kublee.* Here are the ruins of a temple of Serapis and other interesting antiquities.

Ber′esford (James), an English surgeon, born in Barbados in 1783. He was employed for many years as surgeon in the British army, and settled at Hartford, Conn., about 1833. Died in 1843.

Beresford (William Carr), Viscount, a general, born in Ireland Oct. 2, 1768, was a natural son of the first marquis of Waterford. He took command of the Portuguese army in Feb., 1809, and fought against the French in the Peninsula. In May, 1811, he defeated Soult at Albuera. He received the title of duke of Elvas in Spain, was created a viscount in 1823, and was master-general of the ordnance in 1828–30. Died Jan. 8, 1854.

Berezi′na, or **Beresi′na,** a river of Russia, rises in the government of Minsk, flows southward, and enters the Dnieper above Rechitza. Its length is about 325 miles. It is navigable, and is connected with the Düna by a canal which opens a communication between the Baltic and Black seas. The French army, retreating from Moscow in Nov., 1812, suffered a great disaster in the passage of this river. The French constructed hastily two bridges over the river, but while they were crossing they were attacked by the Russians, who took about 16,000 prisoners. The French loss, besides the prisoners, amounted to nearly 12,000, many of whom were drowned in the river.

Ber′gama (anc. *Pergamum* or *Pergamus*), a ruined city of Asia Minor, in Anatolia, situated in a beautiful valley, on the river Caicus, 46 miles N. N. W. of Smyrna. Pop. about 14,000. The ancient city was the capital of the kingdom of Pergamus, and the seat of one of the seven churches of the Apocalypse. Here are extensive ruins of a palace, temple, amphitheatre, and other edifices.

Bérgamo, a province of Italy, in Lombardy, is bounded on the N. by Sondrino, on the E. by Brescia, on the S. by Cremona, and on the W. by Como and Milan. Area, 1027 square miles. The northern part is mountainous. The soil of the plains and valleys is fertile. Silk is among the products. Capital, Bergamo. Pop. 391,580.

Bergamo (anc. *Bergomum*), a fortified city of Italy, capital of the above province, is situated on several low hills, 52 miles by rail N. E. of Milan. It presents a very picturesque appearance, and is well built. It has a castle, a cathedral, a college, a library, a theatre, many convents and churches; also extensive manufactures of silk, cotton, linen, and woollen fabrics. *Bergomum* was destroyed by Attila in 452 A. D., after which it became an important city of the Lombard kings. Bergamo is connected by railways with Milan, Brescia, etc. Pop. 35,600.

Bergamot, the fruit of a tree which is a species or variety of the genus *Citrus*, is also called **Bergamot Orange,** or **Mellarosa.** According to some botanists, it is a variety of the orange (*Citrus aurantium*). It is cultivated in the south of Europe. The fruit is pear-shaped, of a pale yellow or green color, and has a green, sub-acid, and fragrant pulp. From its rind is obtained by distillation the oil of bergamot, which has a very agreeable odor, is extensively used in perfumery, and is an ingredient in eau-de-cologne and several fragrant essences.

Ber′gen, a fortified city and seaport of Norway, capital of the province of Bergen, is at the head of a deep bay (fiord) of the Atlantic, 184 miles W. N. W. of Christiania; lat. 60° 24′ N., lon. 5° 18′ E. It is picturesquely situated at the foot of a mountain, and enclosed on nearly all sides by water. The harbor is deep and safe, and is defended by several forts. Bergen is well built, has a cathedral, several hospitals, a theatre, a public library, a national museum, and a college. It is the seat of one of the three public treasuries, and is probably the most commercial town of Norway. A large portion of the population is employed in the fisheries, and fish and cod-liver oil form the chief articles of export. It is stated that in the spring 600 fishing-vessels may be seen at once in the harbor. These vessels bring cargoes of fish that were caught in the preceding winter on the northern shores. Bergen was founded in 1070, and was once a Hanse town. Pop. 34,388.

Ber′gen-op-Zoom, or **Berg-op-Zoom,** a strongly-fortified town of Holland, in North Brabant, is on the river Zoom, at its junction with the East Scheldt, 27 miles by rail W. S. W. of Breda. It is important as a military position, and has often been besieged. The Spaniards made unsuccessful attempts to take it in 1588, in 1605, and in 1622. In the last-named year General Spinola lost about 10,000 men in the siege. It was taken by the French in 1747, and again in 1794. An English army attacked it without success in Mar., 1814. Pop. 10,419.

Bergen Point, N. J. See Appendix.

Bergerac, a town of France, in Dordogne, is situated in a fertile plain on the right bank of the river Dordogne, here crossed by a fine bridge of five arches, 27 miles S. W. of Périgueux, and 51 miles E. of Bordeaux. It has a college, a public library, and manufactures of paper, hosiery, serges, and copper-ware. The Bergerac wine produced in this vicinity is highly esteemed. Pop. 15,042.

Bergh (Henry), philanthropist, born in the city of New York 1823, educated at Columbia Coll., is author of "Love's Alternative," a drama; "Married Off," a poem; "The Portentous Telegram," "The Ocean Paragon," "The Streets of New York," tales and sketches. In 1863, Mr. Bergh was made secretary of legation to Russia, and also acted as vice-consul there. He is known, not as a writer, diplomatist, or government official, but as the founder and president of the American Society for the Prevention of Cruelty to Animals. On his labors for the dumb creation rests his fame. Alone, in the face of indifference, opposition, and ridicule, he began the reform which is now recognized as one of the beneficent movements of the age. Through his exertions as a speaker and lecturer, but above all as a bold worker, in the street, in the court-room, before the legislature, the cause he adopted gained friends and rapidly increased in influence. The American society was incorporated by the legislature of New York April 10, 1866, and, according to the eighteenth annual report (1883), there are in all thirty-eight States and Territories of the United States and Canada which have followed the example of New York, many of which have numerous local societies and branches. The work of the society covers all cases of cruelty to all sorts of animals, from the horse to the tortoise, employs every moral agency, social, legislative, personal, and touches points of vital concern to health as well as to humanity—the transportation of cattle intended for the shambles, the purity of milk, the times and manner of killing for the market. The total number of cases of all kinds prosecuted by the parent society, its branches and agents, since its foundation, is 10,675; total abuses corrected, 24,142. The membership is large and influential; the cause finds liberal benefactors, Mr. Lewis Bonard, a man who lived and died in extreme indigence and bequeathed a valuable estate to the society, being the greatest. Through this munificence handsome quarters were provided in the city, besides a considerable portion of the annual income of more than $20,000. The work takes on new features every year. Among the latest are an ambulance corps; an ingenious invention for substituting artificial for live pigeons as marks for shooting, and the suppression of an attempt to establish bull-fighting here.

O. B. Frothingham.

Berg′mann (Karl), b. at Ebersbach, Germany, April, 1821; removed to America 1849; became about 1855 director of the Philharmonic Society in New York; composed numerous pieces for orchestras. D. New York Aug. 10, 1876.

Berg′mann (Torbern Olof), Ph. D., a celebrated Swedish chemist, born at Catherinberg, in West Gothland, Mar. 20, 1735. He was educated at the University of Upsal, and devoted himself to natural history, physics, and mathematics. He obtained the chair of chemistry at Upsal in 1767. He discovered sulphuretted hydrogen, and first obtained important results from the use of the blowpipe. He laid the foundation of the science of crystallography. Among his works are an "Essay on Electric Affinities" (1775), and "Opuscula Physica et Chemica" (6 vols., 1779–90). Died July 8, 1784. (See P. F. Aurivillius, "Aminnelse-Tal öfver T. O. Bergman," 1785; Biot, article in the "Biographie Universelle.")

Berg′mehl, a German word signifying "mountain meal," is a name of an extremely fine powder found in geological strata of recent (eocene) formation, and composed of effete and indestructible silicious frustules of Diatomaceæ, which are microscopic plants of the class Algæ. Vast beds of these fossils occur in Germany, Lapland, Va., Md., Vt., N. H., and other regions. This powder is mixed with flour, and used as food by the people of Sweden and Norway in seasons of scarcity. It is used in making water-glass and the floating bricks of Southern Europe and as polishing-powder.

Berg′söe (Wilhelm), Ph. D., born in Copenhagen, Den., Feb. 8, 1835, was in youth a zoologist, and as such attained distinction. But in consequence of the failure of his eyesight, and of a long and severe illness, he was disqualified for his favorite study, and went to Italy for his health. He became a successful writer of romances. His first venture, "Fra Piazza del Popolo" (1866), had a great success. He has also published "I Sabinerbjergene" ("In the Sabine Hills," 1871), and "Bruden fra Rörvig" ("The Bride of Rörvig," 1872).

Bergues, a fortified town of France, in the department of Nord, on the river Colne, 5 miles by rail S. S. E. of Dunkirk. It is connected by a canal with Dunkirk and the sea, and has an active trade, sugar- and salt-refineries, and manufactures of soap, tobacco, and earthenware. Pop. in 1881, 5385.

Ber′gylt (*Sebas′tes Norveg′icus* or *Scorpæna Norvegica*), a fish of the family Sclerogenidæ, resembles a perch in appearance so much that it has been called sea-perch. It is found in all the northern seas, is of a red color, and attains a length of two feet or more. It is used as food, and is found on both sides of the Atlantic.

Ber'hampoor', or **Berhampore,** a town of British India, in the presidency of Bengal, on the Bhagirathi River, 6 miles S. of Moorshedâbâd, and 118 miles by land N. of Calcutta. It is one of the principal British military stations in India, and has an appearance of grandeur and importance. Sanitary improvements have rendered it one of the most healthy places in Bengal.

Bering was formerly BEHRING (which see).

Ber'ja, a town of Spain, in the province of Almería, on the S. slope of the Sierra de Gador, 22 miles W. S. W. of Almería. It is in the midst of lead-mines, and has manufactures of linen, hats, hardware, etc. Pop. 15,586.

Berkeley, on R. R., Alameda co., Cal. (see map of California, ref. 4–B, for location of county), the seat of the University of California, the State Agricultural College, and the California Institution for the Deaf, Dumb, and Blind, is 5 miles N. of Oakland and 9 from San Francisco. Pop. in 1880 not given in census.

Berkeley (GEORGE), an eminent philosopher and bishop, was born at Kilerin, Ireland, on the 12th of Mar., 1684. He studied at Trinity College, Dublin, where he formed a friendship with Dean Swift, and became a fellow of that college in 1707. He published in 1709 his "Essay towards a New Theory of Vision," a work of wide reputation. He propounded his celebrated theory of idealism in a "Treatise concerning the Principles of Human Knowledge" (1710), in which he affirmed that there is no proof of the existence of a material world. The objects of which we are conscious in perception he called "ideas." Their presence he held to be due to the constant agency of the Almighty, who causes them to pass in a real and orderly succession before the mind. His views are the result of the application of rigid logic to the principles which Locke and his school had adopted from Descartes. His method was allied to that of Malebranche, though his conclusions were drawn with a boldness from which the French philosopher recoiled. As distinguished from the egoistic system of Fichte, Berkeley's views have been called theistic idealism. His object was to undermine materialism and counteract skepticism. In 1713 he removed to London, and wrote several essays for the "Guardian." He accompanied Lord Peterborough as chaplain to Italy, and returned to England about 1721. In 1724 he became dean of Derry, with an income of £1100. His abundant charity and zeal induced him to engage in an enterprise for the conversion of the American savages, for which purpose he proposed to found a college in America for the education of missionaries. Having received a promise of pecuniary aid from the government, he married Anna, a daughter of John Forster, in 1728, and sailed to Rhode Island. He preached at Newport two years, but he did not succeed in his enterprise, because the ministers failed to perform their promise. He returned home, and was appointed bishop of Cloyne in 1734. Among his works are "Alciphron, or the Minute Philosopher" (1732), "The Analyst" (1735), and a "Word to the Wise" (1749). He died at Oxford Jan. 23, 1753, leaving an excellent reputation as a model of virtue. (See DR. STOCK, "Life of Berkeley," prefixed to his works, 2 vols. 4to, 1784; G. N. WRIGHT, "Life of George Berkeley," prefixed to his works, 1843. Berkeley's works have recently been edited, with a life annexed, by Prof. Fraser, in 4 vols. 8vo, Oxford, 1871.)

Berkeley (Rev. MILES JOSEPH), F. L. S., one of the most eminent of English botanists of the present century, was born in 1803, and educated at Rugby and Christ's College, Cambridge, where he graduated with honors in 1825. He obtained several Church preferments, but his chief distinction has been won in science. As a botanist his attention has been principally directed to the lower Cryptogamia. He is honorary member of many of the scientific societies of Europe. His monographs are very numerous. He is the author of "Gleanings of British Algæ" (1833), the last volume of the "English Flora" (1836), "Handbook of Cryptogamic Botany" (1857), "British Fungology" (1860), "British Mosses" (1863), etc.

Berkeley (Sir WILLIAM) was born near London. He was appointed governor of Virginia in 1641, and held that office for many years. He was a royalist in the civil war, and was removed from power in 1651 by Cromwell, but became governor again in 1660. He rendered himself unpopular by his cruelty in putting to death the adherents of Nathaniel Bacon. Died in England July 13, 1677.

Berkeley, EARLS OF, and Viscounts Dursley (1679), Barons Berkeley (1416, in England), a prominent family of Great Britain.—THOMAS MORETON FITZ-HARDINGE BERKELEY, the sixth earl, born Oct. 19, 1796, succeeded his father in 1810.

Berkeley Springs, West Virginia. See BATH.

Ber'kenhout (JOHN), an English physician of Dutch descent, was born at Leeds in 1730. He was sent to America as an agent of the British government in 1788, and was imprisoned by Congress as a spy. He wrote "Biographia Literaria," "Outlines of the Natural History of Great Britain," and a "Botanical Lexicon." Died in 1791.

Ber'lat, a town in Moldavia, on the Berlat, 63 miles S. of Jassy. It is an entrepôt for grain. Pop. 26,568.

Ber'liching'en, von (GÖTZ or GOTTFRIED), a famous German knight, surnamed OF THE IRON HAND, was born in 1480 at Berlichingen Castle, in Würtemberg. He lost a hand at the siege of Landshut, and supplied its place by an iron hand. He was a daring and turbulent subject, was involved in several feuds with neighboring barons, and fought for the insurgent peasants against the nobles in the Peasants' War, which closed in 1525. For this offence he was placed under the ban of the empire by Maximilian I. He died in 1562, and left an autobiography (1731). His exploits form the subject of Goethe's drama of "Götz von Berlichingen." (See CARL LANG, "Ritter G. von Berlichingen," 1825; BÜSCHING, "Leben Götz von Berlichingen," 1814.)

Ber'lin, the capital of the Prussian monarchy and the new German empire, residence of the German emperor, seat of the highest authorities of Prussia and Germany, is situated on the Spree; lat. 52° 30′ N., lon. 13° 24′ E. The city is of comparatively modern growth. The two oldest parts, Old Cologne and Old Berlin, are for the first time mentioned in 1237 and 1244. They were in 1307 consolidated into one city, which joined the Hanse, became the head of the confederation of the towns of *Mark*, and at the close of the fifteenth century became the residence of the electors of Brandenburg. Its rapid growth dates from the reign of "the great elector," at whose death it numbered about 20,000 inhabitants. Under Frederick the Great the population rose to 114,000; in 1817 its inhabitants numbered 188,000; in 1844, 311,000; in 1851, 436,000; in 1867, 702,000; and, according to the census of 1880, it had attained the number of 1,122,330 persons, who, with the exception of 50,000 Roman Catholics and 30,000 Jews, belong to the Protestant Church, and chiefly to the United Evangelical State Church. In 1867 the city had about 34,000 buildings, among which there were about 700 public buildings and sixty churches. Berlin consists of sixteen different parts, of which Old Berlin, on the right bank of the Spree, and Old Cologne, on an island, are the oldest. The others are New Cologne, settled about 1681; Friedrichswerder, 1658; Dorotheenstadt, Neustadt, 1673; Friedrichsstadt, 1694; Luisenstadt, 1669; Stralauer Viertel, 1705; Königsstadt, 1693; Spandauer Revier (Sophienstadt, 1691); and Friedrich-Wilhelmstadt, named since 1828. Inside of the wall, which formerly included the whole of these eleven parts, are situated Wedding (Oranienburger Vorstadt); Moabit (Voigtland, 1752); Æussere Friedrichsstadt (laid out in 1838); Æusseres Spandauer Revier, Schöneberger, and Tempelhofer Revier.

The principal streets are Unter den Linden, with four rows of lime trees and the stately Brandenburg Gate, the Wilhelmsstrasse, and Königsstrasse. Foremost among the public places are the Opera Place, with the equestrian statue of Frederick the Great by Rauch (erected in 1851); the Lustgarten (laid out in 1828), with the museums; the Gensdarmenplatz, with the new theatre; the Wilhelmplatz, with the statues of Schwerin, Winterfeld, Seidlitz, Keith, Ziethen, and Leopold of Dessau; the Belle Alliance Platz, with the Victoria Column (since 1843); the Leipziger Platz, with the monument of the count of Brandenburg; and the Pariser Platz. The most important bridges are the Kurfürstenbrücke, with a statue of "the great elector;" the Friedrichsbrücke, with eight iron arches; the Schlossbrücke, built in 1824, upon two massive arches and with eight allegorical marble groups; the iron Weidendammerbrücke, built in 1826; and the Alsenbrücke, built in 1867. Among the remarkable public buildings are the Königliche Schloss, with the Weisser Saal; the Königliche Palast, with which the palace of Prince Louis is incorporated; the palaces of the crown prince and the princes Charles and Albrecht; the Arsenal; the Artillery School, and the University (formerly palace of Prince Henry); the Singing Academy; the Exchange; the Old Museum, built in 1828 by Schinkel, and containing a celebrated picture-gallery, which is rich in paintings by the early Italian and German masters, and in collections of ancient sculpture and other antiquities. Connected with the Old Museum is the New Museum, begun in 1843, and chiefly formed of the Egyptian antiquities brought home by the expedition under Lepsius.

Berlin has no churches of importance in point of architecture. The university was established in 1810, and is in every respect one of the greatest literary institutions of Germany. It had in 1868 about 3000 students, and from its beginning has counted among its professors many of the most celebrated scholars, such as Humboldt, Ritter, Fichte, Hegel, Schelling, Neander, Schleiermacher, and Virchow. The Royal Library numbered in 1880 about 750,000 volumes and more than 15,500 manuscripts. It rapidly increases, as Prussian publishers are bound to deposit in it a copy of every new work. The library of the university has about 200,000 volumes. Other important literary institutions are the Academy of Science, the Polytechnic Institute, the Building Academy, the Navy School, the Mining Academy, the Pharmaceutical School, institutions for the deaf and mute and for the blind, and ten gymnasia. The Charité, the greatest hospital of Berlin, has had as many as 10,000 patients in a year.

The trade and commerce of Berlin are extensive. The castings in iron and the china manufactures of Berlin have a world-wide reputation. The increase of railroad connection has of late given a powerful impulse to the development of industry, and the large numbers of the laboring classes have made Berlin one of the chief centres of the Internationale. The revenue and expenditure of Berlin amount to about five million thalers annually; the debt, to 8,000,000 thalers. The authorities of the city have established a statistical bureau specially devoted to the statistics and history of Berlin; an annual publication by the president of this bureau ("Berlin und seine Entwickelung," established in 1866) is the best source of information for everything relating to this great German city.

A. J. SCHEM.

Berlin, the capital of Waterloo co., Ontario, Dominion of Canada, on the Grand Trunk Railway, 62 miles W. S. W. of Toronto, at the junction of the Doon branch. It has a large button-factory, and other important manufacturing interests. Pop. in 1881, 4054.

Berlin, on R. R., a city, Green Lake co., Wis. (see map of Wisconsin, ref. 6–E, for location of county), on Fox River, 94 miles N. W. of Milwaukee. Steamboats ply between this point and Green Bay, etc. It has flouring-mills, foundry, and manufactures of turbine-wheels, woollen goods, etc. Pop. in 1880, 3353; in 1885, 4007.

Berlin Blue. See PRUSSIAN BLUE.

Berlioz (HECTOR LOUIS), a French musical composer, born Dec. 11, 1803, at Côte-Saint-André (Isère). The son of a physician sent to Paris to study medicine, he entered the Conservatory, following a passionate bent for music. He composed "Symphonie Fantastique," overtures to "Waverley" and "King Lear," "Harold" (1833), and "Romeo et Juliette" (1839), symphonies; "Benvenuto Cellini," an opera in two acts, "Symphonie Funèbre et Triumphale" (1840), "Damnation de Faust" (1846), a symphony, "Enfance de Christ," a trilogy (1854), and "Les Trogens," a grand five-act opera, played without success in 1863. M. Berlioz has been considered the chief of the romantic school. His works bespeak an ardent and independent genius, and have elicited diverse criticism. He was also a talented author and critic, and has published "Traité d'instrumentation et d'orchestration moderne" (1844), "Voyage musicale en Allemagne et en Italie," "Études sur Beethoven, Gluck, et Weber" (1845), "Soirées de l'orchestre" (1853), "Les Grotesques de la musique" (1859), and "Mémoires" (1870). Died Mar. 9, 1869.

Bermuda Grass, the *Cynodon Dactylon*, a grass which is extensively cultivated in India (where it is called *dhab*), and of late years introduced into the West Indies, Europe, the Southern U. S., and the Sandwich Islands. It is valuable both for pasture-grass and hay, and is especially prized in warm climates, where the grass crop is generally poor; but in light soils, especially northward, its perennial roots cause great trouble to the farmer.

Bermu'da Hun'dred, in Chesterfield co., Va., on the right bank of the James River, just above the mouth of the Appomattox, and 1½ miles above City Point. The tortuous course of the James River here encloses a neck of land which Gen. Butler occupied and fortified in May, 1864, and from which he was to co-operate with Gen. Grant by menacing Richmond and Petersburg. On the morning of the 16th of May, 1864, Gen. Butler, who had moved out of his works, was fiercely attacked by the Confederate force under Beauregard, and after a severe struggle, which lasted till noon, driven back into his intrenchments with severe loss. Beauregard, following slowly, erected a line of works across the peninsula in front of Butler's. Subsequent expeditions were made from these works, and the line finally formed a part of the investment lines of the combined armies against Petersburg.

Bermu'da Islands, or **Bermu'das** [Fr. *Bermudes*], or **Somers's Islands,** a group of small, low islands in the Atlantic Ocean, belonging to Great Britain. They take their name from Juan Bermudez, who discovered them in 1522. They are about 624 miles E. S.E. of Cape Hatteras, which is the nearest land, and are in lat. 32° 20′ N., and lon. 64° 50′ W. The extent of the group is only 19 miles by 6 miles, although the number of islets is nearly 400. Area, 41 square miles. They derive importance from the commanding position which they occupy between the West Indies and the other parts of British America. They are enclosed on several sides by formidable coral-reefs, which are said to be the only coral-reefs occurring in the central expanse of the Atlantic. The climate is so mild and delightful that these islands are covered with perpetual verdure. Between December and March the temperature ranges from 60° to 66° F. The chief articles of export are potatoes, onions, and arrow-root. The largest of these islands are Bermuda, 15 miles long; St. George's, 3½ miles; Somerset, 3 miles; and Ireland, 3 miles. Capital, Hamilton, on the isle of Bermuda. St. George's Isle has a good landlocked harbor, which is defended by strong batteries. These isles are separated by narrow and intricate channels, and have no streams, and but few pools of fresh water. Many of the inhabitants are employed in building cedar vessels, which are durable and swift. Pop. in 1881, 13,948.

Bernadotte (Charles XIV.), JOHN, king of Sweden, a French marshal, born at Pau Jan. 26, 1764. His original name was JEAN BAPTISTE JULES BERNADOTTE. He enlisted as a private in the army in 1780, served as general of division under Kleber and Jourdan in Flanders in 1794, and under Bonaparte in 1797. In 1798 he was French minister at Vienna, and married Mademoiselle Clary, a sister of Joseph Bonaparte's wife. He was minister of war for a short time in 1799. Napoleon created him a marshal of France in 1804, and in June, 1806, prince of Pontecorvo. He fought at Austerlitz in 1805, and defeated the Prussians at Halle in Oct., 1806. He quarrelled with Napoleon, who censured his conduct at Wagram (1809), and he resigned his command just after that battle. In Aug., 1810, the Swedish Diet elected Bernadotte as heir to the throne of Sweden, then occupied by Charles XIII., who had no son, and he was immediately associated with the old king in the exercise of royal power. Early in 1812, Bernadotte, who took the name of Charles John, negotiated with Russia a secret treaty of alliance against Napoleon. He openly joined the coalition of the allies in the spring of 1813, and led an army of about 28,000 men into Germany. His army defeated Oudinot at Gross-Beeren in Aug., 1813, but his conduct was considered equivocal and lukewarm by the allies. He forced Prince Christian of Denmark, who had proclaimed himself king of Norway, to resign, and on Nov. 4, 1814, Charles XIII. was proclaimed king, and Bernadotte crown prince. When the allies entered France in 1814, he led his army back to Sweden and conquered Norway. He began to reign alone on the death of Charles XIII., in Feb., 1818, after which a long peace ensued. He died in Mar., 1844, and left the throne to his son, Oscar I. (See ERIK G. GEIJER, "Konung Karls XIV. Johan Historia," 1844; W. G. MEREDITH, "Memorials of Charles (XIV.) John, King of Sweden," 1829.)

Bernalillo, on R. R., former capital of Bernalillo co., New Mex. (see map of New Mexico, ref. 6–J, for location of county). Pop. in 1880, 1223.

Bernard (CLAUDE), an eminent French physiologist, born at Saint Julien, in Rhône, July 12, 1813. He wrote "Researches on the Uses of the Pancreas," which gained the grand prize of the Institute in 1849. He was admitted into the Institute in 1854, and became professor of physiology in the College of France in 1855. Bernard discovered the glycogenic function of the liver. He was created grand officer of the Legion of Honor in 1862. Among his works are "Leçons de Physiologie" (1855) and "Mémoire sur la Chaleur animale" (1856). D. Feb. 10, 1878.

Bernard (Sir FRANCIS), an English lawyer, born in 1714, who became governor of New Jersey in 1758, and of Massachusetts in 1760. He was unpopular in Massachusetts because he brought troops into Boston and opposed liberal measures. He was accused of misconduct, but recalled and made a baronet in 1769. Died June 16, 1779.

Bernard, SAINT, abbot of Clairvaux, an eminent mediæval theologian, and a doctor of the Western Church, born at Fontaines, near Dijon, in 1091. He became an inmate of the monastery of Citeaux in 1113, and founded in 1115 a community of the Cistercian order at Clairvaux, in Champagne, of which he was the first abbot. His ascetic life and eloquence rendered him a very influential and powerful person in the Church. He was regarded as an oracle by all Christendom, founded a large number of monasteries, and was an implacable adversary of Abelard. He zealously promoted the crusade of 1146, which was disastrous to those who joined it. He died Aug. 20, 1153, leaving many religious works, and was canonized in 1174. (See LEMAÎTRE, "Vie de Saint Bernard," 1649; A. Neander, "Der heilige Bernard und sein Zeitalter," 1813 (translated into English by Wrench, 1843); C. Montalembert, "Histoire de S. Bernard;" J. O. Ellendorf, "Der heilige Bernhard," Morison, "Life and Times of St. Bernard," 2d ed., 1868.

Bernard (Simon), an officer of the French imperial corps du genie, born at Dôle April 28, 1779, was aide-de-camp to Napoleon I., and employed by him in many important and confidential duties incidental to his branch of the service. He was invited to this country by President Madison under a resolution approved April 29, 1816, "authorizing the President of the U. S. to employ a skilful assistant in the corps of engineers," instigated by the notion prevalent at that date, that only in Europe, and especially in France, could the high military science necessary to the organization of a system of sea-coast defence by fortification be found. The chief engineer, Gen. Swift, and subsequently another distinguished officer, Col. McRee, sent in their resignations in consequence. Gen. Swift was succeeded as chief engineer by Col. W. K. Armistead. As "Assistant Engineer" Gen. Bernard was associated with Col. (subsequently General and Chief Engineer) J. G. Totten, constituting a "permanent board," upon which the labor of working out the fundamental principles of the system, and of elaborating the projects of defence for the great seaports, devolved; and mainly upon these two officers, though naval officers of rank and experience were associated with them whenever their examinations included positions for dockyards, naval dépôts, or other objects which concerned the naval service; and the resident engineer officers had a voice in relation to their particular works. He also had a prominent part in the inauguration of some of our earlier works of civil engineering; *e. g.* the Chesapeake and Ohio Canal, the Delaware Breakwater, etc. He resigned in 1831, and returned to France, and became aide-de-camp to Louis Philippe, and subsequently minister of war of France. To high military and scientific acquirements and great experience in his professional duties, Gen. Bernard united the qualities of an amiable and accomplished gentleman, and the tact to adapt himself to his peculiar position without wounding the pride of those with whom he was thus associated. The prestige of his name aided powerfully in sustaining with the administration and with Congress the measures which the board found necessary to recommend, and in establishing firmly, as a part of our national policy, the system of sea-coast defence by fortifications. He died in Paris Nov. 5, 1839. J. G. Barnard.

Bernard of Cluny, not to be confounded with his more celebrated countryman and contemporary, Bernard of Clairvaux, was born at Morlaix, in Brittany, of English parents, probably not far from the year 1100. He was a monk at Cluny under Peter the Venerable, who was abbot there from 1122 to 1156. He wrote a poem, "De Contemptu Mundi," in about 3000 lines, portions of which were translated by the Rev. John Mason Neale (1818–66) in 1851 and 1862. Dr. Neale pronounces these verses of Bernard "the most lovely, in the same way that the 'Dies Iræ' is the most sublime, and the 'Stabat Mater' the most pathetic, of mediæval poems." Hymns taken from this poem, such as "The world is very evil," "Brief life is here our portion," and "Jerusalem the golden," are among the finest gems in recent English and American collections.

Bernard, the Great St., a famous mountain-pass of the Pennine Alps, upwards of 8000 feet in height, between the Swiss canton of Vaud and the valley of Aosta. Near the summit is the celebrated hospice, said to have been founded in 962 by Saint Bernard of Meuthon in Savoy for the succor of travellers crossing the mountain. In the humane efforts of the monks of this hospice the valuable dogs known as the St. Bernard breed, and noted for their size and sagacity, are valuable assistants. In 1800 Napoleon crossed the Alps here with an army of 30,000 men, with cavalry and artillery.

Bernardin (Saint) of Siena, born at Massa Carrara in 1380, entered the order of St. Francis in 1404; visited the Holy Land, and became famous throughout Italy as a preacher; was made vicar-general of his order in 1438. Died May 20, 1444, and was canonized in 1450.

Ber'nau, a town of Prussia, in Brandenburg, on the Stettin Railway, 14 miles N. E. of Berlin. It has manufactures of silk stuffs, cotton and woollen goods. Pop. in 1880, 6744.

Bernay, a town of France, in the department of Eure, on the railway from Paris to Caen, 25 miles W. N. W. of Evreux. It has a college, and manufactures of woollen cloths, linens, paper, and leather. A horse-fair, the largest in France, is held here annually. Pop. in 1881, 7989.

Bern'burg, a town of Germany, formerly capital of the duchy of Anhalt-Bernburg, is on the river Saale, here crossed by a bridge, 24 miles S. S. W. of Magdeburg. It is connected by railway with Berlin and Dresden. It has a gymnasium, a Realschule, a valuable library, a ducal castle, and manufactures of porcelain, paper, and starch. Pop. in 1880, 18,593.

Berne [Fr. *Berne;* Ger. *Bern;* Lat. *Ber'na*], the most populous canton of Switzerland, and the most extensive except the Grisons. It is bounded on the N. by Alsace and Soleure, on the E. by Aargau, Lucerne, Unterwalden, and Uri, on the S. by Valais, and on the N. by Vaud, Fribourg, Neufchâtel, and France. Area, 2660 English square miles. It is traversed by the river Aar, and also drained by the Emmen. The Aar expands into two lakes called Brienz and Thun. The surface is mountainous, and the northern part is occupied by the Jura Mountains. Several high peaks of the Alps—namely, the Finsteraarhorn, 14,032 feet, the Jungfrau, 13,514 feet, Schreckhorn, 13,393 feet—are in Berne. The valleys of the Simmenthal, Lauterbrunnen, and Grindelwald in the Bernese Oberland are celebrated for their beauty. The valleys of the Aar and Emmen are fertile and adapted to pasturage. Among its mineral resources are copper, lead, iron, marble, and granite. The canton has important manufactures of watches, paper, woollen goods, linens, etc. It is intersected by several railroads. Capital, Berne. Pop. in 1880, 532,161, of whom 66,015 were Roman Catholics.

Berne, or **Bern** [said to be derived from the Ger. *Bären,* "bears," figures of which are on the armorial bearings of the city], a city of Switzerland, capital of the canton of Berne, is situated on the river Aar, which encloses it on three sides, 65 miles by rail S. of Bâle and 92 miles by rail N. E. of Geneva. Berne is the seat of the federal government of the republic, and is considered to be the finest city in Switzerland. It is built of freestone, and the houses are massive structures, resting on arcades which form covered promenades on both sides of the streets. Magnificent Alpine scenery is visible from this point. Berne has a Gothic cathedral, a public library, a university, a museum of natural history, a mint, and an arsenal. One of the finest buildings is the new federal palace. The river is here crossed by four large bridges. Several railroads connect it with Geneva, Bâle, and other towns. Berne was founded in 1191, and became a free town of the empire in 1218. It joined the Swiss Confederation in 1352. In 1849 it became the permanent capital of the whole republic. Pop. in 1880, 44,087.

Bern'hard, duke of Saxe-Weimar, a celebrated German general, born Aug. 6, 1604, was a younger son of John III. of Saxe-Weimar. He fought for the Protestant cause in the Thirty Years' war, distinguished himself at Wimpfen in 1622, and became a colonel in the army of Denmark, which he quitted in 1628. In 1631 he joined the standard of Gustavus Adolphus. The victory which the Swedes gained at Lützen in 1632 is attributed to the skill and energy of Bernhard, who in 1633 was appointed to the command of the Swedish army. Having made a personal treaty of alliance with France in 1635, he afterwards commanded a French army and defeated the imperialists. Died July 8, 1639. (See Schiller, "History of the Thirty Years' War;" J. A. C. von Hellfeld, "Geschichte des Bernhard des Grossen," etc., 1797; Bernhard Roese, "Herzog Bernhard der Grosse von Sachsen-Weimar," 2 vols., 1828–29.)

Bernhardt (Sarah), a famous French actress, who is also a sculptor and a painter, was born at Paris, Oct. 22, 1844. She made her *début* at the Comédie Francaise as Iphigénie 1862; played in London 1879, and in New York 1880. Phèdre and Donna Sol are her best creations.

Bernice. See Berenice.

Berni'na, an imposing mountain-group in the Swiss canton of Grisons, rises 13,407 feet above the level of the sea, and has a remarkable glacier. The Pass of Bernina, the altitude of which is 6671 feet, affords a communication between the Upper Engadine and the Valtelline.

Berni'ni (Giovanni Lorenzo), an Italian architect and sculptor, born at Naples in 1598, lived at Rome. His works, the best among which are the colonnade to St. Peter's church, the Scala Regia of the Vatican, and the Barberini Palace at Venice, possess some excellencies, but show the beginning of the decline of art into the *baroque* or Jesuit style, to which his influence greatly contributed. D. 1680.

Bernoulli, or **Bernouilli** (Daniel), F. R. S., an eminent mathematician and philosopher, born at Groningen Feb. 9, 1700, was a son of Jean (1667–1748). He became in 1733 professor of anatomy and botany at Bâle, where he afterwards obtained the chair of physics and speculative philosophy. He gained many prizes of the French Academy of Sciences, and wrote in Latin and French many scientific works. He was one of the three greatest members of this famous family. Died Mar. 17, 1782, at Bâle. (See Condorcet, "Éloge de Daniel Bernouilli," 1782.)

Bernoulli (Jacques), a Swiss mathematician, an uncle of the preceding, was born at Bâle Dec. 27, 1654. He became professor of mathematics in that city in 1687. He solved Leibnitz's problem of the isochronous curve, discovered the properties of the logarithmic spiral, and wrote several treatises on mathematics, etc. Died at Bâle Aug. 16, 1705. (See Battier, "Vita Jacobi Bernoulli," 1705.)

Bernoulli (Jacques), a nephew and pupil of Daniel, was born at Bâle Oct. 17, 1759; he became professor of mathematics at St. Petersburg. He was drowned in the Neva July 13, 1789.

Bernoulli (Jean or John), one of the most eminent mathematicians of the Bernoulli family, was born at Bâle July 27, 1667. He was the father of Daniel and brother of Jacques (1654–1705). He discovered the exponential calculus, and ascertained the curve of swiftest descent. In 1705 he succeeded his brother Jacques as professor of mathematics at Bâle. His works were published in 4 vols., 1742. Died Jan. 1, 1748.

Bernoulli (Jean), a son of the preceding, was born at Bâle May 18, 1710. He became professor of mathematics at Bâle in 1748, and wrote several treatises. Died July 11, 1790.—Bernoulli (Jean), born at Bâle Nov. 4, 1744, was a son of the preceding. He became astronomer-royal at Berlin in 1764, and wrote various works. Died July 13, 1807.—Bernoulli (Jérome), a Swiss naturalist, born at Bâle in 1745; died in 1829.—Bernoulli (Nicolas), a son of Jean and a brother of Daniel, noticed above, was born at Bâle Jan. 29, 1695. He was professor of mathematics at St. Petersburg, where he died July 26, 1726.—Bernoulli (Nicolas), LL.D., F. R. S., a cousin of the preceding, was born at Bâle Oct. 10, 1687. He made several discoveries in mathematics. Died Nov. 29, 1759.

Bern'storff (Albrecht), Count, a Prussian diplomatist and statesman, born Mar. 22, 1809, became in 1857 Prussian ambassador in London, was minister of foreign affairs from 1861 to 1862, returned to London in 1862, and represented the German empire in the London Conference of 1871. Died Mar. 26, 1873.

Bernstorff, von (Johann Hartwig Ernst), Count, an eminent statesman, born at Hanover May 13, 1712. Having entered the civil service of Denmark, he was appointed minister of foreign affairs (prime minister) in 1761. He was a liberal patron of learning and the arts, and he promoted the commerce and manufactures of Denmark. He retained power till 1770. Died Feb. 19, 1772. (See G. H. Ahlemann, "Ueber das Leben and den Charakter des Grafen von Bernstorff," 1777; G. Navarro, "Vie du Comte J. H. E. Bernstorff," 1822.)

Ber'öe, a genus of Radiata of the class Acalepha, and of a division called Ciliograde (*i. e.* moving by means of cilia). They are phosphorescent marine animals. The genus is the type of a family characterized by an oval or nearly globular body, of a delicate jelly-like substance, with an alimentary canal passing through its axis, which is vertical as the animal floats in the water. The body is strengthened by bands of firmer texture, which are furnished with rows of cilia, the motion of which is very rapid.

Berœ'a, or **Berea,** a large and ancient city of Macedonia, situated at the foot of Mount Bermius, about 30 miles from Pella. It was attacked by the Athenians in the war which began about 430 B. C. Saint Paul visited Berœa, and preached there. (See Acts xvii. 10.) Its site is occupied by the modern town of *Veria,* 35 miles W. of Salonica. (See Veria.)

Bero'sus [Gr. Βηρωσός], an eminent Chaldee historian, was a priest of Belus at Babylon, and lived about 300 B. C. He wrote in Greek a "History of Babylonia and Chaldæa," which was highly esteemed by the ancient Greeks and Romans, but it is lost except a few fragments. These were edited by Richter in 1825. Pliny states that the Athenians erected a statue to him.

Berquin, de (Louis), born at Passy, France, about 1490, studied law and became a counsellor of Francis I.; was a friend of Erasmus and active in circulating his works; was accused of Lutheranism and imprisoned in 1523, 1526, and 1529. He was condemned first to imprisonment for life, then to be burned alive; the last sentence was executed Apr. 17, 1529, and he became the first Protestant martyr in France.

Berrien (John McPherson), LL.D., a distinguished lawyer and politician, born in New Jersey in 1781. He removed to Georgia, and was elected a Senator of the U. S. in 1824. He was attorney-general under President Jackson in 1829–31, and was again chosen Senator in 1840 and 1846. Died Jan. 1, 1856.

Berrien's Island, in the East River, is a part of Newtown township, Queen's co., N. Y. Area, 12 acres.

Berrien Springs, capital of Berrien co., Mich. (see map of Michigan, ref. 8–G, for location of county), on R. R. and the St. Joseph River, about 15 miles from Lake Michigan and 160 miles W. S. W. of Lansing. Pop. in 1870, 662; in 1880, 758.

Ber'ry [Anglo-Saxon *beria* or *berga;* Lat. *bac'ca;* Fr. *baie*], a botanical term used to designate a fruit which consists of a pulpy pericarp without valves, containing seeds, which have no covering except the pulp or rind, as the grape, gooseberry, currant, barberry, service-berry, and cranberry. Some of them have the calyx adherent to the ovary and the placenta parietal, as the gooseberry. Others have the ovary free and the placenta in the centre, as the grape. The term berry is popularly applied to several small fruits which are not berries in the scientific sense, as the strawberry, which bears seeds (*achenia*) on the external surface of an enlarged and pulpy receptacle. The orange is a berry with a leathery rind, and is also called a *hesperidium.*

Berry, or **Berri,** a former province of France, near its centre, now forms the departments of Cher and Indre. Capital, Bourges. Berry was erected into a duchy about 1360, after which it was held by many princes of the royal family of France. The last duke of Berry was the younger son of Charles X.

Berry, or **Berri, de** (Charles Ferdinand), Duc, born at Versailles Jan. 24, 1778, was the second son of Charles X. He emigrated with his father in 1793, returned to France in 1814, and married in 1816 Caroline Ferdinande Louise, a daughter of the king of Naples. He was assassinated by Louvel Feb. 14, 1820. He was the father of the count de Chambord (Henry V.), who is recognized by the legitimist party as the heir to the French throne. (See Chateaubriand, "Mémoires touchant la Vie et la Mort du Duc de Berry," 1820.)

Berry (Hiram G.), a major-general of U. S. volunteers, born at Rockland, Me., Aug. 27, 1824, killed at the battle of Chancellorsville, Va., May 2, 1863. He was member of the Maine legislature several times, mayor of his native city, and president of Lime Rock Bank. At the first call for troops to suppress the Confederate movement he raised three full companies, and himself entered the service as colonel of the Fourth Maine Volunteers. He was made a brigadier-general Mar. 17, 1862, and major-general Nov. 29, 1862. Killed at the head of his division by a shot while leading a bayonet charge on the morning of May 2, 1863.

G. C. Simmons.

Berryer (Antoine Pierre), a celebrated French orator, lawyer, and legitimist, was born in Paris Jan. 4, 1790. He defended General Cambronne about 1815, gained distinction as an advocate of defendants in political trials, and was elected to the Chamber of Deputies in 1830. After Charles X. had been dethroned (July, 1830), he remained in the Chamber as the orator of the legitimist party, although the other members of that party all retired. He made an eloquent speech against the abolition of hereditary nobility in 1831. During the first years of the reign of Louis Philippe he was regarded as the foremost orator in the Chamber. In 1840 he defended Louis Napoleon, who was tried for his attempt to excite a revolution at Boulogne. He was elected to the Constituent Assembly in 1848, and the Legislative Assembly in 1849. In 1850 he went to Wiesbaden to offer homage to the count de Chambord. He opposed the republic, and protested against the *coup-d'état* of Dec., 1851, after which he retired from political life. In 1852 he was elected a member of the French Academy. Died Nov. 29, 1868. (See Louis Marie de la Haye de Cormenin, "Biographie parliamentaire de M. Berryer," 1837.)

Berryville, capital of Carroll co., Ark. (see map of Arkansas, ref. 1–B, for location of county). Pop. in 1880, 253.

Berryville, on R. R., capital of Clarke co., Va. (see map of Virginia, ref. 3–G, for location of county), is situated 5 miles W. of the Shenandoah River and 10½ E. of Winchester. It contains an academy, and is often called "Battletown," owing to the many contests of Gen. Morgan of Revolutionary fame. In this vicinity are many scenes of historic interest. Washington, in surveying the lands of this county when it was a part of Frederick, had his head-quarters at a beautiful spring just beyond the town. Pop. in 1870, 580; in 1880, not given in census.

Bersaglie'ri, the Italian name of the riflemen or sharpshooters who served in the army of Victor Emmanuel when he was king of Sardinia. They took part in the Crimean war, 1854–55, and fought against Austria in 1859. They wear a dark-green uniform.

Ber'serker [probably from the Scandinavian *berr-serkr*, "bear (-skin) shirt"], a hero of Scandinavian mythology, who fought without coat-of-mail. He was the grandson of Starkader, and overcame all opponents by his irresistible valor. The name has also been given to a class of warriors who fought naked and performed extraordinary feats under the influence of a kind of demoniac possession.

Bert (Paul). See Appendix.

Berthier (Louis Alexandre), prince of Wagram, a French general, born at Versailles Nov. 20, 1753. He served as captain under La Fayette in the U. S. 1778–82. In 1796 he became general of division, and chief of the staff of Bonaparte's army of Italy. He gained the confidence of the general-in-chief, retained for many years the position of chief of the staff, and accompanied Bonaparte to Egypt in 1798. About the end of 1799 he was appointed minister of war. He became a marshal of France in 1804, and rendered important services in the campaign against Austria, 1805. He usually rode in the carriage of Napoleon, whose plans he digested, and whose orders he despatched with remarkable rapidity and precision. He was admirably fitted for the duties of a staff officer by his strong constitution, his methodical habits, and his excellent memory, but he was not so competent to command an army. For his conduct at the battle of Wagram (1809) he received the title of prince of Wagram. He entered the service of Louis XVIII. in 1814, but when Napoleon returned from Elba, Berthier preferred neutrality and retired to Bamberg, where he was killed by a fall from a window Jan. 1, 1815. He left autobiographic "Mémoires d'A. Berthier," 1826.

Berthierite, or **Hardingerite,** a steel-gray, bronzy mineral containing $FeS + Sb_2S_3$.

Berthollet (Claude Louis), M. D., Count, a French chemist, born in Savoy Nov. 9, 1748. He discovered the composition of ammonia, and invented the process of bleaching by chlorine, that of filtration through charcoal, and several fulminating powders. He published a valuable work, "The Elements of the Art of Dyeing" (1790), and "Essai de statique chimique" (2 vols., 1803). He was associated with Lavoisier in forming a new chemical nomenclature, and was one of the chief originators of modern chemistry. Died Nov. 6, 1822. (See Cuvier, "Éloge de Berthollet," 1824.)

Bertholle'tia, a genus of trees of the order Lecythidaceæ. The *Bertholletia excelsa*, a large South American tree, produces a hard-shelled fruit (about six inches in diameter), enclosing numerous elongated and triangular edible seeds, which are called Brazil nuts. Large quantities of them are exported from Pará.

Bertin (Louis François), called **Bertin l'Ainé,** a French journalist, was born in Paris Dec. 14, 1766. He founded in 1800, together with his brother (Louis François, surnamed de Veaux), the daily "Journal des Débats," a literary and political journal, which obtained great influence and success. He was hostile to Napoleon, who banished him. Bertin revived his journal in 1814, and continued to edit it until his death, Sept. 13, 1841.—His son (Louis Marie Armand), born Aug. 22, 1801, succeeded him as editor. Died Jan. 12, 1854.

Bertino'ro, a town in Central Italy, province of Forli, on a mountain 7 miles S. E. of Forli. It is the seat of a bishop. Pop. 6014.

Bertrand, de (Henri Gratien), Count, a French general, was born at Châteauroux Mar. 28, 1773. He followed Napoleon to St. Helena in 1815. He died Jan. 31, 1844, leaving "Memoirs of the Campaigns of Egypt and Syria, dictated by Napoleon at St. Helena" (2 vols., 1847).

Berwick, on R. R., Columbia co., Pa. (see map of Pennsylvania, ref. 4–H, for location of county), on the North Branch of the Susquehanna, 28 miles S. W. of Wilkesbarre. It has a car-shop, foundry, machine-shop, rolling-mill, and an academy. Pop. in 1870, 923; in 1880, 2095.

Berwick (James Fitz-James), Duke of, an able general, a natural son of James II. of England and Arabella Churchill, was born in France Aug. 21, 1670. He had a high command in his father's army in Ireland in 1690, soon after which he entered the French service. He obtained the command of the French army in Spain in 1704, was created a marshal of France in 1706, and gained a decisive victory over the English and their allies at Almanza in 1707. Philip V. rewarded him with the title of duke of Liria and Xerica. He was killed at the siege of Philipsburg June 12, 1734. (See his own "Mémoires," published by his son in 2 vols., Paris, 1778.)

Berwick-on-Tweed, often called simply **Berwick,** a fortified seaport-town of England, in Northumberland, on the left (N.) bank of the Tweed, at its entrance into the North Sea, 58 miles by rail E. S. E. of Edinburgh; lat. 55° 46′ N., lon. 1° 59′ W. The river is here crossed by an old stone bridge of fifteen arches, 924 feet long, and by a magnificent viaduct, over which the trains of the North British Railway pass. It is crossed by the North-eastern, the Midland, and the Great Northern Railways. It has a Gothic church, a theatre, a public library, a town-hall, also large manufactures of steam-engines, mill-machinery, etc. Coal-mines are worked in the vicinity. Pop. in 1881, 13,995. The history of Berwick is full of interest. It was one of the chief seaports of Scotland in the Middle Ages, and in the border wars was often taken and retaken by the English and Scotch, who regarded it as an important military position. It was finally ceded to England in 1502, and became by treaty a free town, independent of both states. These privileges were confirmed on the accession of James I. to the English throne. Down to the time of George II. it was customary in Parliamentary statutes to mention specifically their application to "Berwick-on-the-Tweed."

Ber'wickshire, a county of Scotland, forming its S. E. extremity, is bounded on the N. by Haddington, on the N. E. by the German Ocean, and on the S. E. by the river Tweed, which separates it from England, on the S. by Roxburgh, and on the W. by Edinburgh. Area, 473 square miles. It is drained by the Blackadder, the Whiteadder, and the Eye. The surface is partly hilly in the northern part, occupied by the Lammermuir Hills. The Merse district in the S. part, and near the Tweed, is nearly level, and is one of the most fertile and well-cultivated tracts in the island. Carboniferous limestone, porphyry, and old red sandstone occur here. Capital, Greenlaw. Pop. in 1881, 35,383.

Ber'yl [Gr. βήρυλλος; Lat. *beryl'lus*], a mineral which occurs in the form of six-sided prisms, which are generally blue, yellow, or green, but are sometimes colorless. Those which display clear tints of sky-blue or sea-green are called *aquamarine* by jewellers. The deep green crystals constitute Emeralds (which see). The sides of the prisms are often longitudinally striated, but the terminating or truncating planes are smooth. The beryl is one of the few minerals that contain *glucina*. It consists of 67 per cent. of silica, 19 of alumina, and 14 of glucina. Gigantic crystals of beryl are found at Acworth and Grafton in New Hampshire. One specimen found at Grafton was four feet long, and weighed more than 2500 pounds. Beryls of fine quality occur in Brazil, Siberia, and several parts of Europe. Emeralds are obtained from Peru, Siberia, and Upper Egypt. (See Gems, by Prof. H. B. Cornwall, E. M.)

Be'ryx, a genus of fishes of the family Percidæ, of which few species are living in the present seas, while a large number are found fossil. It begins with the first of the teleosts in the chalk. Three species are found in the chalk of England, and several in the tertiary, especially in the fish-beds of Monte Bolca, near Verona in Italy. This is therefore one of the oldest genera of living fishes.

Berze'lius (Johan Jacob), M. D., F. R. S., Baron, a distinguished Swedish chemist, was born in East Gothland, Aug. 20, 1779. He studied medicine and chemistry at the University of Upsal, and published in 1806 a "Treatise on Animal Chemistry" (2 vols.). He acquired great excellence as an analyst, and made important discoveries in chemistry. He was the author of the system of chemical symbols, and he discovered the elements selenium and thorium. His most important work is a "System of Chemistry" ("Lärebok i Kemien," 3 vols., 1808–18), which was translated into every European language. He was professor of medicine and pharmacy at Stockholm 1807–32. He contributed largely to "Memoirs of Physics, Chemistry, and Mineralogy" (6 vols., 1806–18), a work founded by Berzelius and Hisinger. D. Aug. 7, 1848. (See G. Forchhammer, "J. J. Berzelius," 1849.)

Besançon (anc. *Vesontio*), a city of France, capital of the department of Doubs, on the river Doubs, 58 miles by rail E. of Dijon. It is connected with Paris and Lyons by several railways, is well built and strongly fortified, having a citadel which is considered impregnable. It was formerly the capital of Franche-Comté. The most remarkable edifices are a Gothic cathedral, a town-hall, a theatre, the palace of Cardinal Granvelle, and the prefecture. It has also a college, a public library, a museum, an academy of sciences and arts, and extensive manufactures of watches, jewelry, porcelain, carpets, etc. *Vesontio* was an important town in the time of Cæsar, who in 58 B. C. expelled the Sequani from it. Here are many Roman antiquities, and the remains of an amphitheatre and aqueduct. P. 57,039.

Bessara'bia, a province in the S. W. part of Russia, is bounded on the N. by Podolia, on the E. by Podolia, Cherson, and the Black Sea, on the S. by Moldavia, and on the W. by Moldavia and Bukovina. Area, 14,014 square miles. By the treaty of Paris (1856) part of Bessarabia adjacent to the Black Sea was ceded to Turkey, but by the treaty of Berlin, in 1878, it was ceded to Russia again. The surface is mostly low and flat; the soil is fertile, producing wheat, barley, maize, tobacco, etc. The chief articles of export are cattle, wool, tallow, and salt. The most of the land is in pasturage. The population is composed of Russians, Germans, Bulgarians, Moldavians, Greeks, Jews, Poles, etc. Capital, Kishinef. Pop. in 1879, 1,314,191.

Bessa'rion (JOHN), a learned Greek cardinal, born at Trebizond in 1395, was a disciple of Plato in philosophy. He favored the union of the Latin and Greek churches. He was appointed a cardinal by Pope Eugenius IV., and received in 1463 the title of patriarch of Constantinople. He wrote several works, translated the metaphysics of Aristotle into Latin, and was an efficient promoter of Greek learning. Died Nov. 19, 1472. (See A. BANDINI, "De Vita et Rebus gestis Bessarionis Cardinalis," 1777.)

Bess'borough, EARLS OF (1739), Viscounts Duncannon (1723), barons of Bessborough (1723, in Ireland), Barons Ponsonby (1749, in Great Britain), Barons Duncannon (1834, in the United Kingdom), a prominent family of Great Britain.—JOHN GEORGE BRABAZON PONSONBY, the fifth earl, born Oct. 14, 1809, succeeded his father in 1847. He was member of Parliament for Bletchingley in 1831, for Higham Ferrers in 1831, and for Derby 1834–37. D. Jan. 28, 1880.

Bes'sel (FRIEDRICH WILHELM), an eminent German astronomer, born at Minden July 22, 1784. He became assistant to Schröter at Lilienthal in 1806, and was appointed in 1810 director of a new observatory at Königsberg. In 1818 he published "Fundamenta Astronomiæ," an important and capital work, on which he had expended the labor of many years. After three years' observations he determined in 1840 the annual parallax of the star 61 Cygni, and published the result in his "Measure of the Distance of the Star 61 Cygni, etc." (1839). Having made a series of 75,011 observations, he formed a catalogue of stars within the zone from 15° N. to 15° S. declination, containing all stars to the ninth order. Among his works are "Astronomical Observations" (1841–42) and "Popular Lectures on Astronomy" (1848). Died Mar. 14, 1846. (See C. T. ANGER, "Erinnerung au F. W. Bessels Leben und Wirken," 1846.)

Bes'semer (HENRY), an English inventor of Breton descent, was born in Hertfordshire in 1813. He made various improvements in machinery, but is chiefly known as the inventor of the Bessemer process of refining steel—a process now largely employed in Europe and America. This invention has made Mr. Bessemer a very wealthy man.

Bessemer's Process for Refining Iron. See STEEL, by A. L. HOLLEY, C. E.

Bessières (JEAN BAPTISTE), duke of Istria, a French marshal, born near Cahors (Lot) Aug. 5, 1768. He entered the army as a private in 1792, served with distinction in Italy and Egypt, became a general of division in 1802, and marshal of France in 1804. He rendered important services at Austerlitz, Jena, Friedland, and Eylau. Having obtained in 1808 command of an army in Spain, he gained a victory at Medina del Rio Seco. He had the chief command of the cavalry of the grand army in 1813, and was killed on the day before the battle of Lützen, May 1, 1813. (See MIRAMONT, "Vie de J. B. Bessières;" "Victoires et Conquêtes des Français.")

Betan'zos (anc. *Fla'vium Brigan'tium*), a town of Spain, in the province of Corunna, is 12 miles S. E. of Corunna. It is said to be the oldest town in Galicia, and has remains of ancient fortifications. Here are manufactures of linen, leather, and pottery. Pop. 8122.

Be'tel, or **Pawn,** a narcotic stimulant extensively used as a masticatory by Oriental peoples, especially by tribes of the Malay race. It consists of a portion of the nut of the *Areca Catechu* (called betel-nut or *pinang*), rolled up with lime in the leaf of the *Piper Betel* or other species of pepper. The leaf is plucked green, and is smeared with moistened quicklime before the slice of areca-nut is wrapped in it. This mixture is chewed continually by men, women, and children, and the use of it is so general that a Malay presents his betel-box as a European offers his snuff-box. This practice appears to be very ancient, having prevailed before the Christian era. The betel causes giddiness in those who are not accustomed to chew it. The habitual use of it blackens the teeth, and perhaps destroys them. According to Sir James E. Tennent, the betel is beneficial, acting as a tonic, antacid, and carminative.

Beth, a Hebrew noun, meaning "house" or "habitation," employed some fifty times in the Scriptures as a prefix in naming places, such as Bethel, Bethlehem, and Bethany.

Bethab'ara, a place beyond the Jordan where John baptized (John i. 28), though some of the best manuscripts have Bethany, which is correct. Its situation is still undetermined.

Beth'any [Heb. "house of dates;" Gr. Βηθανία; Arab. *El-Azizeh* or *Lazarieh*], a village of Palestine, on the E. slope of the Mount of Olives, nearly 2 miles (15 stadia) E. of Jerusalem. As the home of Mary, Martha, and Lazarus, it was the scene of interesting events in sacred history. (See Matthew xxi. 17; xxvi. 6; John xi. and xii.; Luke xix. 29.) From some point near the village Christ ascended into heaven. (Luke xxiv. 50.) Here is a cave or excavation in a rock, which, according to a worthless tradition, is the grave of Lazarus. The descent into it is effected by twenty-six steps cut into the solid rock. The modern village contains about twenty families.

Bethany, on R. R., capital of Harrison co., Mo. (see map of Missouri, ref. 1–E, for location of county), 62 m. N. E. of St. Joseph, has a good trade. Pop. in 1880, 994.

Bethany, a post-village of Brook co., West Va. (see map of West Virginia, ref. 2–D, for location of county), on Buffalo Creek, 7 miles from the Ohio River and 16 miles N. E. of Wheeling. It is situated in a beautiful and fertile region, and is the seat of Bethany College, established in 1841 by Alexander Campbell, the founder of the sect of "Disciples." Pop. in 1880, 335.

Beth'el [Arab. *Beitîn* or *Beiteen*], an ancient town of Palestine, noted as the scene of the dream of the patriarch Jacob, was 10 or 12 miles N. of Jerusalem. It was near the boundary between Judea and Samaria. Here are ruins of ancient churches and other buildings.

Bethel, Conn. See APPENDIX.

Bethel, on R. R., Windsor co., Vt. (see map of Vermont, ref. 7–C, for location of county), 25 miles N. W. of White River junction, has manufactures of shoe-pegs, lumber, leather, etc. Pop. in 1880, 482.

Bethel College, in McKenzie, Tenn. This institution of learning was founded, with a liberal charter, in 1850. Its career of usefulness met the most sanguine expectations of its ardent friends. In an incredibly short time fine libraries of well-selected books were collected, an excellent apparatus was obtained, and praiseworthy efforts were made by the board of trustees to secure a liberal endowment. The very moderate charges, as at present, have ever made it eminently the school of the people. The war of the States in 1861–65 closed its doors and left its denuded walls all scathed and scarred, the endowment lost, libraries scattered, the apparatus destroyed, and its friends wasted and greatly disheartened. But since the dark clouds of despondency have partially passed away the reorganization of the college has been consummated. To secure better accessibility, the college has been moved from McLemoresville to McKenzie, Tenn. Her doors are again open, and she comes forward to resume her position among colleges, that she may bear her part in the education and elevation of the youth of our common country. A liberal patronage has been given since the reorganization. The refilling of the cases with valuable libraries has been undertaken with encouragement, and the furnishing of suitable apparatus is progressing. Thus dark hours are yielding to a brighter dawning. The college is under the control of the Synod of West Tennessee of the Cumberland Presbyterian Church. A liberal Christianity and a high standard of moral character are inculcated, yet no peculiar sectarian or political principles are allowed in the literary department. Candidates for the ministry of all denominations receive tuition free of charge. "Church schools differ from the schools of secular learning as differs the cold statue from the living man." Bethel College admits both sexes to her highest honors. The course of study is as thorough as that of any college of the country, and of an eminently practical character. This institution has had her bright as well as her dark hours. Many of the most useful in all the professions found in various parts of the country have obtained their education in this college. There have been many of the most powerful revivals of religion connected with its history. Her presidents have been in the following order: Rev. J. N. Roach, Rev. C. J. Bradley, Rev. A. Freeman, D. D., Rev. Felix Johnson, D. D., Rev. B. W. McDonnald, D. D., LL.D., Rev. J. S. Howard, A. M., Rev. M. Liles, A. M., Rev. W. W. Hendrix, W. B. Sherrill, A. B. McKenzie is in Carroll county, at the junction of the Nashville and North-western and Memphis Clarksville and Louisville R. Rs. REVISED BY W. B. SHERRILL.

Bethes'da [Heb. "house of mercy" or "place of the flowing of water"], a pool or tank at Jerusalem where the lame man was miraculously healed (John v. 1–9). Some identify it with Birket Israil, a large reservoir inside the city walls, near St. Stephen's Gate; others with the Fountain of the Virgin (intermittent), about 300 yards S. of the

Temple area; and others with the pool of Siloam, about 300 yards farther S.

Beth'lehem [Heb. *Beth-lehem*, the "house of bread," so called from its fertile soil], a town frequently mentioned in both the Old and New Testaments, and especially distinguished as the birthplace of our Saviour, as well as of his ancestor, King David. Anciently it was called "Bethlehem Judah," to distinguish it from another Bethlehem in the northern part of Palestine (Josh. xix. 15). It is mentioned as existing in the time of Jacob, but was probably never very large or commercially important. It has at present about 5000 inhabitants, all Christians. The principal trade of the place is in crosses, beads, and relics. Here are Greek, Latin, and Armenian convents; and the monks show a cave which they claim to have been the stable where our Lord was born. (See ROBINSON'S "Biblical Researches;" HACKETT'S "Illustrations of Scripture;" RITTER'S "Geography of Palestine.")

Bethlehem, R. R. junction, Northampton co., Pa. (see map of Pennsylvania, ref. 4–J, for location of county), on the left bank of the Lehigh River, 51 miles N. of Philadelphia and 5 miles E. of Allentown. It is pleasantly situated on the slopes of several hills. A bridge across the river connects it with South Bethlehem, the seat of Lehigh University, founded by Asa Packer in 1865, and richly endowed, having a fine stone edifice on a high and commanding position. Bethlehem was founded in 1741 by the Moravians, who have here a large stone church 142 feet long, a theological seminary, an ancient chapel, and several benevolent institutions. It has also a school for boys and a seminary for ladies. There are a large number of manufactories, chiefly in South Bethlehem, including the Lehigh Shovel-Works, several foundries, the Bethlehem Iron Company's rolling-mills, machine-shops, etc.—one of the largest establishments of the kind in the U. S.; Lehigh Zinc Company's rolling-mill, zinc, oxide, and spelter works; Lehigh Brass-Works, gas-works in both boroughs, etc. Pop. in 1870, 4512; in 1880, 5193; of South Bethlehem borough in 1870, 3556; in 1880, 4925.

Beth'lehemites, an order of monks established at Cambridge, England, in 1257; also an order of monks and nuns instituted at Guatemala about 1665. They are found in Central and South America and the Canary Islands.

Beth'mann-Holl'weg (MORITZ AUGUST), a German jurist and statesman, born at Frankfort-on-the-Main April 8, 1795. He was professor of civil law at Berlin, and subsequently at Bonn, and was Prussian minister of public instruction from 1858 to 1862. He published several valuable legal works. D. July 14, 1877.

Beth'phage, a locality in Palestine, near Jerusalem, appears to have been on or near the Mount of Olives. The name occurs in Luke xix. 29 and Matthew xxi. 1. Its site has not been exactly ascertained.

Bethsa'ida [Heb. "house of fish"], an ancient town in Palestine, on the W. shore of the Lake of Galilee, the home of Andrew, Peter, and Philip (John i. 44). Dr. Robinson identifies it with Ain-et-Tabigbah, in a little bay or cove between Khan Minyeh (Capernaum?) and Tell Hum (Chorazin?). Another Bethsaida, afterwards called *Julias*, was situated near the head of the lake, on the E. side of the Jordan, about 2 miles from its mouth. It was near this Bethsaida that Christ fed the 5000. (Luke ix. 10–17.)

Beth'shemesh [Heb. "house of the sun"], the name of four places mentioned in the Scriptures, the most important of which was a sacerdotal city of Judah, about 15 miles W. S. W. of Jerusalem, and about 2 miles from the great Philistine plain. It was here the ark rested on its way home from Ekron (7 miles). It was here that Amaziah, king of Judah, was worsted and taken prisoner by Jehoash, king of Israel (2 Kings xiv. 11–13). In the reign of Ahaz it was captured by the Philistines (2 Chron. xxviii. 18), and is not again mentioned in sacred history. It stood on a low ridge. Only ruins now mark the spot, which bears the name of *Ain-Shems* ("fountain of the sun"). The greater part of Samson's exploits were in its immediate neighborhood.

Béthune, a fortified town of France, in the department of Pas de Calais, near the river Lave and the Canal of Aire, 23 miles by rail N. N. W. of Arras. It has a fine castle, a college, and a Gothic church; also manufactures of oil, soap, and woollen goods. It was taken from the Spaniards in 1645, retaken by Prince Eugène in 1710, and restored to France in 1713. Pop. 8178.

Bethune (GEORGE WASHINGTON), D. D., an American divine and poet, was born in the city of New York in 1805. He graduated at Dickinson College in 1822, and at the Princeton Theological Seminary in 1825. In 1828 he became pastor of a Dutch Reformed church in Rhinebeck, N. Y. He was afterwards settled in Utica, and still later in Philadelphia. In 1849 he removed to Brooklyn, N. Y. In 1861 he went to Europe for the benefit of his health, but died at Florence April 28, 1862. Dr. Bethune was distinguished for his fine taste, his varied culture, and his love of nature. Besides several literary and religious works, he published "A Commentary on the 130th Psalm" (1847), "Lectures on the Heidelberg Catechism" (1864), "Lays of Love and Faith" (1847). (See his life by DR. VAN NEST, New York, 1867.)

Beton. See BRICK, CEMENT, and STONE, ARTIFICIAL, by GEN. Q. A. GILLMORE, U. S. Army.

Bet'terton (THOMAS), a popular English actor, born in London in Aug., 1635. He performed with great success the parts of Hamlet, Macbeth, and Othello. He was the chief ornament of the English stage for nearly fifty years. His wife was a popular actress. He died April 28, 1710. (See CHARLES GILDON, "Life of T. Betterton," 1710.)

Bet'ting, or **Wa'gering,** a vicious practice which prevails more or less in all countries. The English are addicted to betting on horse-races to a ruinous extent. The British Parliament passed an act, 16 and 17 Vict. c. 119, to suppress the haunts of betters, called betting-houses, which it declares to be a common nuisance and contrary to law. But it provides that its enactments shall not extend to stakes or deposits due to the winner of any race or lawful sport. The U. S. laws prohibit betting on elections.

Betts (BEVERLEY ROBINSON), A. M. See APPENDIX.

Betts (SAMUEL ROSSITER), LL.D., one of the ablest of American jurists, was born at Richmond, Mass., June 8, 1787, and graduated at Williams College in 1806, practised law in Sullivan co., N. Y., served in the war of 1812, became judge advocate, and was a member of Congress (1815–17). He was a judge of the circuit court of the State (1823–26), and U. S. district judge (1826–67). Died Nov. 2, 1868. He published a treatise on "Admiralty Practice" (1838).

Beudant (FRANÇOIS SULPICE), an eminent French mineralogist, born in Paris Sept. 5, 1787, became professor of mineralogy in Paris in 1820. Among his writings is an "Elementary Treatise on Mineralogy" (2d ed. 1830). Died Dec. 9, 1850.

Beugnot, de (ARTHUR AUGUSTE), COMTE, a French writer and liberal statesman, was born at Bar-sur-Aube in 1797. He wrote an "Essay on the Institutions of Saint Louis" (Paris, 8vo, 1821), "The Jews of the West" (Paris, 8vo, 1824), and a "History of the Destruction of Paganism in the West" (2 vols., 1835). He became a peer of France in 1841. As a member of the Legislative Assembly of 1849 he promoted freedom in public instruction. Died in 1865.

Beulé (CHARLES ERNEST), a French archæologist, born June 29, 1826, took part in 1849–53 in the excavations of the Acropolis in Athens, and became in 1854 professor of archæology in the Imperial Library in Paris. He wrote, among other works, "L'Acropole d'Athènes" (2 vols., 1854), "Études sur le Peloponnèse" (1855), "Fouilles de Carthage" (the results of his excavations in Carthage in 1858), and "Auguste, sa Famille," etc. (1867). Died in 1874.

Beur'mann, von (KARL MORITZ), a celebrated German explorer, was born in 1835. In 1860 he attempted to explore the country of the Bogos, but did not succeed in reaching it until Mar., 1861. In Dec., 1861, he was engaged to look for Vogel, who, it was supposed, had been murdered in Wadaï. Beurmann was to start from Tripoli, while at the same time Heuglin should attempt to reach Wadaï from Abyssinia. He reached Kuka in Bornu in Aug., 1862. As it was impossible to reach Wadaï at that time, he made a trip to Jacoba in Bautchi, from which he returned to Kuka Dec. 13. Soon after he attempted the voyage to Wadaï, and having succeeded in reaching Wadaï after several futile attempts, he was murdered in Feb., 1863, in Moa, in the most W. province of Wadaï, by the command of the governor.

Beust, von (FRIEDRICH FERDINAND), COUNT, born at Dresden June 13, 1809. He studied law and political economy at Leipzig and Göttingen, entered the diplomatic service of Saxony in 1831, and was made minister of foreign affairs in 1849. In this position he made himself noticed by his opposition to Prussia, which often assumed the aspect of mere rivalry with Bismarck. After the battle of Sadowa he resigned his position and removed to Vienna, and in 1867 he was made chancellor of the Austrian empire. The complete reorganization of the empire—political, financial, military, etc.—was the problem placed before him, and the present constitution, which made great concessions to the Magyars, placing them on an equal footing with the Germans, but paid no regard to the Slavs, was his work. After his advice, Austria simply cancelled the concordat with the pope in spite of the protest of the Curia. In 1871 he went to London as Austrian ambassador, where he remained till 1876, when he was appointed Austrian ambassador at Paris, where he remained till 1882.

Beu'then, a town of Prussia, in Silesia, 50 miles E. S. E. of Oppeln, has manufactures of woollen cloth, zinc-ware, and pottery. Pop. in 1880, 22,823.

Bev'el [Fr. *beveau* or *buveau*], an instrument used by masons and carpenters to take or measure angles. It is movable on a point or centre, and may be set to any angle. The term also denotes a slant or inclination of a surface which is not at right angles with the adjacent surface; a sloped or canted surface.

Bevel Gear, or **Bevelled Gear,** in mechanics, a species of wheelwork in which the axes of two wheels working into each other are neither parallel nor perpendicular, but inclined to each other at a certain angle. Some wheels are also called conical wheels.

Bevereu, a town of Belgium, in the province of East Flanders, 7 miles by rail W. of Antwerp. It contains factories of laces and woollen, linen, and cotton goods. Pop. 7151.

Bev'eridge (William), an English Orientalist and bishop, born at Barrow, in Leicestershire, in 1638. He was a man of great learning and of profoundly religious character. He published a "Treatise on Chronology" (1669), a work "On the Canons of the Greek Church" (1672), and several devotional treatises. In 1704 he was appointed bishop of St. Asaph. Died in 1708. (See Thomas H. Horne, "Memoir of Bishop Beveridge," prefixed to an edition of his works, 9 vols. 8vo, 1824.)

Bev'erland (Adriaan), a Dutch classical scholar and heterodox writer, born at Middelburg about 1654, was a friend of Isaac Vossius. He wrote "Peccatum Originale" ("Original Sin," 1678), and other works which were censured for impiety. He was banished from Utrecht, and removed to England, where he died insane in 1712.

Bev'erley, a market-town of England, in Yorkshire, 1 mile W. of the river Hull, and 10 miles N. N. W. of the city of Hull. It is the chief town of the East Riding of Yorkshire, and is handsomely built. The origin of the name is said to be *Beverlac*, a "lake or dam of beavers." It has an ancient and beautiful Gothic minster, called the church of St. John, which exhibits several styles of Gothic architecture, and ranks next to York Minster among the ecclesiastical structures of England. The oldest part of this was erected in the thirteenth century. A priory was founded here about 700 A. D. Beverley has an active trade in corn, coals, and leather, and is on the railway from Hull to York. Pop. in 1881, 11,442.

Beverly, on R. R., Essex co., Mass. (see map of Massachusetts, ref. 1–I, for location of county), is on a small inlet of the ocean, 2 miles N. N. E. of Salem and 18 miles N. N. E. of Boston. A bridge across the inlet connects it with Salem. It derives its prosperity chiefly from commerce and fisheries, and has manufactures of shoes, carriages, cotton and woollen goods. Pop. of township in 1870, 6507; in 1880, 8456; in 1885, 9186.

Beverly, a city of Burlington co., N. J. (see map of New Jersey, ref. 5–D, for location of county), on R. R. and the Delaware River, 15 miles above Philadelphia. It has a woollen mill, an oil-cloth factory, a very extensive rope-walk, and is a place of summer resort. Pop. in 1870, 1418; in 1880, 1759.

Beverly, capital of Randolph co., West Va. (see map of West Virginia, ref. 4–E, for location of county), is on the Tygart's Valley River, about 100 miles S. S. E. of Wheeling. Pop. in 1880, 235.

Bewd'ley (formerly **Beaulieu,** *i. e.* "fair place," so called from its situation), a market-town of England, in Worcestershire, on the river Severn, 14 miles N. N. W. of Worcester. It is pleasantly situated and neatly built, and has manufactures of combs, carpets, brass-ware, and leather. Pop. in 1881, 3088.

Bew'ick (Thomas), a celebrated English engraver, born near Newcastle-on-Tyne Aug. 12, 1753, was a pupil of Beilby. He was the founder of the modern English school of wood-engraving, and none of his numerous pupils have excelled him. He illustrated Gay's "Fables," 1779. Beilby and Bewick published in 1790 a "History of British Quadrupeds," with engravings, which procured for Bewick a high reputation. He was assisted by his brother John in the designs of Goldsmith's "Traveller" and "Deserted Village." Among his best works is a "History of British Birds" (2 vols., 1804). Died Nov. 8, 1828.

Bey, or **Beg,** a title of the Turkish empire signifying "lord." The ruling officers of Tripoli and Tunis are beys, and the same title is given to some local magistrates, to colonels and generals of the army, and to the sons of pashas. In other cases it is a merely honorary title.

Beyle (Marie Henri), a French *littérateur*, who wrote under the assumed name of Stendhal, was born at Grenoble Jan. 23, 1783. He held several high civil offices under Napoleon. Among his chief works are a "History of Painting in Italy" (2 vols., 1817), "Le Rouge et le Noir," a novel, a "Life of Rossini" (1824), "Memoirs of a Tourist" (1838), "Rome, Naples, and Florence," and a novel called "The Carthusian Nun of Parma" (1839). He passed many years in Italy. Died in Paris in 1842. (See Honoré de Balzac, "Études sur M. Beyle.")

Bey'root', Beyrout, Beirout, Beirut, or **Bairut** [supposed by some to be identical with the *Berothai* of 2 Sam. viii. 8, and the *Berothah* of Ezek. xlvii. 16; Gr. Βηρυτός; Lat. *Berytus*], a flourishing commercial town and seaport of Syria, is finely situated on the Mediterranean at the foot of Mount Lebanon, 58 miles W. N. W. of Damascus. The harbor admits only small vessels, but in the bay about 3 miles from the city there is good anchorage for large ships. This is the chief seaport of Damascus and Syria, and has an extensive commerce, which is increasing. French steamers ply weekly between Beyroot and Marseilles, and British steamers ply regularly between this city and Liverpool. The chief articles of export are madder, silk, wool, olive oil, and gums. Here are important manufactures of silk stuffs. Pop. estimated at 80,000. *Berytus* was besieged and taken by Baldwin, king of Jerusalem, about 1110, and retaken by the Saracens in 1187. American missionaries have been there since 1823. The Protestant Syrian college was opened in 1866.

Be'za [Fr. *De Bèze*], (Theodore), an eminent Calvinistic theologian, born at Vezelay, in Burgundy, June 24, 1519. In his youth he enjoyed two benefices in the Catholic Church, but in 1548 he went to Geneva with his wife, and avowed himself a Protestant. He became professor of Greek at Lausanne, and an intimate friend of Calvin. In 1554 he published a treatise, "De Hæreticis a Civili Magistratu Puniendis," in which he defended the burning of Servetus. He translated the New Testament into Latin (1556), removed to Geneva in 1559, and became Calvin's ablest coadjutor. He succeeded Calvin as professor of theology in 1564. He afterwards ruled the Genevan Church with energy for forty years. Among his works are a "Life of Calvin" and a "History of the Reformed Churches in France from 1521 to 1563" (3 vols., 1580). Died Oct. 13, 1605. (See Baum, "Th. Beza," 2 vols., 1843–51; Heppe, "Th. Beza," 1861.)

Bezant', or **Besant,** a gold coin struck at Byzantium, or a circular piece of gold or silver without any impression, supposed to be a part of the old coinage of Byzantium. Some of these were brought home by the Crusaders, and were current in England. Their value was 10*s.* sterling, but some gold bezants were worth £15 sterling. They occur in heraldic charges, especially Cornish coat-armor, and in the arms of banks or bankers (hence the "three balls" of the pawnbrokers' shops). *Bezant* in heraldry is a globe *or*, or a circle *argent*.

Bez'dau, a town of Hungary, in the county of Bacs. Pop. in 1880, 7715.

Béziers (anc. *Bæter'ræ*), a city of France, in the department of Hérault, on the river Orb and the Canal du Midi, 27 miles by rail E. S. E. of Cette. It is on the railway which connects Montpellier with Toulouse, and has a delightful situation, with a mild climate. Among its antique and interesting edifices are a noble Gothic cathedral and the church of La Madeleine. It has a college, a public library, a theatre; also manufactures of silk, hosiery, gloves, glass, soap, brandy, and leather. Béziers has some Roman remains. It was the scene of a massacre of the Albigenses in 1209. Pop. in 1881, 42,915.

Be'zoar, a calculous concretion found in the stomachs or intestines of goats, deer, and other ruminant animals, was formerly prized for its supposed medicinal virtues and as an antidote to poisons. That of the antelope was especially prized. The bezoar is sometimes composed of the superphosphate of lime. It is quite worthless as a medicine.

Bhagavat (or **Bhagavad**) **Gîta,** modern Hindoo pron. bhŭg'a vŭt geet—*i. e.* "the divine song" [from the Sanscrit *bhagavat*, "adorable," "divine," and *gita*, a "song"], a famous Hindoo poem usually regarded as an episode of the Mahabharata (which see), though it is not found in all the manuscripts of that great epic. The Bhagavat Gîta may be called a poetical treatise on the Hindoo philosophy, ethical and religious. The discourse on these subjects is represented as proceeding from the mouth of the god Krishna (one of the avatars of Vishnu). The poem is regarded with great reverence by the Hindoos, and it has been made the subject of numerous commentaries both in

India and in Europe. (See a translation by Wilkins, who first introduced the poem to the notice of Europe; W. von Humboldt, "Treatise on the Bhaghavat Gîta," 1827.) The Sanscrit text, with a Latin translation, was edited by A. W. von Schlegel (2d ed., 1846).

Bhamo. See Bamo.

Bhar′tri-Ha′ri, a Hindoo poet celebrated as a writer of apothegms, is supposed to have been a brother of King Vikramâditya, who lived in the first century B. C. His name is attached to a collection of 300 apothegms which were published by Bohlen (Berlin, 1863). Bhartri-Hari was the first Hindoo poet whose works became known in Europe.

Bhawl′poor, a state of Northern India, bounded on the N. W. by the Ghara River and the Indus, and on the S. W. by Sinde. Area, about 22,000 square miles. The soil is mostly desert and sterile, except near the Ghara. Cattle, poultry, sheep, rice, and provisions are plentiful and cheap. The chief articles of export are cotton, sugar, indigo, hides, wool, and drugs. Capital, Bhawlpoor. This state is subject to a khan, and protected by the British. Pop. about 500,000.

Bhawlpoor, a town of India, the capital of the above state, is on a branch of the river Ghara, 210 miles S. W. of Lahore. It is situated in a fertile district, which produces abundance of oranges, apples, and other fruits, and has an extensive trade. Here are manufactures of scarfs, turbans, chintzes, and other cotton stuffs. Pop. about 20,000.

Bhil′sa, a town of Hindostan, 190 miles S. of Gwalior, on the Betwat River, is built on a trap rock, and is fortified. In the neighborhood are extensive ruins. Good tobacco is raised here. Pop. about 30,000.

Bhooj, a fortified town of Hindostan, capital of Cutch, 170 miles S. E. of Hyderâbâd. It has numerous temples or pagodas, mosques, and a beautiful mausoleum of Row Lakka, a former ruler of Cutch. Its manufactures of gold and silver are widely celebrated. Pop. estimated at 25,000.

Bho′pâl′, or **Bhapaul,** a state of Hindostan under British protection, is bounded on the S. by the Nerbudda River. Area, estimated at 6764 square miles. It is traversed by the Vindhyan Mountains. Capital, Bhopal. Pop. about 664,000.

Bhurt′poor′, or **Bhurtpore,** a "protected" state of British India, is between 26° 30′ and 27° 50′ N. lat., and between 77° and 78° E. lon. Area, estimated at 1978 square miles. Good crops of cotton, sugar, and grain are produced. The heat in summer is extreme. Pop. about 600,000.

Bhurtpoor, or **Bharatpura,** a large town of India, capital of the above state, in a plain 33 miles W. of Agra; lat. 27° 12′ N., lon. 77° 33′ E. Pop. estimated at 60,000. It was formerly fortified by a mud wall, and a ditch which could be filled with water from a lake. Lord Lake, having assaulted this town in 1805, lost 3000 men. It was besieged and taken by the British in 1826.

Bi [from the Lat. *bis*, "twice"], a prefix which occurs in many chemical and other scientific terms, and denotes duality or the number 2, as *bivalve*, "having two valves;" *bicarbonate*, a salt in which two equivalents of carbonic acid are combined with a base; *biceps*, "double-headed."

Biaf′ra, Bight of, a bay of the Atlantic Ocean, on the W. coast of Africa, is the eastern portion of the Gulf of Guinea, and lies between Cape Formosa and Cape Lopez. It encloses the island of Fernando Po and other smaller isles. The largest rivers which flow into the bight are the Niger (or Quorra), the Calabar, and the Cameroon.

Bia′la, an Austrian town, in Galicia, situated on the Biala, 42 miles S. W. of Cracow, has manufactures of cloth and linens. It is connected by rail with Bielitz. Pop. in 1880, 7251.

Biala, a town of Russia, in the government of Siedlce. It has several churches and a monastery. Pop. in 1882, 19,435.

Bial′ystok, a fortified town of Russia, in the government of Grodno, on the river Bialy, 52 miles by rail S. W. of Grodno. It is well built and handsome, has several churches, and a palace with a park, which have been called the "Versailles of Poland." Here are a gymnasium and manufactures of woollen goods, hats, leather, and soap. It is on a railway from Warsaw to Grodno. Pop. in 1882, 36,252.

Biancavil′la (*i. e.* "white town"), a town of Sicily, in the province of Catania, on the S. W. declivity of Mount Etna, 13 miles N. W. of Catania. Grain, cotton, and silk are exported from it. Pop. 9083.

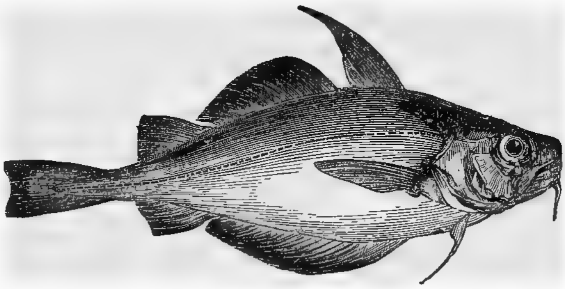
Bianchi′ni (Francesco), an eminent Italian astronomer and antiquary, was born at Verona Dec. 13, 1662. He lived mostly at Rome, and enjoyed a rich benefice, the gift of Pope Alexander VIII. He published, besides other works, a "Universal History, proved by Monuments and illustrated with Symbols of the Antique" (1694). He spent several years in an effort to draw a meridian line from the Adriatic to the Mediterranean, but failed to complete it. He succeeded in drawing a meridian line through the church of Santa Maria degli Angeli. Died at Rome Mar. 2, 1729. (See Fontenelle, "Éloge de Bianchini," 1757; A. Mazzoleni, "Vita di F. Bianchini," 1735.)

Biard (Auguste François), an eminent French painter, born at Lyons June 27, 1800, travelled extensively in the Levant, Egypt, etc., collecting materials for his art. He excelled in several departments of painting, especially in *genre*. Among his works are a "Family of Beggars," "The Strolling Players," "The Wind of the Desert," "A Battle with Polar Bears," "The Slave-Trade," and the "Burning of a Hindoo Widow." (See L. Boivin, "Notice sur M. Biard.") D. June, 1882.

Biarritz, a village and fashionable watering-place of France, on the Bay of Biscay, in the department of Basses-Pyrénées, 5 miles S. W. of Bayonne. Here are several curious grottoes and mineral springs. The situation is pleasant and healthy. This was recently the summer residence of Napoleon III. Pop. 3652.

Bi′as [Βίας], one of the Seven Sages of Greece, was a native of Priene, and a contemporary of Crœsus, king of Lydia. He lived about 570–550 B. C. He was distinguished for eloquence as well as wisdom, and was employed as a legal and political adviser or advocate. Besides other pithy sayings is ascribed to him this: "I carry all my goods (or riches) with me."

Bib, called also **Pout** or **Whiting Pout** (*Gadus luscus* or *Morrhua lusca*), a fish of the same genus as the cod and haddock, is found on many parts of the British coasts and farther N. It is seldom more than one foot long, and is remarkable for the depth of its body, which equals one-fourth of its length. It is esteemed for food.



The Bib.

Bibaud (F. M. U. M.), LL.D., son of Michel, was born at Montreal, Canada, Nov., 1824; became law professor at Jesuits' College, Montreal, and wrote "Dictionnaire Historique des Hommes Illustres du Canada et de l'Amerique."

Bibaud (Michel), born at Côté des Neiges, near Montreal, Canada, Jan. 20, 1782, was educated at College of St. Raphael, and wrote much in defence of the nationality of Canada and for the conservation of the French language. He wrote the first French history of Canada since the conquest. Died Aug. 3, 1857.

Bibb (George M.), born in Virginia in 1772, graduated at Princeton in 1792, became a prominent lawyer of Kentucky, and was several times chosen chief-justice of that State, and once chancellor; was U. S. Senator (1811–14 and 1829–35), and secretary of the treasury under Tyler. He published four volumes of Kentucky "Law Reports" (1815–17). Died at Georgetown, D. C., April 14, 1859.

Bibb (William Wyatt), M. D., born in Virginia Oct. 1, 1780, was member of Congress from Georgia (1806–13), U. S. Senator (1813–14), governor of Alabama Territory (1817–19), and first governor of the State of Alabama (1819–20). Died July 9, 1820.

Bi′ber (George Edward), an English clergyman, born in 1801, was formerly associated with Pestalozzi in educational enterprises, and is author of several pedagogic works. He has taken an active part in recent church controversies in the High Church interest.

Bi′berach′, a town of Würtemberg, is in a charming valley and on the river Riss, 23 miles by rail S. S. W. of Ulm. It has a realschule, a beautiful church, built in 1110, manufactures of paper, linen goods, leather, etc. Pop. in 1880, 7718. The French general Moreau here defeated the Austrians under Latour in Oct., 1796, and the Austrian general Kray in 1800. In 1803 it was deprived of its imperial freedom, and it was transferred to Würtemberg in 1806. The poet Wieland was born near Biberach.

Bi'berich, or **Bie'brich,** a village of Prussia, in the province of Hesse-Nassau, on the right bank of the Rhine, 3 miles S. of Wiesbaden. It has a ducal residence which is said to be the finest palace on the Rhine. The river-scenery here visible is almost unrivalled. Pop., including Mosbach, in 1880, 8499.

Bible. See BIBLE, THE, and also REVISION OF THE BIBLE.

Bible Christians (called also **Bryanites,** from Rev. William O'Bryan of Cornwall, England, who had for some time been a member and local preacher with the Wesleyans, but on account of his being a married man could not be received as an itinerant minister among them). The first society formed was in a farm-house in Shebbear, Devon, when twenty-two gave in their names; these all had hitherto been constant attendants at the parish church. They numbered (June, 1875) in England 565 chapels, 152 ministers, 1381 local preachers, 18,811 members, and 36,697 Sabbath scholars; in Australia, 40 ministers, 145 chapels, 147 local preachers, 2650 members; Sabbath scholars, 6920; in Canada (in 1876), Prince Edward Island, and Wisconsin and Ohio, U. S. (known as Canadian Conference), 87 ministers, 195 local preachers, 177 chapels, 6943 members, and 9396 Sabbath scholars.

G. BODLE.

Bible Communists, or **Perfectionists.** See ONEIDA COMMUNITY.

Bible Societies. While the sixteenth century is distinguished for the labor spent upon numerous translations of the Holy Scriptures into the languages of Christian nations, the nineteenth is no less memorable for the multiplication of Bible societies as a means of securing the widest diffusion of the Bible, not only in civilized lands and among Christian communities, but throughout the world. The British and Foreign Bible Society was established in London, Mar. 7, 1804. Previous to that time eight societies in Great Britain had been engaged in publishing or distributing Bibles, though only three, the Naval and Military Bible Society (1780), the Dublin Association (1792), and the French Bible Society (1792), had made this their principal work, and these, it is believed, did not long survive. The great destitution which was found to prevail in the principality of Wales in 1802, and the utter inability of existing societies to supply the demand for Bibles, led to the organization of the British and Foreign Bible Society, with the sole object of encouraging a wider dispersion of the Scriptures, first in the British dominions, and then, according to its ability, in other countries, Christian, Mohammedan, and Pagan. Three hundred persons of different religious denominations united in organizing it, and £700 were at once subscribed. Its entire receipts the first year fell a little short of £5600.

The American Bible Society was founded in the city of New York, May 11, 1816, with the sole object, as announced in its constitution, of encouraging "a wider circulation of the Holy Scriptures without note or comment." This society had, however, been preceded by fifty or sixty others, which had come into being at one point and another in the U. S. after the organization of the British and Foreign Bible Society. The first of these was founded at Philadelphia in 1808; the second at Hartford, Conn., in 1809. Next came the Massachusetts Bible Society at Boston, the New Jersey Bible Society at Princeton, and the New York Bible Society. Such local societies accomplished much good within their own bounds, but having no bond of union, their operations lacked efficiency and economy, and it soon became apparent that a combination of effort was essential for thorough work. Thirty-five local organizations sent delegates to the convention which founded the American Bible Society, and eighty-four became auxiliary to it during the first year of its existence. Among the delegates were representative men of the leading denominations—Baptist, Congregational, Reformed Dutch, Methodist Episcopal, Protestant Episcopal, Presbyterian, and the Society of Friends; but every sectarian jealousy and party prejudice being laid aside, all united with perfect harmony and cordiality in the single object of "disseminating the Scriptures in the received versions where they exist, and in the most faithful where they may be required." The announcement of this organization brought from the British and Foreign Bible Society the expression of their warmest congratulations, and the offer of a gift of £500. At an early date Bible societies were formed on the continent of Europe, as at Bâle (1804) and Berlin and Ratisbon (1805), and nearly fifty others, chiefly in the north of Europe, before 1816. At that time also two had been established in Africa, five in Asia, and others in Nova Scotia, Canada, and the West Indies. About seventy principal societies may be named as having been actually engaged in the manufacture and publication of Bibles. Auxiliary and branch Bible societies and associations have been very extensively formed with a view of enlisting local sympathies, collecting funds from churches and individuals, maintaining depositories, and looking after the circulation of the Scriptures among the needy. The American Bible Society has more than 2000 auxiliary societies, and with them are connected nearly 5000 branches. Such societies are expected to supply the wants of their field from their own resources, if possible, though receiving aid from the national society when necessary, and paying over their surplus funds annually into its treasury. The British and Foreign Bible Society has also not far from 1200 auxiliaries and branches, as well as 3134 Bible associations in the management of which ladies have a principal part. Besides these home institutions, it has many colonial auxiliaries, and also foreign agencies superintending its depositories of Bibles in the chief cities of Europe. Not far from 16,000 smaller organizations are thus connected with the two principal Bible societies of the world; and when it is remembered that many of the continental societies also have adopted the auxiliary system, it is very clear that this multiplication of associations for the distribution of the Scriptures is one of the phenomena of the age.

The American and Foreign Bible Society was founded in New York in 1836 by representatives of the Baptist denomination, owing to the refusal of the American Bible Society to apply its funds to print and circulate versions of the New Testament made by American Baptist missionaries, in which βαπτίζειν and its cognate terms were literally translated, not transferred. The American and Foreign Bible Society, thus inaugurated, instructed its translators "to endeavor to ascertain the exact meaning of the original text, to express that meaning as literally as the nature of the languages into which they should translate the Bible would permit, and to transfer no words which were capable of being literally translated." By vote of the representatives of the two societies this society was to have been consolidated with the American Baptist Publication Society, but legal obstacles have been thrown in the way, and the Bible Society still maintains an independent existence. Some of the members of this society were earnest advocates of the publication of a new version of the English Scriptures on the same principle as that which governed its translations into foreign tongues; and on the refusal of the society to authorize such a revision the American Bible Union was formed (1850)—a society which has published a revised version of the New Testament, Psalms, Job, and Genesis in conformity with the principle indicated—translating βαπτίζειν by "to immerse," etc. Although some of the most eminent scholars among the Baptists have been employed on the versions of this society, it has never received the support of the great body of American Baptists.

In general, several characteristics of Bible societies are to be noted. They are voluntary associations, being neither close corporations nor under ecclesiastical direction, and the privileges of membership are secured by the payment of money. They are unsectarian, inviting all men to common efforts on the simple basis of the Scriptures of the Old and New Testament without note or comment. They are Protestant organizations, however, because the rules of the Roman Catholic Church are opposed to the free circulation of the Scriptures without admixture of comment. They are strictly benevolent societies, publishing not for profit, but at prices as low as possible, and making large grants, as their receipts may allow, for the supply of the destitute. Their work is exceedingly helpful to Sunday-schools and to various forms of missionary effort at home and abroad; and their influence has been most happy in promoting Christian union, and presenting a form of religious activity in which all denominations might participate without the sacrifice of principle.

The work of Bible societies has constantly encountered difficulties of one sort and another. The circulation of the Bible in all lands creates a demand for new versions, the preparation of which involves many nice points, while the revision of existing versions can hardly fail to occasion complaint. Even the determination of the canon of the Scripture is not universally agreed on. The most violent controversy in the British and Foreign Bible Society turned upon the question whether the Apocrypha should be published and circulated. The controversy continued for years, and when in 1826 it was finally decided to withhold all aid from associations circulating the uncanonical books, fifty auxiliaries on the Continent withdrew from the parent society. The Edinburgh society, which had earnestly opposed the circulation of the Apocrypha, also withdrew and stood aloof. The proposal to combine men of different persuasions in Bible effort, and to circulate the Bible without the Book of Common Prayer, encountered some opposition in England at an early date, which after a few years died away. The Russian Bible Society at St. Petersburg (founded 1813) flourished until 1826, when its operations were summarily suspended by the emperor Nicholas, on the ground that it belonged to the Church, rather than to a secular society, to furnish the people with the word of God.

In the American Bible Society differences of opinion concerning the principles which should govern translations into foreign tongues led to the formation of the American and Foreign Bible Society in 1836; and at a later period (1858) its harmony was again imperilled for a time in consequence of dissatisfaction at some attempted modifications (numerous though generally slight) in the English editions of the society—a dissatisfaction which was allayed by abandoning the proposed changes.

The work accomplished by Bible societies in the present century is vast in extent and of unspeakable usefulness. In 1886 the receipts of the American Bible Society, for the year ending Mar. 31, applicable to its general purposes were $523,910.59. The same year it had issued 1,437,440 volumes, including Bibles, Testaments, and integral portions of Scripture. The British and Foreign Bible Society reported its issues for 1884, 3,118,304 volumes, of which 827,850 are Bibles. Its total issues from 1804 to 1886 are 108,320,869 volumes, and the total issues of the American Bible Society from 1816 to 1886 are 46,877,646. It is a low estimate that 194,000,000 volumes of the Bible or separate books of the Bible have been issued by Bible societies since the tears of a little girl in Wales in 1802 led Thomas Charles to ask what could be done to secure Welsh Bibles for his congregation. The aggregate number of volumes issued by no means measures the results of Bible society work. From motives of benevolence the prices of Bibles have been determined by the cost of materials and of manufacture, without regard to profit. The British and Foreign Bible Society has its work done by contract; the American Bible Society manufactures its publications on its own premises, and in so doing gives constant employment to about 400 persons. Besides the books which are sold at unremunerative prices, a large part of the publications each year are given away to destitute families and individuals, to charitable institutions, Sunday-schools, missionary societies, soldiers, seamen, immigrants, travellers, prisoners, and other classes of persons. The American Bible Society and its auxiliaries through the U. S. are engaged for the fourth time in an effort to reach every destitute family in the land with the offer of a Bible. It has printed the Bible or parts of it in fifty different languages, twenty-seven of these being new translations; over 200 new versions have been prepared since 1804. The British and Foreign Bible Society has directly or indirectly promoted the publication and distribution of the Scriptures in over 200 languages and dialects. (For further information respecting Bible societies reference may be had to the following works: OWEN'S "History of the British and Foreign Bible Society," 1817; BROWNE'S "History" of same, 1859; DUDLEY'S "Analysis of the System of Bible Societies," 1821; "Jubilee Memorial of British and Foreign Bible Society," 1854; "Jubilee Commemoration at Bombay," 1854; STRICKLAND'S "History of American Bible Society," 1856; "Manual of American Bible Society," 1885; "Jubilee Memorial," 1866; Memoirs of S. H. Turner, Gardiner Spring, and John C. Brigham; numerous controversial pamphlets; "Bible Society Record," and "Annual Reports" of each Bible society.) E. W. GILMAN.

Bible, The [Lat. *Bib'lia;* Gr. τὰ Βιβλία (*i. e.* "the books"); Fr. *la Bible;* Ger. *die Bibel;* It. *la Bibbia*], popularly known also as the **Holy Bible** and **Holy Scriptures,** a collection of ancient writings, divided into two parts, the Old and New Testaments, of which the first is regarded by the Jewish Church, and both are regarded by the Christian Church, as a divine revelation. With respect to the more precise definition and character of the Bible, the views are very diverse in the different churches. The Roman Catholic Church, in consistency with the monarchical theory which it inherited from the Roman civil law, denies any such character to the Bible as would make it a constitutional limitation on the sovereign power. The supreme authority of revelation does not, on this theory, inhere in the codex, but in the personal representative, for the time being, of the Church catholic. The Greek Church lays chief stress on orthodoxy—that is, on inflexible adhesion to the dogmatic symbols in which the faith of Christianity was codified in the early centuries. The Scriptures must therefore be interpreted in accordance with these creeds, but as this elevates the creeds into the position of supreme authority, the labor of interpreting Scripture becomes a superfluous trouble. The Scriptures have in consequence fallen into neglect, and this neglect has become so absolute, under a rigid traditional orthodoxy, that it is impossible to state any positive attitude towards the Scriptures as characteristic of this Church. The Protestants of the sixteenth century, in reviving reverence for the authority of the Scriptures, developed various schools of opinion. Luther and his followers adopted a comparatively free but subjective position. They saw divine revelation in the Bible, but not in all parts of it equally. Calvin's position was different and more scientific. Among his followers in Switzerland, however, there sprang up a great zeal for the doctrine of inspiration. The sacred writers were compared to trumpets or to pens, in order to express their absolute instrumentality in the hands of the Holy Spirit. The Anglican Church at first held a less definite theory of the Scriptures, and there was great diversity of opinion, but it has gradually adopted the general theory of the Swiss Reformers, modified only so far as sober reflection has forced the over-credulous or over-zealous to relinquish the theory of verbal inspiration. Finally, the scientific and critical school of biblical scholars, represented chiefly by modern Germans, regards the Bible as the human record of a divine revelation; not absolutely infallible, since there is no book written in any human language but must partake in a measure of the imperfections of that language. Many of this school, while admitting the Bible to contain the record of a true supernatural revelation, do not consider it to be without positive errors of historical fact, not without false coloring from popular legend and tradition, but nevertheless a record as good as human hands could make of a truly divine revelation. Thus diverse are the conceptions of the book which are held by different parties. Scarcely any of these conceptions rely on an unbiassed examination of the book, to see what it is; many of them are invented to obtain the support of the Bible for some form of Christianity which is first settled, independently of the Scriptures, on the basis of religious or philosophical prepossessions. The Protestant churches, however, are generally united in regarding the Scriptures—1, as of divine authority; 2, as containing all knowledge necessary to salvation; 3, as the appropriate form of a divine revelation (as opposed to tradition or the inner light); 4, as the heritage of all Christians—*i. e.* it is the right of all to read and become acquainted with the teachings of the Bible.

A. *The Old Testament.*—The Old Testament was originally written in Hebrew, but of course the Hebrew manuscripts which we possess are separated by a long interval and many vicissitudes from the original handiwork of the authors.

The History of the Hebrew text is briefly as follows: I. *First Period* (536–180 B. C.)—The Babylonian captivity (from 586, the chief deportation, to 536, the first return) forms an epoch in the history of the Jews. It is a gulf dividing the independent from the subject position of the nation. It was under the former that they had original and productive power and a living revelation, and while they had them they were indifferent to them. After the captivity, when the Jewish nation had been purified by adversity, they turned back to them with new interest. They were able to see that Isaiah and Jeremiah had been the only men of their times who had truly had "the mind of the Spirit." They desired to restore the ancient law, worship, and traditions. To this end the collection and preservation of the ancient writings, which served as the authority for, or bore witness to, the former observances, became an object of great interest and importance. With this movement, however, the nation entered on a new stage. Its work was not original and creative, but preservative and reconstructive. It did not look to the future, to an ideal, but to the past, to a memory. Its spring was not in thought, communion with God, foresight, and purpose, but in tradition, reflection, and application. It had to make the most of its inherited wealth, without adding to it.

In the work which now began Ezra had a prominent part. He collected and arranged the ancient writings, and so laid the foundation of the canon (see below, section on the *Canon*); and from this point the history of the written codex begins. The books were at this time written in the ancient Phœnician characters which appear on some ancient Phœnician inscriptions, on the Moabite Stone, on some coins of the Asmoneans, and in the Samaritan Pentateuch. The letters had no variation of form or shape for capitals and small letters, and neither words, verses, nor chapters were marked off in any way. Some of the books which now appear separately were then united, and a few which are now found in the canon had not yet been written. The work, however, which was now to be done extended beyond the collection, arrangement, and preservation of the ancient Scriptures. The Hebrew language was already a dead language. The popular dialect was the Chaldee, and the Hebrew of Moses, David, and the prophets had become a sort of classical and sacred language, known only to the oldest and to the learned. It was an object of academical acquisition. It was, therefore, necessary to explain and translate or expound the writings. This task naturally devolved upon such as possessed the requisite knowledge, and they constituted an informal body for this purpose. So much is no doubt true, and it forms the historical basis of the rabbinical tradition about the "Great Synagogue" which was said to have done this work.

When this much is said of the commencement of this period, we have in fact told nearly all which is known about it. We can only infer, from what we know of its beginning and what we find at its close, that the following movements were in progress: 1. The college of interpreters, though not a formally or legally constituted body, and though their business was primarily literary or academical, were gaining in authority and dignity, and acquiring a certain official character from general consent. The "elders" came to have civil and judicial authority from the lack of others to fill these functions. Possibly the Sanhedrim was an outgrowth of this body. 2. The canon (see below) was being formed; the idea of *Holy* Scripture was being elaborated and formulated; the respect for the traditional writings, and the disposition to set them by themselves, were gaining ground; the doctrine of inspiration took its rise. At the close of this period the canon is formed and these doctrines are established dogmas. 3. The form of the letters in use was undergoing a change. At the period referred to, the square letters which are represented in our printed texts had become established in use.

II. *Second Period* (180 B.C. to 500 A. D.).—The "schools" begin with Simon the Just, in 180 B. C. These schools produced the Talmud, an immense work in a dozen folio volumes, containing a commentary on the Mishna, which is itself a "repetition" of the "Law." The schools developed intense zeal for the text of the Scriptures—a zeal which, though frivolous and fanatical in many of its manifestations, has been of immense value to biblical scholarship. The scribes and Talmudists spent unwearying labor in the establishment of the consonant text; they separated the words by spaces (but characteristically ordained just how great the space should be). They probably also introduced the verse-mark (:), and therefore the division into verses. The preservation of the text from corruption in copying was secured by counting the letters or by other devices, and by crabbed, rigid, and minute rules. This work exercised its legitimate influence on the characters of those who did it; it made them punctilious about trifles and negligent of "the weightier matters;" but it preserved the Old Testament text from corruption, and handed it down to us in a comparatively pure and reliable form. In their exegesis the Talmudists were generally guided by arbitrary rules, by dogmatic prepossessions, by a view of the Bible which made it a storehouse of occult wisdom, only to be unlocked by cabalistic and allegorical treatment. It is asserted by some who are well acquainted with the Talmud that it contains valuable geographical, ethnological, historical, and exegetical information for the elucidation of the Bible, but the commentaries of Jews and Christians alike fail to bear witness to the truth of the assertion.

The Targums.—One result of the zeal of the Jews for the original Hebrew was the publication of paraphrases in the Aramaic or popular dialect, which were called *Targumim* (from a root signifying to "interpret"). They present the rabbinical and traditional interpretation of the Scriptures. Their origin is very obscure.

III. *Third Period* (500–1488 A.D.).—The Talmud, having grown by the work of successive generations for three or four centuries, closed about the year 500—*i. e.*, the last of the commentators whose sayings are included in it lived at that time. Then a new work began. The Jewish nation had long been broken up and dispersed. Christianity had grown into a powerful opponent. The latter fact had led the Jews to abandon the Septuagint Greek version of the Old Testament (see below, on the *Versions of the Old Testament*), and the former fact made it necessary to provide still further for the preservation of the Hebrew text. The pronunciation of a language written only with consonants must, of course, be very uncertain; that of the Hebrew had been preserved in the rabbinical schools by tradition. There seemed to be danger that it would now be lost if no means of recording it were devised. The Syriac language had shortly before been provided with points to designate the vowel sounds, and to make the written language a complete representation of the spoken. The chief seats of rabbinical learning at this period were Tiberias in Galilee and Sora in the Euphrates valley, and the scholars are known as the Massoretes. The Massorah was a mass of notes, comments, emendations, and corrections of various kinds, which the Talmudists had adopted, committed to memory, and handed down by tradition, but which they had not ventured to mark in any way upon the pages of the sacred text. The Massoretes now undertook to do this. They marked in the text—1, the vowels, the shades of pronunciation of the consonants, and the diacritical points which distinguish two sounds expressed by one character; 2, the accents, which are partly marks of pronunciation, and partly serve the purpose of musical notes, marking the intonations of the chant; 3, the emendations and corrections which the Talmudists had adopted. These they mark on the margin by a peculiar device, which leaves the consonants as they were, but suggests those which should be read. Here, again, the superstitious reverence of the rabbis for the text served the purpose of a true biblical science, since their proposed amendments are still open to criticism and review. It is difficult to pass a summary judgment on their emendations, but perhaps in a majority of cases modern scholars retain the original reading and reject the Massorah.

The work of the Massoretes did not begin before the sixth century, and it was finished before 1106, the date of the oldest manuscript now known to exist. This manuscript presents the Massoretic text. The work certainly covered a long period, and was done by many different hands. It was not possible, even with the minute and stringent rules which were adopted, to prevent errors in copying, and our manuscripts, all of which belong to the period between 1106 and 1488, offer many variants. The Jews continued to use in the synagogues copies of the Scriptures containing only the consonant text.

IV. *After the art of printing* was invented some books of the Old Testament were printed separately. In 1488 the first edition of the whole Hebrew Bible was printed at Soncino. The second, based on the first, was published at Brescia in 1494. This was the one used by Luther. An independent version appeared in the Complutensian Polyglot, 1517. A collection of variants was made from 615 manuscripts by Kennicott, Oxford, 1780, and a better one by De Rossi, 1788. The Hebrew Bibles in use are scarcely more than reproductions of the two first printed editions. They possess some critical advantages, but generally the excellence of a subsequent edition over the former consists in typographical accuracy and neatness. A satisfactory critical edition, with a full account taken of the variants, is yet to be prepared.

V. *The Old Testament in the Christian Church.*—The Church of the first and second centuries based the authority and truth of its doctrines on the Old Testament, just as it is used in the New Testament. The Church of the third and fourth centuries wavered between acquiescence in the authority ascribed to the Old Testament by our Lord and his apostles, and hatred and suspicion of all things Jewish. No Christians save converted Jews knew Hebrew, and of these very few were of the class which "knew the Law." No man was converted who brought into the infant Church a knowledge of the Hebrew. The Septuagint Greek version (see below) was the form in which the Christians became acquainted with the Old Testament. The first Christian scholar who undertook to learn Hebrew was Origen (254 A. D.). He prepared a Hexapla, containing the Hebrew and five versions, which unfortunately is lost. We possess, however, his commentaries, which show that he had borrowed from the rabbis their allegorical mystical methods of interpretation. He is counted among the Fathers of the Eastern Church, and is the only biblical scholar of whom that Church can boast.

Jerome (430 A. D.) endeavored to learn Hebrew of a Jew, and did learn as much as his teacher could or would teach him. His method of treating the Old Testament shows the influence of his teacher. Through him the rabbinical ideas of inspiration, etc. found their way into the Western Church. His translation of the Scriptures (see *Vulgate*, in the section below on the *Versions*) was regarded as a finality, and all interest in the original text died out. In 1311, Clement V. ordered that Hebrew should be studied at the universities, but no results followed. Nicholas de Lyra (1340) was a converted Jew. His commentaries carried great authority among Christians, and influenced Luther so much that a popular saying arose: "If Lyra had not played the lyre, Luther would not have danced." The Reformers returned with zeal to the study of the Hebrew. That pursuit participated in the general revival of learning, and in the most recent times it has been wonderfully advanced by the development of philological and historical science. It is probably not too much to say that the Hebrew language is more at the command of this generation than of any other since the Babylonian captivity.

It follows from the above—1, That the only text we can hope to establish on manuscript authority is that of the Massoretes. 2, We have no manuscript, even of this text, older than 1106. We shall see below, under *Versions*, what means we have of learning what the text was at an earlier date.

3, The vowel-points, accents, word, verse, and chapter divisions are all many centuries more recent than the original writings. Even the consonant text has been transliterated. The chapter divisions were made in the thirteenth century, and applied to the Vulgate. In the sixteenth century it was asserted that the vowels, etc. were of later origin than the text. This assertion was considered heterodox, as it was inconsistent with the prevailing theory of inspiration. It is only in the most recent times that this fact has been admitted, and it is now undisputed. 4, The crude and superstitious theories of inspiration which have prevailed to some extent in the Christian Church are of rabbinical manufacture. They were introduced into the Christian Church first as attaching to the Old Testament, and then extended over both in their purest and most original form.

VI. *The Canon and the Apocryphal Books.*—As we said above (A, I.), when the period of creation and production was ended, and the period of conservation and reflection and application began, one of the first ideas which was elaborated from the crude into the dogmatic form was that of the Scriptures in their sacred character and divine authority. Hence the terms Holy Scripture, Word of God, etc. When this doctrine was established, the necessity of defining and limiting its application at once made itself felt. What books come under this designation? What is the standard by which they must be tested in order to answer this question? It is certain that these questions never received any authoritative answer. Ezra made a collection of books, but he did not include those books which were not yet written. The Hebrew Bible as we now possess it is divided into three parts: 1, the Torah (*i. e.*, Law—Pentateuch); 2, the Nebiim (Prophets, including Joshua, Judges, First and Second Samuel, and First and Second Kings); 3, the Chetubim ("Writings," including all the other books in the English Version of the Old Testament). Ezra and Nehemiah probably collected a book. The addition of the third part cannot be historically accounted for. The form of the collection, as a whole, bears witness to successive collections and successive gradations of authority. This gradation may be traced still farther. Besides and beyond the Chetubim were a number of books which were on the line, not accepted and not definitely rejected. Still again, beyond these were others which were positively set aside. The translators of the Septuagint included in their collection a number which do not appear in the Hebrew collection (they form the Apocrypha of the English Bible). The Ethiopic version contains others which belong even to the class of the totally rejected. Thus, one who knew only the Septuagint version would find the book of Exodus and the book of Tobit side by side, presented to him as of equal authority. Ethiopian Christianity would give the same authority to the book of Adam as to the book of Genesis. Thus it is certain that when these versions were made, the strict definition of the books to which standard authority belonged was not yet established. Fürst has even shown from the Talmud (*Kanon des Alten Testament*, s. 25) that this idea of the canon was not so definitely established at the time of our Lord but that the rabbis ventured to propose to exclude the book of Ezekiel from the canon, on account of its contradiction to the Pentateuch. Here, then, we have the idea of the canon. It is the limited collection to which, and to which only, authority as the inspired word of God appertains. The works which were in circulation, and to which this authority was denied, were called apocryphal, from a Greek word meaning "to withdraw," because they were withdrawn from use for public instruction. The third class, the pseudepigraphs, were so called because many of them bore names which were forged. In 2 Maccabees ii. 13 we read: "The same things are narrated in the writings and memoirs of Nehemiah, and how he collected the books about the kings and prophets, and those of David, and the letters of the kings in regard to offerings." The Pentateuch had been restored to authority and use by Ezra in 444 B. C. (Nehemiah viii.). Nehemiah added the "Nebiim," which are distinctly described in this passage ("kings and prophets"), and the Psalms, which are the nucleus of the Chetubim. The "letters" are those of the Persian kings, such as we find in the books of Ezra and Daniel. The subsequent omission of these letters from the canon bears witness to the soundness of the standard by which its formation was governed. The Massoretes were finally called upon to decide what books they would recognize as canonical, but in this, as in other things, they no doubt confined themselves to the establishment of the tradition which they had received. In the Christian Church the influence of the Septuagint secured the introduction of the Apocrypha with full canonical authority. Jerome translated all into the Latin Vulgate. They thus remain in authority in the Greek and Roman churches. Luther adopted the Hebrew canon, but translated the apocryphal books, setting them by themselves, and giving them a heading which recommended them for edification, though not for dogmatic definition. The English translators followed the same policy. Of late, however, the Apocrypha has been omitted from the popular editions of the English Bible, because the presence in the volume of works which formed a grade between it and ordinary works seemed to detract from the supreme and isolated position of Holy Scripture.

The Apocrypha and Pseudepigrapha are both quoted in the New Testament. See Jude 9 ("Translation of Moses"); 14 (Book of Enoch); 1 Corinthians ii. 9 (said by Origen to be from a lost apocryphal writing under the name of Elijah). Compare also James iv. 5, John vii. 38, and Luke xi. 40—citations which we cannot identify with passages in any known book.

It appears from the above—1, That the Canon was fixed only after long experience, and by the general consent of successive generations, who bore testimony, by their esteem and veneration for particular books, to their intrinsic authority and profitableness. 2, There is no broad and distinct line of demarcation between the Canon and the Apocrypha. If we allow ourselves to form estimates of the comparative value of various books, we shall find that the first book of Maccabees compares very favorably, as an edifying religious history, with the book of Esther, and that the book of Jesus the son of Sirach compares favorably with Ecclesiastes as a book of religious instruction.

VII. *The Order of the Books of the Old Testament.*—In the arrangement which has been adopted there appears to have been an effort to conform as far as possible to chronology, not only in regard to the historical, but also the legal and prophetic portions. The following are the principal divisions:

1. Law (in Hebrew, תורה, *Torah;* Gr. νόμος) or Pentateuch (Gr. πεντάτευχος), because it consisted of five parts.
2. Prophets (Heb. נביאים; Gr. Προφῆται).
3. Holy Writings or Hagiog'rapha (Gr. ἁγιόγραφα), called in Heb. כתובים, *Chetubim—i. e.*, the "writings," *par excellence*).

The Law included—1, Genesis, or "origin;" 2, Exodus, or the "going out;" 3, Leviticus, or the book relating to the Levites; 4, Numbers, so called because Moses was commanded to "take the sum of all the congregation of the children of Israel" (Numbers i. 2); 5, Deuteronomy (from the Gr. δεύτερος, "second," and νόμος, "law"), because it was the second laying down (or the repetition) of the Law.

The Prophets were divided into the Former or Earlier (*Priores*), including Joshua, Judges, First and Second Samuel, First and Second Kings; and Later (*Posteriores*), comprising the greater prophets, viz., Isaiah, Jeremiah, and Ezekiel, and the minor prophets, Hosea, Joel, Amos, etc.

The Holy Writings, or Hagiographa, included the Psalms, Proverbs, Job, The Song of Songs, Ruth, Lamentations, Ecclesiastes, Esther, Daniel, Ezra, Nehemiah, First and Second Chronicles. (For a more particular notice of the different books the reader is referred to their respective heads.)

VIII. *Versions of the Old Testament.*—As we saw above, the oldest manuscript of the Hebrew Scriptures which we possess dates from 1106 A. D., and presents the Massoretic text. If we wish to go back of this to reach something nearer to the original work of the authors, and to eliminate errors which may have crept in, we have one means of doing so—viz., the ancient translations which were made from the text at a remote date.

1. The first and most important of these is the Greek version, called *the Septuagint* (LXX.).—Passing over the fables of the Jews and early Christians in regard to this version (such as that it was made on a set occasion by seventy-two men (six from a tribe) chosen by the high priest, and sent to Egypt for the purpose—that they each separately translated the whole, but that, by virtue of divine inspiration, the seventy-two translations were identical), we state only the best-assured facts in regard to it. The Pentateuch was translated by Alexandrian (not Palestinian) Jews, but by how many is unknown. It was a result of the enlightened interest of the Ptolemies (Lagus and Philadelphus) in all literary and scientific progress. It was made in 285 B. C. The work thus begun was carried on by various persons at various times until all the canonical and apocryphal books were translated. Some originally written in Greek were added. The parts vary in fidelity to the original and in literary excellence. Job and Isaiah are so poorly translated that one must know Hebrew to see the sense of the Greek; Ecclesiastes is faithfully and correctly rendered. At this time Greek was the language of popular intercourse. The Jews of the time of Christ neglected the Hebrew, and generally relied on the Septuagint version. It is the form in which the Old Testament is quoted by Mark, Luke, Peter, and, for the most part, by Paul. Matthew, John, and Paul show acquaintance with the Hebrew, but they also use the Septuagint. Its influence was at this time para-

mount. It passed into the Christian Church as *the* authoritative form of the Old Testament. It soon began to be asserted, however, by the Jews, when the Septuagint was quoted in controversy by the Christians, that it was not a faithful rendering of the original. Hence the Jews abandoned it and returned to the Hebrew, and the most scholarly of the Christians attempted to acquire that language. Nevertheless, the Septuagint remains the authority of the Greek Church to this day. Other Greek versions, which need only be mentioned, are those of Aquila, Theodotion, and Symmachus.

2. *The Peshito* is a Syriac version, whose name signifies "simple" or "faithful," because it is a literal translation, not a paraphrase. It includes the New Testament. Its origin is obscure. It was in use in the time of Ephraim Syrus (378 A. D.).

3. *The Vulgate.*—Augustine says ("De Doctr. Chris." ii. 11), in regard to the early Latin versions, that "in the first days of the faith, if any one obtained a copy of the Greek Scriptures, and gave himself credit for any knowledge of the two languages, he ventured to translate." He recommends only one of the versions existing at the time—viz., the Itala. This is now lost, but seems to have been made from the Septuagint. Jerome (430 A. D.) undertook to learn Hebrew, in order to make a new translation from the original. History repeats itself with regard to all new translations of the Bible. This one was made avowedly in order to meet the wants of the common people, and it was called the "Vulgate" because written in the popular Latin. It was met by the most violent opposition, by all the arguments of tradition and prescription, and by all the considerations of policy and expediency, which suggest themselves in such a case. It was finally adopted, and now it has itself become sacred in the Latin Church. The text of the Vulgate became so corrupt by repeated copyings that, on the invention of printing, the true text seemed lost in a chaos of variants. An attempt to revise it resulted in an arbitrary decree of Sixtus V. (1598), deciding what it should be, and this text is now the "received text" in the Roman Church. A text having critical and scientific authority is still a desideratum.

B. *The New Testament.*—With the advent of our Lord the fountain of divine revelation once more began to flow. Mankind once more received an original and creative revelation, not whimsical traditions or weary reflections on the record of past thought and life. The Greek language, which, as we saw above, was at this time the medium of popular intercourse, became the vehicle of the new revelation. The Gospel of Matthew was probably originally written in Aramaic, but the remainder of the New Testament was certainly Greek from the very hands of the authors.

I. *History of the Greek Text.*—The original handiwork of the writers soon perished. We have no record or tradition of the original manuscripts, and no tradition to bear witness to any care for them. Copies were made from them, and by the middle of the second century the interest in them had become so great as to lead to extensive multiplication of copies. The oldest manuscripts which we possess date from the fourth century. (See article on the Codices of the New Testament.) From that time on, the number of manuscripts which we possess increases as we come down, but as the copies increase in number, so also do the variants. When printing was invented one of the first uses to which it was put was the printing of the Greek Testament. This art gave ground to hope that the text-copies might be multiplied for the future without the errors inseparable from manual copying. The first printed text was contained in the Complutensian Polyglot, prepared under the patronage of Cardinal Ximenes, at Alcalá (the ancient Complutum), in Spain, in 1514. It is not known what manuscript served as copy for this edition. Erasmus prepared a very faulty text, published at Bâle in 1516. These two editions from manuscripts taken at hazard, no doubt fresh ones, served as the basis of succeeding ones (Stephanus, Paris, 1546; Beza, 1565; Elzevir, 1641). The last of these (chiefly on account of its convenience of form and typographical beauty) became the "received text." The doubt between various authorities was settled in this case, as in so many others, not by thoroughly investigating the matter, but by giving arbitrary sanction to one. The Elzevir remained supreme until the time of Griesbach (1812). Here again we come to a department in which the credit for what has been done belongs entirely to German scholars. Griesbach, and after him Lachmann (1851), and at present Tischendorf, have prosecuted the tedious labor of comparing the variants and weighing the authorities. The effort cannot be defined as one to re-establish the text of the apostles, for that may be pronounced hopeless, but to recover the text to which the oldest and best manuscripts bear witness. The three scholars mentioned form a succession in which this aim has been prosecuted with intelligence and zeal and consistency. Some other editions, based on limited authorities and imperfect grasp of the task and its method, have only confused the labor (Bloomfield, Wordsworth, Alford).

The dialect of Greek in which the New Testament is written is what is called the Hellenistic. This was not a good dialect in point of grammatical accuracy, etc., and the influence of the Septuagint makes the New Testament even a sad specimen of it. This assertion was made in the sixteenth century, and it was generally declared that the New Testament was written in "bad Greek." Such an assertion was considered, in some quarters, derogatory to the Bible, and a controversy arose as to whether the New Testament was good Greek or bad. It ended in the general and very sensible conclusion that any dialect is "good" as soon as it contains a literature of any value. Nevertheless, the lack of grammatical accuracy, of precision in the use of words and particles, and of adherence to the rules of style, adds greatly to the difficulty of interpreting the New Testament.

The order of the books in the Greek differs from that in the English Version, in that the catholic Epistles follow the Acts.

II. *Respecting the Separate Books of the New Testament.*—The following account includes such facts as can be relied on, omitting questions which are involved in controversy.

The Gospels.—We possess a fourfold record of the life and teachings of our Lord. It strikes the attention of the reader at once, that the first three contain many passages which are almost identical. On the other hand, each differs from each in a manner equally remarkable. From the earliest times efforts have been made, without much success, to harmonize them into one consistent narrative. Within a century these phenomena have again been examined with great zeal. The question is raised: Do not these resemblances point to an interdependence between the synoptical Gospels? If so, which is the original? If one served as the original, how is it that the authors of the others, in using it, failed to transfer passages of high interest? In fact, the phenomena of identity and difference are so perplexing that these questions seem unsolvable. The prevailing opinion of scholars at the present time appears to be that the Gospel of Mark presents the nearest approach to the original of the synoptical Gospels; that Matthew was originally written in Aramaic, and translated with the assistance of Mark. That Luke is a subsequent compilation of the gospel-material is certain. It was written about the year 70. Before the historic interest in the Gospels arose, and before the movement towards a New Testament canon began, the Gospels no doubt exerted great influence on each other. Passages appear to have been copied from one into another, either inadvertently or at the pleasure or will of the copyist, and hence our science is baffled when it attempts to trace the intricacies of the movement.

The Gospel of John is clearly independent of the others in its material, scope, and purpose. It takes up the life of our Lord not so much pragmatically as philosophically and mystically—in its religious rather than its historical aspect. It has been vigorously attacked by the negative and rationalistic school of critics, and is held by many of them to be falsely attributed to John, but to date from the latter half of the second century. These opinions, however, rest chiefly on philosophical and historical dogmas which are set up as postulates; and one who refuses to admit the necessary *a priori* truth of these postulates, finds that the true critical grounds on which this opinion rests are meagre and insufficient. Conservative scholars of every grade admit the authenticity of the book, and even many who doubt if John were the author, admit its evangelical authority.

III. *The Canon.*—The first century of the Christian era produced a large number of literary works beyond those contained in the New Testament. The idea of the canon therefore came to be applied here once more (see above, *Canon of the Old Testament*). Such of these works as were of genuine apostolic origin, or were faithful representatives of Christian truth, must be separated and recognized apart from all others. Here once more the same phenomenon appeared as in the Old Testament. There was no distinct dividing line to be drawn. The division did not make or suggest itself. The whole body of works might be graded from the Gospel of Matthew down to the most gross and contemptible product of superstition, but the stages were gradual all the way. Different persons differed in their comparative estimate of two (*e. g.*, the Epistle of Barnabas and the Epistle of Jude, the Shepherd of Hermas and the Epistle to the Hebrews), though they agreed in the general range of estimate. Down to the middle of the second century the Christians used the Old Testament for their apologetics and their polemics. Moreover, the tradition was still so fresh that literary authority was not needed. We do not find in any writers earlier than Irenæus (202) references to the New Testament writings as authoritative, or as inspired in any such sense as the Old Testament was believed to be inspired. From this time on, the chief interest of the Christian Church is rapidly transferred to the New Testament. The books are collected and studied and compared. Their respective authority is determined. The informal verdict of the Church accepted certain books and rejected others, but there were a number which were on the line or in doubt. These were the Epistle of Jude, the Second of Peter, the Second and Third of John, the Epistle to the Hebrews, the Shepherd of Hermas, and the Epistle of Barnabas. In the third century considerable disfavor to the book of Revelation was manifested in the Western Church, though earlier it had been very popular. To go into details of various authorities would lead us too far. Eusebius (340 A. D.) bears witness that the matter stood, in his time, in just about the position above described. 'Not only the above-mentioned doubtful books, but others also which had become familiar and gained a footing in popular affection, were retained, as the Apocrypha is still sometimes retained in our Bibles. The Synod of Laodicea (360) made the first official list (omitting the Apocalypse), and forbade the public reading of uncanonical books. Pope Innocent I. (405) fixed the canon by decree as it now stands.

IV. *Modern Translations of the Bible.*—1. *German.* In the fifteenth century numerous attempts were made to translate the Bible into German, but it remained for Luther to present the German people with a national version. His safety-imprisonment in the Wartburg gave him an opportunity. He there translated the New Testament (published in 1522). He then undertook, with others, the task of translating the Old Testament, and if he had no other claim to rank among the Fathers of the Christian Church, without regard to time or country, this work would establish it. He had all the enlightened zeal for the popularization of the Bible which animated Jerome (see under *Vulgate*), though he resembled him in nothing else. He had to make his own tools for the work, for he and his age inherited no science and little knowledge from the scholasticism of the Middle Ages. Heine's saying of him and his critics still remains true, that many a dwarf has sneered at the giant for not being able to see as far as himself after climbing upon his shoulders.

2. *French.* A French version by Le Fevre was published first in parts, then as a whole, at Antwerp in 1530. Another by Olivetan, improved by Calvin, was published in Switzerland in 1536. Neither, and no other, has ever won the position of a national version in France.

3. *English.* John Wickliffe (1384) made the first translation into the English language. He translated literally from the Vulgate. His work in this respect, as in others, was a pioneer of the Reformation. William Tyndale is the true father of the English national version, founded on the original languages. He conceived and undertook the work when he risked his life if a proof-sheet of it were found on him, and his work was the basis of all subsequent ones. He published the New Testament (from Erasmus's text—see above, *History of the Greek Text*) at Wittenberg in 1526. He and Coverdale commenced to translate the Old Testament at Antwerp, but they were discovered; Tyndale was captured, and burnt near Brussels in 1536. His merits, obscured by those who afterwards used his work when it was safe and popular to do so, have never met with the recognition they deserved. Coverdale finished the translation of the Old Testament in 1535. "Matthew's Bible" (1537) was approved by royal authority. It contained notes. A new edition (1539)—the "Great Bible"—and another in 1540 with Cranmer's preface—"Cranmer's Bible"—which omitted the notes, supplanted the former. The "Geneva Bible" followed in 1560, with Calvinistic notes. This won great popularity. Archbishop Parker went back to the "Great Bible," and appointed a commission (mostly bishops) to revise it. This produced the "Bishops' Bible" (1568). It also had explanatory notes. It was the "Authorized Version," and was read in the churches. It represented the Church party, while the Geneva Bible retained its place amongst the Puritans, and, in fact, with the popular majority. In 1610 the Roman Catholics also produced a representative version, translated strictly and solely from the Vulgate, and known as the "Douay Bible." In 1604, at the "Hampton Court Conference," it was proposed to supersede the two Protestant versions by a new one satisfactory to both parties. James I. appointed a commission of fifty-four learned men of all parties to do the work, and fixed the rules under which they were to act. The "Bishops' Bible" was to be made the basis, and only altered where necessary. This version was published in 1611, and it gradually displaced the others by virtue of its intrinsic merits. Under the Commonwealth the question of a new version was raised, but the committee of Parliament reported that the English version was "the best in the world." It certainly is one of the very best modern national versions. In 1870 the Convocation of Canterbury proposed a revision, now finished. The revised New Testament was published in 1881, and the revised Old Testament in 1885.

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Bib'lia Pau'perum [a Latin term signifying "the Bible of the poor"]. The work known to bibliographers under this name is one of the earliest "block books" printed before the use of movable type. The printing has been attributed to Lawrence Coster of Haarlem, and was probably printed somewhere between 1410 and 1420. The work consists of a series of cuts illustrating the history of our Lord, as set forth in the New Testament and as predicted in the Old. The descriptive text is in the abbreviated Latin of the time. It has different titles, but Heineken gave it the name which he found attached to a copy which he described. It would seem ill adapted to the wants of the ignorant laity of that time, when few among them were equal to the task of deciphering the letter-press, and without this the engravings would have been meaningless. There seems good reason for the opinion of Jackson and Chatto (*History of Wood-Engraving*), that the work was prepared to aid the mendicant friars of the time in their preaching—the text forming the topic for their sermons, and the pictures an excitement for their imaginations.

Bib'lical Archæol'ogy, the science which treats of those things which illustrate the public and private life of the people and places mentioned in the Bible. Our knowledge of these subjects is obtained from the ancient literature both of the Jews and Gentiles, and from the monumental and other remains of ancient nations, such as inscriptions, ruins, coins, etc. The principal literary sources of archæological knowledge of this kind are the Bible, Josephus, Philo, the rabbinical and Arabian writers, Herodotus, and a great number of modern works of travel and literary research. The monumental sources of knowledge may not improperly include the interesting literary and other remains of ancient Egypt, the coins of the Phœnicians, of the Maccabees, and of the Syrians, the cuneiform inscriptions of Babylon, Assyria, and Persia, the Moabite Stone, and the remains of the ancient cities of Palestine and the neighboring countries. The archæology of the early Christian Church receives light also from the writings of the Fathers, from the later classical authors, and from the catacombs of Rome.

Among the immense numbers of treatises upon this subject we may mention Jahn's "Biblical Archæology" (1796–1805); Robinson's "Researches" (1856); Rheinwald's "Kirchliche Archaeologie" (1830); Kitto's "Cyclopædia" (1845–50); Michælis's "Mosaisches Recht" (1770; 2d ed. 1775); Saalschütz, "Das Mosaische Recht" (1846–48).

Bibliog'raphy [from the Gr. βιβλίον, a "book," and γράφω, to "write"], that science which has for its object the knowledge and description of the literary productions of all ages and races. It is one of the most important auxiliaries in studying the history of science and art. Distinction is often made between pure and applied bibliography. The former considers the books by themselves, and aims merely to show what has been written, while the latter considers the books according to their character and contents. Bibliography is also useful as facilitating the buying and selling of books, while classified catalogues are often valuable to the student of special subjects. Almost every nation, as well as every science, has its own bibliography, and there are also separate lists of scarce and peculiar books, valuable to bibliomaniacs. The German books published since 1700 are given in the "Allgemeine Bücherlexicon" of Heinsius in alphabetical order (vol. i.–xvi., 1812–69). Ersch gave a list of those published since 1750 in his handbook of German literature (1845–49). In Leipsic a trade catalogue is published semi-annually, as well as Hinrich's "Verzeichniss" and the monthly "Allgemeine Bibliographie" of Brockhaus, comprising the most important works of every nation. The French literature has been catalogued since 1811 in the "Bibliographie de la France;" the Dutch in the "Nederlandsche Bibliographie" since 1854; the Belgian in the "Bibliographie de la Belgique" since 1838; the English in the "Publishers' Circular" since 1838; the Italian in the "Bibliographia italiana" since 1861; the Spanish in the "Boletin bibliografico español" since 1860. Danish, Swedish, Hebrew, Greek, and Polish catalogues are also annually published; while the Russian literature is given in the monthly magazine "Russkaja Bibliografija." The new books published in the U. S. are given in the "Publishers' Weekly," New York. Trübner's "American and Oriental Literary Record" (London, monthly since 1865) gives a list of the most important works published in America, China, and India. (For the earlier literature of all nations see EBERT, "Allgemeines bibliographisches Lexicon," 2 vols., 1821–50.)

The oldest known work with this title is De Bure's "Bibliographie Instructive" (1763–68), but there were older and very valuable bibliographies, such, for example, as Conrad Gesner's "Bibliotheca Universalis" (1545). The works of Robert Watt, Dibdin, Horne, and Lowndes in Great Britain, of Peignot, Brunet, Bourquelot, Louandre, and Quérard in France, of Gambia in Italy, of Foppens in Belgium, of Nyerup and Kraft in Denmark, and of Hain and Panzer in Germany, are all of value to the student of general literature. The American works of Allibone, Duyckinck, Rich, Bartlett, and Sabin also deserve mention.

REVISED BY C. W. GREENE.

Bib'liomancy [Gr. *βιβλία*, the "Bible," and *μαντεία*, "divination"], a mode of divination used in both ancient and modern times, by opening the Bible and observing the first passage which occurred, or by entering a church and taking note of the first words of the Bible heard after entering. It seems to have originated with the Jews, and to have been adopted from them by the Eastern Christians. The application either depended upon the sound of the words or upon the signification of the passage. Prayer and fasting were used as a preparation for consulting the divine oracles. Bibliomancy was prohibited, under pain of excommunication, by the Council of Vannes, 465 A. D. It continued, however, to prevail for many centuries thereafter. It came into use in the Roman Catholic Church in the choice of bishops, and prevailed in some places for centuries. Many eminent Protestant Christians have made use of this practice in times of perplexity, as Bunyan and John Wesley.

Biblioma'nia [from the Gr. *βιβλίον*, a "book," and *μανία*, "madness"], a taste for collecting books, not for their intrinsic value, but for their age or rarity, or on account of their publisher's, printer's, or binder's fame, or even, in some instances, for the mere caprice of fashion. For example, a few years since the works of some of the Elzevirs brought fabulous prices, while at present they are sold at a comparatively low rate. First editions usually bring high prices. The works of such ancient printers as Caxton must always be sold high on account of their age; so also the books of Aldus Manutius, joining great textual beauty and accuracy to extreme age; while the productions of much later date are often sought for their beauty alone; such, for instance, are the works of Foulis and Baskerville, printers of the last century.

Bibliothe'ca [from the Gr. *βιβλίον*, a "book," and *θήκη*, a "case"], the Latin word signifying library, a collection of books; often used, like our word "library," as a name for publications of various kinds, as "Bibliotheca Hispana," "Bibliotheca Sacra," etc.

Bice [Ger. *Beis*, possibly from a root cognate with the Sanscrit *bisha* or *bisa*, "poison"], the name of two blue and green pigments which are native carbonates of copper, and have been used by painters from very early times. The blue bice is sometimes called mountain blue and ongaro. The synonyms of green bice are Hungarian green, verdetto, malachite green, mountain green, etc.

Bi'ceps [from the Lat. *bis*, "twice" or "two," and *ca'put*, a "head"], ("double headed"), is the large round muscle lying upon the front of the arm. Above, it consists of two portions or heads—whence its name—one being attached to the coracoid process of the scapula, the other to the margin of the shallow socket of the head of the humerus. The former is the short, the latter the long, head of the biceps. They unite to form a fleshy belly, which terminates in a rounded tendon inserted into the tubercle of the radius. The action of the biceps is to bend the fore arm. Another biceps is found on the outer and posterior aspect of the thigh. Its long head arises from the tuberosity of the ischium; its short head, from the *linea aspera* of the thigh-bone. Its tendon is the outer hamstring.

Bicêtre,* the name of an old castle, a hospital, and a fort in the department of Seine, in the southern environs of Paris. The castle, which is very large, has been converted into a hospital for old men and for lunatics. Here the prisoners sentenced to death or to the galleys were formerly kept until the sentence was executed. But in 1837 this prison was transferred to La Roquette. Situated on an eminence, it commands a fine view of Paris and the Seine. Here are accommodations for about 900 male lunatics, who receive gentle treatment.

Bichat (MARIE FRANÇOIS XAVIER), an illustrious French anatomist and physiologist, born at Thoirette, in Jura, Nov. 11, 1771. In 1797 he began to lecture on anatomy, surgery, etc. in Paris. He published "Researches on Life and Death" (1800), and an excellent and profound work entitled "General Anatomy applied to Physiology and Medicine" (4 vols., 1801). He simplified anatomy and physiology by reducing the complex structures of the organs to the simple or elementary tissues, and he was the first who recognized the importance of the distinction between the organic functions and the animal or vital functions. Having impaired his health by close application, he died before the age of thirty-one, July 22, 1802.

Bickanir', a native state of India, under British protection, situated between lat. 27° 30' and 29° 55' N., and between lon. 72° 30' and 75° 40' E. Area, 17,750 square miles. The soil is poor, consisting almost entirely of deserts. The inhabitants are mostly Rajpoots. Pop. 539,520.

Bickanir, a fortified town, capital of the above state, is in an arid and desolate tract 240 miles W. S. W. of Delhi; lat. 28° N., lon. 73° 22' E. It is surrounded by a battlemented wall three and a half miles in circuit, and has a citadel, several temples, and lofty buildings, but the streets are dirty and most of the houses mean. Pop. estimated at 60,000.

Bick'erstaff (ISAAC), an Irish dramatist, born about 1735, was in his early life an officer of marines. He produced several popular comedies and comic operas, among which are "The Maid of the Mill," "The Padlock," "Love in a Village" (1763), and "The Captive." Died after 1787. Steele's "Tatler" was published under the assumed name of Isaac Bickerstaff, which often occurs in the papers of that work.

Bick'ersteth (EDWARD), an English theologian, born in Westmoreland in 1786. He took orders in the Anglican Church, and was sent by the Missionary Society to Africa in 1816 to reorganize their mission stations. On his return he was chosen secretary to that society. He became rector of Watton, in Hertfordshire, in 1830, and was one of the founders of the Evangelical Alliance. Among his works, which are highly esteemed, are a "Help to the Study of the Scriptures" (1814), "The Christian Student," "A Treatise on Baptism," and "The Promised Glory of the Church of Christ." Died in 1850. His collected works were published in 16 vols., 1853. (See T. R. BIRKS, "Memoir of the Rev. E. Bickersteth," 2 vols., 1851.)

Bickersteth (EDWARD HENRY), a poet and clergyman of the Church of England, son of the above, was born Jan. 25, 1825, and was educated at Cambridge. He has published, besides numerous other works, "Poems" (1849), "The Rock of Ages" (1859), and "Yesterday, To-day, and For Ever" (1866), which has had a great success. His poetry, chiefly upon sacred themes, has many admirers.

Bick'more (ALBERT SMITH), PH. D., naturalist, was born in St. George's, Me., Mar. 1, 1839, and graduated at Dartmouth in 1860. He studied under Agassiz at Cambridge, and in 1865 sailed for the Dutch East Indies for the purpose of collecting shells. He also travelled in China, Japan, Manchooria, Siberia, and Russia. He became in 1870 professor of natural history in Madison University, and has devoted much time to the Museum of Natural History founded by him at the Central Park, N. Y., and of which he is superintendent. He has published "Travels in the East Indian Archipelago" (1869).

Bi'cycle, a conveyance with only two wheels, which is propelled by the rider's feet acting on pedals attached to the larger wheel, which is placed in front; the other wheel is much smaller. The rider sits on a saddle-shaped seat over the front wheel, a little behind a perpendicular line from its centre. The bicycle is made of steel with a rubber tire, and is very light and easily portable. It was perfected in England. It is extensively used, and long journeys have been very rapidly made on it.

Bidasso'a, a small river forming part of the boundary between France and Spain. It rises in Spain, and enters the Bay of Biscay at Fuentarabia. On the Isle of Pheasants, in this river, the treaty of the Pyrenees was concluded in 1659. In Aug., 1813, Wellington defeated the French marshal Soult at San Marcial on the Bidassoa.

Bid'deford, a city and R. R. centre, York co., Me. (see map of Maine, ref. 11–A, for location of county), on Saco River, 9 miles from its mouth. It was named from city of Bideford, England. The first settlement was made at the "Pool" (at the mouth of the river) by Richard Vines, in 1616–17. It was settled by a patent to John Oldham and Vines in 1630. York county originally embraced all of the province of Maine, and while settlements were made at a very early date along the seacoast (none earlier than this) to the Piscataqua River, Bideford or Biddeford for a long series of years was the chief settlement and centre. Here are inexhaustible ledges of granite, which ranks among the best in the world, and is largely exported. The business of the place is principally the manufacturing of cotton cloth. A large amount of lumber is also manufactured. Pop. in 1870, 10,282; in 1880, 12,651.

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*This name is said to be a corruption of *Winchester*. Its castle was founded in 1290 by John, bishop of Winchester.

Bid'dle (Charles John), a son of Nicholas Biddle, was born in Philadelphia in 1819, and graduated at Princeton in 1837. He became a lawyer, served with distinction in the Mexican war, winning a major's brevet, and served also in the late civil war; became editor of the "Age," a leading Democratic journal of Philadelphia, which he conducted with great ability. He published a masterly vindication of Washington's conduct with regard to the execution of André. Died Sept. 28, 1873.

Biddle (Clement), an American officer and merchant, born in Philadelphia May 10, 1740. He was appointed deputy quartermaster-general of the militia of Pennsylvania and New Jersey, fought with the rank of colonel at the battles of Trenton, Princeton, Brandywine, and Monmouth, and quitted the army in 1780; became quartermaster-general of the State Sept. 11, 1781. He was a friend and correspondent of Gen. Washington, who appointed him marshal of Pennsylvania. Died July 14, 1814.

Biddle (Clement Cornell), a lawyer, a son of the preceding, was born in Philadelphia in 1784. He served as colonel in the war against the British, 1812–15, and afterwards applied himself to political economy. He produced in 1821 a translation of J. B. Say's "Treatise on Political Economy," with notes. Died in 1855.

Biddle (Edward), brother of the American naval officer Nicholas Biddle, was born in 1739, was an officer in the French war (1756–63), and became a noted lawyer of Reading, Pa.; was member and speaker of the Assembly, and was a delegate from Pennsylvania to the Continental Congress 1774–76 and 1778–79. He was a leading advocate of independence. Died Sept. 5, 1779.

Biddle (James), a naval officer, born in Philadelphia Feb. 28, 1783, educated at the University of Pennsylvania, and entered the navy in 1800. He served against Tripoli, where he was a prisoner nineteen months. In the war of 1812 he served with distinction in several engagements, and while commanding the Hornet captured the brig Penguin, receiving a wound in the action (Mar. 23, 1815). For his services he received a gold medal from Congress, besides other honors. He became a captain in 1815. He was afterwards commissioner to Turkey, China, etc., and held other important positions. Died Oct. 1, 1848.

Biddle (John), the founder of English Unitarianism, was born at Wotton-under-Edge, in Gloucestershire, in 1615, and graduated at Oxford. He was prosecuted about 1645 for the expression of heterodox opinions respecting the personality of the Holy Spirit, and after a formal trial by Parliament was condemned to imprisonment for five years. While in prison he published in 1648 a "Confession of Faith concerning the Holy Trinity." He was liberated about 1650, after the death of Charles I., and gathered a congregation of his fellow-believers. He was subsequently persecuted and imprisoned twice during the Commonwealth. It is stated that Cromwell once banished him in order to save his life. He died in prison Sept. 22, 1662. (See J. Toulmin, "Life of John Biddle," 1815.)

Biddle (John). See Appendix.

Biddle (Nicholas), a American naval officer, born in Philadelphia Sept. 10, 1750. He entered the royal navy in 1770, and once served in a ship of which the famous Nelson was mate. He obtained the rank of captain in the U. S. navy in 1776, and took several prizes from the British. Early in 1777 he took command of the Randolph, a frigate, which encountered the Yarmouth, a 64-gun ship, Mar. 7, 1778. During the action that ensued the magazine of the Randolph exploded and killed Captain Biddle, with nearly all his crew.

Biddle (Nicholas), LL.D., an American financier, a nephew of the preceding, was born in Philadelphia Jan. 8, 1786. He was a son of Charles Biddle, who was vice-president of Pennsylvania in 1786–87. He graduated at Princeton in 1801, was elected to the legislature of Pennsylvania in 1810, and appointed a director of the U. S. Bank by President Monroe in 1819. In 1823 he became president of that bank, the affairs of which he managed with great ability and success for many years, so that it supplied the country with a sound and uniform currency. The bill to recharter the bank having been vetoed by President Jackson in 1832, the bank was closed in 1836 by the limitation of its charter. He was soon elected president of a new State bank, called "The United States Bank," which was chartered by the legislature of Pennsylvania. This bank became insolvent in the financial crisis of 1841. He was president of the trustees of the fund ($2,000,000) which Stephen Girard left to found a college for orphans. "To his exertions alone," says Judge R. T. Conrad, "the country owes one of the most beautiful structures of modern times, the Girard College. He proposed the present plan, and in the midst of wild political excitement and opposition persisted firmly, and secured a building which every citizen now not only approves, but applauds." Died Feb. 27, 1844. (See a "Memoir of N. Biddle," by R. T. Conrad, in the "National Portrait Gallery," vol. iv., 1839.)

Biddle (Richard), a lawyer and writer, a brother of the preceding, was born in Philadelphia Mar. 25, 1796. He practised law at Pittsburg, was a member of Congress (1837–41), and wrote a "Memoir of Sebastian Cabot, with a Review of the History of Maritime Discovery" (1831). Died July 7, 1847.

Bid'eford, a seaport-town of England, in Devonshire, on the river Torridge, 1½ miles from its entrance into the estuary of the Taw, 30 miles N. W. of Exeter. It has a stone bridge of twenty-four arches, about 680 feet long, a town-hall, a hospital, and manufactures of ropes, sails, earthenware, and leather. Among the articles of export are linen and woollen goods, iron, sails, and naval stores. vessels of 500 tons can come up to the centre of the town. It had a great trade in the sixteenth and seventeenth centuries. Pop. in 1881, 6512.

Bidsch'ow, or **Bydcow,** New, a town of Bohemia, is 41 miles E. N. E. of Prague. Pop. in 1880, 6747.

Bidwell (Daniel D.), an American general of volunteers, born at Black Rock, now part of Buffalo, N. Y., Aug. 12, 1816. He held various important local offices, and was actively identified with the militia organizations of the city for many years. On the outbreak of the civil war he enlisted as a private soldier, and was promoted to be captain in the Sixty-fifth, and subsequently colonel of the Forty-ninth, New York volunteers. He was engaged in the various actions of the Peninsula campaign, in the battles of South Mountain and Antietam, Fredericksburg, and Chancellorsville, and before Richmond and Petersburg, being most of the time in command of a brigade. In July, 1864, he was commissioned a brigadier-general of volunteers, and assigned to a command under Gen. Sheridan in the Shenandoah Valley, participating in the engagements of that campaign, including the battle of Cedar Creek, Oct. 19, 1864, where he was mortally wounded while gallantly leading his brigade.

G. C. Simmons.

Biebrich Scarlet. See Azo-Colors.

Bie'dermann (Alois Emanuel), a German rationalistic theologian, was born Mar. 2, 1819. He wrote "Die Freie Theologie" (1844), founded the "Kirche der Gegenwart," 1845, and published in 1869 his "Christliche Dogmatik," one of the most important emanations of recent rationalistic theology.

Biedermann (Friedrich Karl), a German journalist and author, born at Leipzic Sept. 25, 1812, made his studies in the university of his native city, and was appointed professor of philosophy there in 1838. On account of his advanced political ideas and the freedom with which he propagated them, he was discharged in 1845. In 1848, however, circumstances changed, and the prominent part he played in the Parliament of Frankfort caused him to be restored to his chair. Nevertheless, in 1853, the victory of the reaction enabled the government to discharge him again, and to keep him in prison for some time. He was a member of the Saxon Diet and of the imperial Diet, 1871–73. From 1863–66 he edited the "Deutsche allgemeine Zeitung;" he has also founded and edited several other liberal papers. Among his works are "Wissenschaft und Universität" (Leipzig, 1838), "Die Deutsche Philosophie von Kant bis auf unsere Tage" (1842–43, 2 vols.), "Vorlesungen über Socialismus und sociale Fragen" (Leipzig, 1847), "Erinnerungen aus der Paul's Kirche" (Leipzig, 1849), etc.

Bièfve (Édouard de), a Flemish historical painter, born in 1808, studied in Paris with Von Paelink, and lives at Brussels. His chief work is "Compromise of the Burgundian Nobles."

Biel (Gabriel), "the last of the Schoolmen," was born at Spire, in Germany, after 1442, was professor at Tübingen from the establishment of the university there in 1477, and died in 1495. Although a devout and earnest Catholic, he sided with the Council of Bâle against the pope, and deplored the corruptions and abuses of his time. Indeed, the singular openness and unconcern with which he showed his sympathies and antipathies gave him the surname Papista Antipapista. He was a follower of William of Occam, and his great work "Collectorium super libros Sententiarum G. Occami" (1508) is an elaborate and complete representation of the system of Occam. Though it was written from a nominalist point of view, there goes through the whole work a tendency of circumscribing the realm of reason and extending the domain of faith which was not altogether without influence on Luther and Melanchthon.

Biel. See Bienne.

Biela, von (Wilhelm), Baron, a German astronomer, born at Rosla, in Prussia, in 1782, discovered in 1826 the comet noticed below. Died in 1856.

Biela's Comet, a comet of short period (6⅔ years), discovered by Baron von Biela in 1826. It was observed apparently unchanged at various returns, but at its return in 1845–46 it was found to have separated into two parts, both of which were observed in 1852. It was due in 1865, and again in 1872, but no trace of it could be found; in Nov. of the latter year the earth crossed its path, and a shower of meteors was observed, which is now supposed to have been due to fragments of the lost comet.

W. G. Peck.

Bielau, or **Langen Bielau,** a village of Prussia, in the province of Silesia, extends for more than four miles along the banks of the Biela, and is noted for its numerous and extensive industrial establishments, in which bleaching, dyeing, printing, tile-making, sugar-refining, etc. are carried on. The cotton manufactories alone employ about 2000 looms. Pop. about 13,000.

Bielaya Tzerkow, a village of Russia, in the government of Kieff, one of the principal commercial centres of the government. It has eleven annual fairs, three of which last for ten days. Great quantities of grain and cattle are disposed of by these fairs. Pop. about 12,000, of whom more than one-half are Jews.

Bielef', an old town of Russia, in the government of Toola, and on the river Oka, 70 miles S. W. of Toola. It has a large trade, and manufactures of hardware, leather, and soap. Pop. 8640.

Bie'lefeld, a walled town of Prussia, in Westphalia, is finely situated on the Minden and Cologne Railway, 20 miles S. W. of Minden. It has manufactures of woollen stuffs, leather, soap, and meerschaum pipes. Its principal industry, however, is linen-weaving. It is, indeed, the centre of the whole Westphalian linen-trade. The origin of this industry dates back to the thirteenth century, but it was greatly extended during the sixteenth and seventeenth centuries by refugees from Holland. Here is the old castle of Sparrenberg, now used as a prison. Pop. in 1880, 30,679.

Bielgorai, a town of Russian Poland, in the government of Lublin. Pop. 6705.

Bielgorod, a Russian town, in the government of Koorsk, on the Donitz, 80 miles S. of Koursk. Pop. 16,097.

Bie'litz, a town of Australian Silesia, on the river Biela, 48 miles S. W. of Cracow, with which it is connected by rail. It has an active trade in woollen cloths and cassimeres. Here is a castle of Prince Sulkowsky. A bridge across the river connects Bielitz with Bialia, in Galicia. Pop. in 1880, 13,060.

Biel'la, a town of Italy, in the province of Novara, is on the Cervo, 50 miles by rail N. E. of Turin. It has manufactures of paper, hats, and woollen goods. Pop. 14,717.

Bielo'pol, a town of Russia, in the government of Kharkof, on the Vira, 118 miles N. W. of Kharkof. It is on the railway from Orel to Kiev. It has a considerable trade and several distilleries. Pop. 12,256.

Biël-oz'ero ("the White Lake") is situated in the government of Novgorod, Russia, lat. 60° 10' N., lon. 37° 30' E., and is about 25 miles long and 20 miles broad. Its bottom of white clay gives to the water during stormy weather a milky appearance which was doubtless the cause of its name White Lake. It receives many small streams, is of considerable depth, and abounds with fish. It is connected by the Sheksna River with the Volga and united by canals with the Onega, Sukona, and Dwina. The old town of Biël-ozersk, situated on the S. shore of the lake, was formerly the capital of an ancient principality bearing the same name, and has considerable trade in cattle, corn, and pitch, also manufactures of candles. Pop. in 1882, 5982.

Bielshö'hle, a curious cave situated in one of the Hartz Mountains, called Bielstein, on the right bank of the river Bode, in the duchy of Brunswick, Germany. It was discovered in 1762, and in 1768 a passage was found by which it could easily be entered. The entrance is over 100 feet above the bed of the stream, and the cave is about 600 feet deep, with eleven main compartments besides an upper cave. These contain a great many curious arrangements of stalactites and stalagmites. In the eighth division the stalactites have a singular resemblance to a great organ, and in the ninth the stalagmites look like the waves of a sea.

Biëlsk, a town of Russian Poland, in the government of Grodno, is situated on R. R., 25 miles S. of Bialystok. It was until 1795 the capital of a Polish palatinate. Pop. in 1882, 9763.

Bielzy, a town of Russia, in the province of Bessarabia, 145 miles N. W. of Odessa, has several factories. An annual fair is held here. Pop. in 1882, 8871.

Bienne [Ger. *Biel*], a town of Switzerland, in the canton of Berne, at the N. E. extremity of the Lake of Bienne, 13 miles W. S. W. of Soleure. It is beautifully situated at the foot of the Jura, is enclosed by old walls, and is connected by railways with Berne and Lausanne. Here are manufactures of watches, cotton goods, etc. Many Roman coins have been found at Bienne, which is a place of great antiquity. Pop. in 1880, 11,623.

Bienne, Lake of, is in the Swiss canton of Berne. It is 10 miles long, 3 miles wide, and 250 feet deep, is near the base of the Jura Mountains, and has an elevation of 1419 feet above the sea. The Thiele passes through it before joining the Aar. It encloses the island of St. Pierre, which was the residence of J. J. Rousseau in 1765. In digging peat, which is extensively procured from its marshy border, the remains of a prehistoric village of lake-dwellings has been found on the S. E. side of the lake.

Biennial Plants, a term including all plants which live longer than annuals, and not so long as perennials. They grow the first season without flowering, and produce flowers in the second season, at the end of which they die. Such are the turnip, parsnip, beet, and many other plants which are cultivated. Many biennials, if sown early in the spring, will flower in the summer or autumn of that year, and become annuals. In botanical books, biennial plants, are often designated by the symbol of the planet Mars, ♂.

Bienville, de (Jean Baptiste Lemoine), a French officer and pioneer, born in Montreal Feb. 23, 1680, was a brother of Lemoine d'Iberville. He accompanied the latter in an expedition to the mouth of the Mississippi in 1699, and was three times appointed colonial governor of Louisiana. He founded New Orleans in 1718. Died in France in 1768.

Bier'stadt (Albert), an eminent painter, born at Düsseldorf in 1829, was brought to the U. S. by his parents in 1831. He studied at Düsseldorf, visited Rome, and returned to the U. S. in 1857. He took part in General Lander's expedition to the Rocky Mountains in 1858. Among his works are a magnificent "View of the Rocky Mountains—Lander's Peak" (1863), "A Storm in the Rocky Mountains," "The Domes of the Yosemite," "Laramie Peak," "Emigrants crossing the Plains," "Mount Hood," "Mount Whitney," and "Scene near Fort Laramie." In 1871 he was elected a member of the Academy of Fine Arts of St. Petersburg. In 1873 he visited the Pacific coast and painted a series of pictures from that region. In 1882 his house and studio at Irvington, N. Y., were destroyed by fire, but, fortunately, some of his best pictures happened to be on exhibition in New York, and were saved.

Bies-Bosch, a marshy lake of the Netherlands, situated between the provinces of North Brabant and South Holland, and formed in 1421 by an inundation which destroyed 72 villages and 100,000 people. It forms the part of the estuary of the Maas which is called Holland's Dip, and contains a number of islands.

Bi'ga (or **Bi'gæ,** a plural form with the same signification), a term applied by the ancient Romans to a vehicle drawn by two horses abreast; a two-horse chariot used in processions and games. Like the Greek war-chariot, it had two wheels, was low and open behind, and higher and closed in front. Figures of the bigæ are often found upon ancient coins.

Bigamy [Lat. *bigamia*], the offence of contracting a second marriage while a former marriage is still subsisting. The more proper term for this offence is "polygamy." It is governed by statute. It is usual to provide that if a husband or wife shall remain absent for a specified number of years (generally seven) without being heard from or being known to be living, and the other party shall marry again, no crime will be committed, though the absent party be alive. The same rule extends to the case of a party divorced from the bonds of matrimony. The offence, it is generally held, consists in the act of marrying; so that if the parties marry in one State and cohabit in another, the crime is committed solely in the place of the marriage, and can only be prosecuted there; but the State laws differ on this point. In a prosecution for bigamy, an *actual* marriage must be established. Evidence of reputation, or even of cohabitation, will not suffice. It does not follow that proof of a ceremonial marriage is necessary. The laws of the States differ upon that point, some holding that a case of bigamy may be established by proof of consent before witnesses, without any ceremony. Such is the law in New York.

George Chase.

Big Bethel, the name given to the action of June 10, 1861. Gen. Butler, who had taken possession of and fortified Newport News a few days previously, found the Confederates under Gen. Magruder in possession of all the commanding points in his front; he accordingly directed a reconnoissance in force to be made, with the object of surprising and capturing the position called Little Bethel; and to make the expedition more certain of success two regiments, Duryea's Zouaves and the Third New York under Col. Townsend, were to start about midnight of the 9th, and gain the rear of the position to prevent retreat, while a battalion of Vermont troops, Col. Phelps, and a New York regiment, Col. Bendix, were to be ready to attack in front by daybreak of the 10th. Though various precautions had been taken against mistake, the commands of Cols. Bendix and Townsend approaching each other near daybreak, Col. Bendix's command opened fire on the Third New York, killing two men and wounding a considerable number, and throwing the whole command into confusion before the mistake was discovered. The Confederates, being thus notified, retreated to Big Bethel, where they hastily threw up breastworks behind a deep creek. Gen. Pierce, who was in command of the Federal expedition, after being reinforced, and finding Little Bethel deserted, advanced towards Big Bethel, a few miles to the N., where he found a Confederate force, estimated at 1800, under the command of Col. J. B. Magruder, a graduate of West Point, protected by the hastily constructed earthworks. Gen. Pierce ordered an attack, which was continued nearly four hours, during which time the Federal troops were exposed to a deadly fire, while the Confederates were almost entirely protected. Later in the day a more general assault was made, led by Major Theodore Winthrop, in which he was instantly killed while encouraging his men to the assault. Gen. Pierce finally ordered a retreat, which was effected in good order, the Confederates following at some distance with cavalry. Lieut. John T. Greble of the Second U. S. Artillery was killed while covering the defeated troops. The Confederates, fearing reinforcements of the Federals from Fortress Monroe, fell back that night to Yorktown. The Federal loss in killed and wounded was about 100 men; the Confederate loss was said to be only 1 killed and 7 wounded.

Big Black, a river of Mississippi, rises in Choctaw co., flows south-westward, and enters the Mississippi at Grand Gulf. Length, about 200 miles. It is navigable for steamboats for 50 miles. General Grant's army, moving to the siege of Vicksburg, defeated the Confederates on the Big Black, nearly 15 miles E. of that town, May 12, 1863. The morning after the battle of Champion Hills, May 17, 1863, found the Confederate forces under Pemberton strongly posted on both banks of the Big Black River. The works were successfully assaulted, and all the troops on the E. bank, with seventeen pieces of artillery, captured, the remainder of Pemberton's army retreating to the fortifications of Vicksburg.

Big Bone Lick, a salt "lick" or spring in Boone co., Ky. It takes its name from the fossil bones found here of the mastodon and other animals, which are thought to have resorted to this place to "lick" the salt earth, and to have perished in the marshy soil.

Bigelow (Erastus Brigham), LL.D., an eminent inventor, born in West Boylston, Mass., April, 1814. While a mere boy, he invented a loom for suspender-weaving and other machines, and wrote a book on short-hand writing. He subsequently invented looms for counterpanes (1838–40), another for coach-lace, and in 1839 brought out his well-known carpet-loom. He was one of the principal manufacturers of Clinton, Mass. He published "The Tariff Question" (1862) and other works. D. Dec. 6, 1879.

Bigelow (George Tyler), LL.D., was born at Watertown, Mass., Oct. 6, 1810, and graduated at Harvard in 1829. He was a State senator of Massachusetts (1847–48), a justice of the State supreme court (1850–61), and chief-justice (1861–68). D. Apr. 12, 1878.

Bigelow (Jacob), M. D., LL.D., an eminent American physician and botanist, born in Sudbury, Mass., in 1787, graduated at Harvard in 1806. He became professor of materia medica and clinic medicine at Harvard, and president of the Massachusetts Medical Society. He practised medicine in Boston many years, founded the Mount Auburn Cemetery, and laid out the grounds with much taste. Among his works are "American Medical Botany" (3 vols. 8vo, 1817–21), an able "Discourse on Self-limited Diseases" (1835), "Nature in Disease" (1854), and "History of Mount Auburn" (1860). D. Jan. 10, 1879.

Bigelow (John), an author and diplomatist, born in Malden, N. Y., Nov. 25, 1817, graduated at Union College in 1835. He contributed numerous articles to the "Democratic Review," and in 1850 became managing editor of William C. Bryant's journal, the "New York Evening Post." Having visited Jamaica in that year, he published "Jamaica in 1850, or the Effects of Sixteen Years of Freedom on a Slave Colony." He was appointed American consul at Paris in 1861, and minister plenipotentiary at that court in April, 1865. He resigned this position in 1866. He published in Paris "Les États Unis d'Amérique en 1863." He has also edited the "Autobiography of Franklin" (1868), from materials gathered in France. Among his other works are "Some Recollections of Antoine Pierre Berryer" (1869), "France and Hereditary Monarchy" (1871), "The Wit and Wisdom of the Haytians" (1877), and "Molinos the Quietist" (1882). He was editor of the "New York Times" for a short period after the death of Mr. Raymond, in 1869. In 1872 he became a member of the Democratic party, and was secretary of state of New York 1876–78. In 1885 he was appointed assistant treasurer of the U. S. at New York, but declined the office.

Bigelow (Timothy), born in Worcester, Mass., Aug. 12, 1739, was a blacksmith who became a member of the provincial Congress of 1774–75, entered the Revolutionary army as captain of minute-men in 1775, was captured at Quebec, became a colonel of Massachusetts troops, serving at Stillwater, Valley Forge, etc. Died Mar. 31, 1790.

Bigelow (Timothy), a son of Col. Timothy Bigelow, was born in Worcester, Mass., April 30, 1767, graduated at Harvard in 1786, practised law in Groton and Boston, Mass., where he long stood at the head of his profession, performing an immense amount of legal work. He was also long a prominent Federalist leader. Died May 18, 1821.

Big'ger (Samuel), born in Warren co., Ohio, about 1800, was educated at Athens University; studied law at Lebanon, and commenced practice in Indiana; was member of Congress 1834–35, and subsequently judge of the circuit court; elected governor of Indiana for 1840–43 by the Whigs. Died at Fort Wayne, Ind., 1845.

Big Horn, or **Rocky Mountain Sheep** (*Ovis montana*, Cuvier), is regarded by Cuvier as identical with the argali of the Old World. It also resembles the wild sheep (*mouflon*) of the Mediterranean Islands and of the Atlas Mountains. It is very large and extremely wild, and is found in the western and north-western mountains of North America. Its hair can hardly be called wool.

Big Horn, a river of the U. S., is the largest affluent of the Yellowstone. It rises in Wyoming Territory, among the Wind River Mountains, and, flowing in a generally northward direction, crosses the southern boundary of Montana, and enters the Yellowstone at Big Horn City, in Montana. Entire length, estimated at 450 or 500 miles. The upper part or head stream of it is called Wind River.

Biggs (Asa), born at Williamston, Martin co., N. C., in 1811, was educated at an academy; studied law, and was admitted to the bar in 1831; was elected member of the constitutional convention of North Carolina in 1835, and of the State legislature in 1840, 1842, and 1844. He was a member of the 29th Congress, and in 1850 was one of the commissioners appointed to revise the statutes of the State. In 1854 he again became a member of the State senate; was elected a Senator in Congress in 1854 for six years; resigned in May, 1858, and was appointed judge of the U. S. district court of North Carolina.

Biggs (Benjamin T.), born in Del., Oct. 1, 1821, studied at Pennington Seminary and at Wesleyan University, Conn.; was a member of the State constitutional convention of 1852, and was elected member of Congress in 1868.

Big'ler (John), born in Cumberland co., Pa., Jan. 8, 1804, was a brother of Gov. William Bigler of Pennsylvania, became a printer, a journalist, and subsequently a lawyer. He removed to Illinois in 1846, and to California in 1849, where he was a prominent Democratic politician, and was known as "Honest John Bigler." He was governor of California (1852–56). Died Nov. 30, 1871.

Bigler (William), governor of Pennsylvania, born Dec., 1813, was of German descent. He received a common-school education, and entered a printing-office. He was connected with the press many years, and afterwards engaged in mercantile pursuits. He was elected by the Democratic party speaker of the State senate 1843, governor 1851 and 1854, and U. S. Senator 1855 and 1858. Died Aug. 9, 1880.

Big'low (William), an American teacher and poet, born at Natick, Mass., Sept. 22, 1773. He graduated at Harvard in 1794, and became principal of the Latin School of Boston, for which he prepared several text-books. He contributed to different periodicals, and wrote poems, among which is "The Cheerful Parson." Died Jan. 19, 1844.

Bigney (Mark F.). See Appendix.

Bignon (Louis Pierre Édouard), a French statesman and historian, born at La Meilleraye Jan. 3, 1771. He was elected to the Chamber of Deputies in 1817, and became a peer of France in 1837. He wrote a "History of France from the 18th Brumaire to the Peace of Tilsit" (7 vols., 1827–38), and other works. Napoleon I. bequeathed him 100,000 francs. Died Jan. 5, 1841.

Bigno'nia [named by Tournefort in honor of the Abbé Bignon, the librarian of Louis XIV.], a genus of plants, the type of the natural order Bignoniaceæ, natives of the tropical and sub-tropical parts of America. Many of them are climbing plants, with compound leaves terminating in a tendril, and handsome trumpet-shaped or bell-shaped flowers, which are 5-lobed, or rather 2-lipped. The *Bignonias* are probably the handsomest twining plants known." The trumpet-creeper or trumpet-flower of the U. S. is the *Bignonia radicans* (or *Tecoma radicans*). It has a large and showy orange and scarlet corolla, funnel-shaped and 5-lobed, with four stamens.

Bignonia'ceæ (so called from *Bignonia*, the principal genus), a natural order of exogenous plants, natives of the U. S. and of tropical climates. They are mostly trees or shrubs, with compound leaves and showy flowers. The corolla is monopetalous, tubular, or campanulate, and irregular; the stamens are five, or four with the rudiment of a fifth; the fruit is a capsule or a drupe. The order comprises about 500 species or more, including those which some botanists have placed in the separate orders of Crescentiaceæ and Pedaliaceæ. Some of them are noble trees which are valuable for timber, as the *Bignonia Leucoxylon* of Jamaica, and the ipe-una of Brazil, which is said to be the hardest timber of that empire. The red coloring-matter called chica is obtained from the leaves of the *Bignonia Chica*, which grows near the Orinoco River. Among the North American species of this order is the *Catalpa Bignonioides*, a well-known ornamental tree of the U. S., which has simple cordate leaves.

Big Rapids, city and R. R. centre, capital of Mecosta co., Mich. (see map of Michigan, ref. 6–I, for location of county), on the Muskegon River, 56 miles N. of Grand Rapids and 55 miles N. of Muskegon. It has Holly waterworks, extensive water-power, the river being dammed in two places, a heavy lumber trade, and large manufacturing interests. Pop. in 1870, 1237; in 1880, 3552; in 1884, 5917.

Big Sandy River, an affluent of the Ohio, is the boundary between West Virginia and Kentucky. It is navigable for more than 100 miles for steamboats. Its main stream, or Tug Fork, rises in the S. of West Virginia. Its West Fork flows through Eastern Kentucky. Its valley abounds in coal, timber, and mineral wealth.

Big Trees of California. See Sequoia.

Big Vermilion River. See Vermilion River.

Big Wood (**Boisé,** or **Boisée**) **River,** of Idaho, rises in or near the Salmon Mountains, flows westward, and enters the Lewis or Snake River on the line between Idaho and Oregon. Gold is found near this river.

Bihar, a county of Hungary, is bounded on the N. by the county of Szabolcs, on the E. by the county of Middle Szolnok and Transylvania, on the S. by Arad, and on the W. by Bekes. Area, 4279 square miles. The eastern part is mountainous, while the western is a plain, consisting alternately of swamps, sandy plains, and fertile ground, traversed by numerous small rivers. All kinds of grain abound, especially wheat of an excellent quality. Wine and tobacco are also raised in great quantities. Pop. in 1880, 447,142. Chief town, Debreczin.

Biisk, a town of Siberia, in the government of Tomsk, 300 miles S. of Tomsk. Pop. in 1882, 6329.

Bilba'o, often written in English **Bilbo'a,** a seaport-town of Spain, capital of the province of Biscay, is situated on the river Nervion, near the Bay of Biscay, and 28 miles N. W. of Vitoria; lat. 43° 15′ N., lon. 2° 54′ W. It is partly enclosed by high mountains, and is well built. Small vessels can ascend the river to this point, which is here crossed by several bridges. Bilbao has a cathedral and a number of convents; also manufactures of hardware, hats, leather, paper, and earthenware. The chief articles of export are grain and flour, iron, oil, and fruits. This town was founded in 1300 and was first called *Belvao*, and about 1500 was the seat of a famous commercial tribunal. It has steam communication with London and Liverpool. Pop. 32,734.

Bil'berry, or **Whortleberry,** the fruit of various small shrubs, of the genera *Vaccinium* and *Gaylussacia*, and of the natural order Ericaceæ, natives of North America and Northern Europe. These fruits, under the name of huckleberries and blueberries, are extensively used in the Northern U. S. and Canada.

Bil'derdijk' (Willem), an eminent Dutch poet and philologist, born in Amsterdam Sept. 7. 1756, was a man of great erudition and versed in many languages and sciences. He studied law, and practised as an advocate at The Hague. About 1808, Louis Bonaparte appointed him president of the Institute of Holland. He was the author of many poems, tragedies, and prose works, which had a high reputation, and display a vigorous imagination. Among his important works are "Elius" (1778), "Miscellaneous Poems" (1799), "Rural Life," and an epic poem called "The Destruction of the First World." Died at Haarlem Dec. 18, 1831.

Bildt, a town of Holland in Friesland. Pop. 9408.

Bile [Lat. *bilis*], the secretion of the liver in animals. In all vertebrates it is formed chiefly from the blood of the portal vein, which is mingled, however, to some extent with that of the hepatic artery. It is secreted slowly during the intervals of digestion, attaining its maximum (according to Dalton) about an hour after eating. It is in man a yellowish-green, viscid fluid, with a bitter taste and a peculiar smell. In carnivorous animals it is brownish-yellow; in herbivorous, greenish. From twenty to fifty ounces of it are secreted daily in a man. A portion of bile is commonly detained in the gall-bladder, where it becomes more dense by the loss of water and the addition of mucus.

Bile contains certain resinous, coloring, and saline constituents. The biliary resin, or *bilin*, consists of cholic (glycocholic) and taurocholic acids, combined in man with soda; also with a little cholesterin, a fatty body. These acids are formed in the liver, not being present in the blood, unless from absorption after their elaboration in the liver. Cholesterin and the coloring-matter of the bile are probably present in the blood. Arrest of their removal causes unpleasant, sometimes serious, symptoms, recognized under the term "biliousness."

Entering by the common biliary duct into the duodenum, the bile aids in the digestion of food, especially of fat; and the greater part of it is then reabsorbed from the small intestine. A portion, however, is excreted with the fæcal discharge. Bile stimulates the peristaltic muscular action of the bowels, being the natural laxative. It acts also as an antiseptic to the almost putrescent contents of the large intestine. Solidification of the components of the bile (especially of cholesterin) causes gall-stones, the passage of which through the duct often produces extreme pain.

The gall-bladder is not always present, even in the higher animals. Oxen, sheep, and antelopes have it, but not deer or camels. It is absent in the elephant and horse, but present in the hog. All carnivora have it. Among birds, the ostrich, pigeon, and many parrots are without it. Some species of the same genus have it, and others not. (See Digestion.) The bile of salt-water fishes contains potash in place of soda, although, from their being surrounded by much common salt (chloride of sodium) in the sea-water, we should naturally expect to find soda in abundance; and the bile of land and fresh-water animals contains soda, while, considering diet and habitat, potash might more naturally be looked for. Henry Hartshorne.

Bilin' [Lat. *Belina*], a town of Bohemia, beautifully situated in the valley of the Bila, 17 miles W. of Leitmeritz. It has celebrated mineral springs which are much frequented, and two castles. The well-known polishing-powder of Bilin is bergmehl. Pop. 5058.

Bilious Colic and Calculus. See Liver, Diseases of.

Bilious Fever. See Fever.

Bill, or **Beak** [Lat. *ros'trum*; Fr. *bec*], the hard, horny mouth of birds, consists of two parts called the upper and lower mandibles, which may be regarded as mere extensions of the upper and lower jaws. It is not furnished with teeth, but the bills of the tribe Dentirostres have notches like teeth, and Prof. Marsh has discovered a fossil bird at Fort Harker, Kan., with true teeth. The bill is the principal weapon of offence and defence of many birds, and is an important character on which the distinctions of the orders are founded, the various forms of the bill being intimately connected with the peculiar habits of birds. These forms are especially adapted to the nature of the food on which the bird subsists, and to the operations by which that food must be procured. In birds of prey (Raptores), the upper mandible is hooked and sharp, and the whole bill is adapted for seizing animals and tearing their flesh; birds that feed on seeds have short, strong, and conical bills; while humming-birds have long, straight, and slender bills, fitted to insert into long, tubular corollas. Many aquatic birds have broad, obtuse, and comparatively soft and sensitive bills, with laminæ on the inner margin in order to strain the mud in which they find their food. At the base of the upper mandible is a membrane called the *cere*, which in many birds is naked, in others feathered.

Bill, in law, a formal statement or declaration in writing. It is commonly used in connection with some descriptive word. The principal cases will be considered separately. Bills may be conveniently arranged under the following classes:

1. Contracts and commercial instruments—bill of exchange, bill of lading, bill of credit, bill of sale, single or penal bill.
2. A project of law pending before a legislature, as in the U. S. Constitution, Article I., section 7, "bills for raising revenue." After such a bill becomes a law, it is usually termed an "act."
3. Laws actually passed by the legislature, as a bill of indemnity, a bill of attainder or of pains and penalties.
4. Constitutional instruments or provisions—"bill of rights."
5. In mercantile and ordinary usage—bill of goods, bill of health, bill of mortality, bill of parcels, bills payable and receivable.
6. In pleadings, criminal and civil—original bill, bill of Middlesex, bill of indictment, bill of privilege, bill in equity.
7. In legal practice—bill of costs, bill of exceptions, bill of particulars.

Bill, Brown-bill, or **Gisarme,** an ancient weapon of the English infantry for fighting at close quarters. It differed from the battle-axe in its sickle-shaped blade, to which a drawing stroke was given. The bill was used by the English at the battle of Hastings, and finally went out of use in consequence of the introduction of firearms. Similar weapons were used by mounted troops, as well as infantry, both in England and on the Continent. The partisans with which the yeomen of the Guard in England are armed, and the halberd, are derived from the ancient bill.

Bil'leting, a mode of feeding and lodging soldiers when they are not in camp or barrack. It is a compulsory process by which soldiers obtain food and lodging in taverns, inns, or private houses. In 1745 all persons in England were exempt from this burden except certain traders. The persons liable to have soldiers billeted on them in England at present are the keepers of hotels, inns, public-houses, ale-houses, beer-shops, wine-shops, livery-stables, and such-like licensed places. Those who supply food and lodging receive tenpence per day for each soldier.

Bil'liards [Fr. *billard*], a game played with ivory balls upon a rectangular table having resilient sides. The balls are put in motion by means of rods called *cues* held by the players. The place of the origin of this game is variously given as in the East, in France, and in Italy, and the date is entirely uncertain. Shakspeare alludes to this game in "Antony and Cleopatra," but this is undoubtedly an anachronism. The rules of the game vary somewhat in different countries. Various games are played at present in the U. S., the French three-ball game being considered the best. This game requires great skill and quickness of hand and accuracy of sight, and is one of the most popular of games. (See PHELAN, "The Game of Billiards.")

Bill in Eq'uity. This is a statement of the plaintiff's case in a suit in court of equity. A bill is either original or not original. An original bill initiates the suit; a bill not original is used to controvert or suspend or revise a proceeding in the cause, as a decree or order, or for cross-litigation. Particular suits receive special names, with which the word *bill* is connected, such as "bill of peace," "bill of interpleader," "bill of discovery," "cross bill."

Bil'ling (SIGISMUND), born at Calmar, in Alsace, in 1773, was a noted French liberal; entered the French army, and participated in many battles and sieges. He was prominent with Lafayette in the revolution of 1830. D. 1832.

Billings, on R. R., Christian co., Mo. (see map of Missouri, ref. 7–F, for location of county), 261 miles S. W. of St. Louis, is the seat of South-western Christian College and the Christian Colony. It is beautifully situated, and has a steam flouring-mill, wagon and plough factory, etc. Chalybeate springs are within ten miles. Pop. in 1880, 129.

Billings, Mont. See APPENDIX.

Bil'lings (ELKANAH), geologist, was born in Canada May 5, 1820. His father was a native of Massachusetts. In 1845 he was called to the bar, but since 1856 has acted as palæontologist to the Canadian geological survey. He has published valuable scientific memoirs and other important contributions to the geology and natural history of Canada.

Billings (JOHN SHAW). See APPENDIX.

Billings (JOSEPH), an English navigator who entered the service of Catherine II. of Russia in 1785. He commanded an exploring expedition sent out by that sovereign in 1787. He explored the coast of Alaska, discovered several islands in the Arctic Ocean, and returned in 1791.

Billings, Josh, the pseudonym of Mr. H. W. Shaw of Poughkeepsie, N. Y., an American humorist, who is known by his "Allminax" and other works.

Billings (LUTHER G.), U. S. N., born in New York in 1840, entered the navy as an acting assistant paymaster Oct. 24, 1862, became an assistant paymaster in 1865, and a pay-director in 1882. He served in the steamer Waterwitch when she was captured by Confederates on the morning of June 3, 1864, and fought gallantly in her defence. Lieutenant-Commander Austin Pendergrast, in his detailed report of Oct. 22, 1864, says: "Notwithstanding the defeat I have sustained, I cannot close this report without recommending to the kind consideration of the department the gallant conduct of those officers and men who so bravely defended their ship. To C. W. Buck, acting master, Acting Ensigns Charles Hill and A. D. Storer, Acting Assistant Paymaster L. G. Billings, Acting Master's Mate C. P. Weston, Coast-pilot R. B. K. Murphy, Henry Williams, captain of the hold, John Williams, captain of the after-guard, John Parker, gunner's mate, and John Y. Hazelton, cockswain, I am indebted for a cordial support in the defence of the ship; and though every one of them was wounded, and many of them threatened with instant death unless they would say that they surrendered, I am proud to say that not one of them disgraced himself by doing so." Was pay-inspector in 1883. FOXHALL A. PARKER.

Billings (WILLIAM), an American musical composer, was born in Boston, Mass., Oct. 7, 1746. He introduced a new style of church-music, which became very popular in New England. Died Sept. 26, 1800.

Bil'lingsgate, a wharf and fish-market of London, below London Bridge, which was made a "free and open market for all sorts of fish" in 1699. It is the only wholesale fish-market in London, and all fish, fresh or cured, if imported in British vessels, are admitted free of duty. All fish are sold here by tale, except salmon and eels, which are sold by weight; oysters are sold by measure. No fish are sold on Sunday except mackerel. The women who vended fish here were formerly notorious for ribaldry and vituperative personalities, so that "Billingsgate" became a synonym of vulgar and foul expressions.

Bill'ion, in the French system of numeration, is a thousand millions (also in U. S.), but it is used by the English to denote a million millions—1,000,000,000,000.

Bil'liton, or **Billeton,** a Dutch island in the East Indies, is situated between Borneo and the S. E. end of Sumatra, and is separated from Banca by Clement's (or Gaspar) Strait. It is about 3° S. lat., and 108° E. lon. Area, estimated at 1150 square miles. Iron ore and good timber abound here. Trepang, tin, birds' nests, and tortoise-shells are exported from it.

Bill of Attain'der is a legislative enactment declaring the attainder of one or more persons. (See ATTAINDER.) Formerly, persons were often attained of high treason in England by act of Parliament, and during the war of the Revolution bills of attainder were frequently passed in this country. The Constitution of the U. S. provides that neither a State nor Congress shall pass bills of attainder. Such a bill is usually opposed to sound legislation in four principal respects: It is adopted by the legislature, instead of being a sentence by the judiciary; it departs from judicial rules in establishing the commission of the alleged criminal act, having no regular methods of trial or rules of evidence; it may declare an act to be a crime which was not so when committed; and it admits of the infliction of cruel and unusual punishments. (An instance of such a bill is found in FROUDE'S "History of England," i., 286.)

Bill of Credit, in law. (1), in mercantile law, a letter written by one person to another authorizing or requesting him to give credit to a third or his order, or to bearer. Such a letter is either general or special. It is general when addressed to any one who may see fit to give the proposed credit, and who on giving credit may have recourse to the writer of the letter. On such a letter several persons may successively give credit. The letter is said to be special when addressed to specified persons in such a way that no other persons but those specified can give the credit.

2. Under the U. S. Constitution. That instrument provides that no State shall "emit bills of credit." This expression is construed by the courts to mean instruments issued for the payment of money—issued on the credit of the States as such, payable at a future day, and intended to circulate as money. The clause does not prevent a State from issuing bonds for the payment of its indebtedness, payable at a future day; nor is it supposed to prohibit the creation of banks, which issue currency. The provision aims at the use of the credit of the State in its corporate character.

Bill of Excep'tions, a formal statement in writing of exceptions taken to the opinion, decision, or direction of a judge during a trial. It sets forth the proceedings at such trial, the decision or ruling made, and the exception thereto, signed and sealed by the judge in testimony of its correctness. The object of a bill of exceptions is to bring the alleged error of the judge before the proper court for review, and it usually contains only such portion of the proceedings and evidence taken at the trial as is necessary for that purpose. (The details of the subject will be found in TIDD and other works on legal practice.)

Bill of Exchange, an open letter of request, whereby one person requests another to pay a third or his order or bearer a sum of money, absolutely and at all events. The person who writes the letter is called the *drawer;* the one to whom it is addressed is termed the *drawee;* and the person who is to receive the money is the *payee.* A bill of exchange is either inland or foreign. Where the parties are in the same State, it is inland; where the drawee resides in a State or country different from that of the drawer, or in any case where the bill is drawn in one State upon a person in another, it is foreign. A bill may be considered under the following heads—1, its nature; 2, endorsement; 3, acceptance; 4, presentment for payment, and steps to be taken to charge drawer and endorsers.

1. A bill of exchange having all the requisites referred to in the definition as above given is *negotiable.* By this word is meant that a transfer of it in good faith before maturity will give the purchaser a right of action in his own name in a court of law, as distinguished from a court of equity; and he accordingly takes a title free from defences that may have existed between the original parties. But if any of the qualities referred to in the definition are wanting, *negotiability* does not exist. The paper becomes assignable, and the defences between the original parties are let in. Negotiability, however, assumes that the instrument has a legal existence as to its outward form, and is accordingly executed by a person competent to contract. A bill of exchange drawn by or upon a married woman or an infant would not create a valid obligation even as to a purchaser in good faith. So if the instrument were declared void by statute, as is sometimes the case when infected with usury or given for a gaming consideration. Under these rules, if an instrument otherwise in the form of a bill of exchange were payable in something other than money, or upon a contingency, or from a special fund, or to a particular person, without the addition of the words "order" or "bearer," it would not be negotiable. The law presumes that a bill is given for a valuable consideration. Evidence may be offered as between the original parties, and as to all who cannot insist upon the protection of negotiability, that there is no consideration. An important distinction thus arises between what may be called business paper and accommodation paper. The former is given for a valuable consideration as between the original parties, such as for money lent or goods sold. In accommodation paper there is no such consideration, but the person who makes it intends to lend his credit to some person. Every party to a bill may hold this relation to it. Thus, there may be an accommodation acceptor, drawer, or endorser. This kind of paper must be distinguished from that which is simply without consideration, in which there is no *intent* to have the credit of the party who makes it used. A single illustration will show the distinction. If a friend should draw a bill in favor of his friend on account of his affection, it would be simply without consideration; if under the same circumstances it was drawn with intent to have it discounted by a bank, it would be "accommodation paper." In the one case, if a purchaser should acquire it with knowledge of all the circumstances, he could not enforce it, while in the other case he could, by reason of the intent. When accommodation paper has been acquired for value, it is substantially equivalent, as far as the holder is concerned, to business paper. Between the original parties it would have no validity, and could not supply the basis of an action. On the contrary, if an accommodation party to the bill is obliged to pay, he has his remedy against the party in whose favor he acted, either on the bill or on an implied contract, as the case may be. Thus, an accommodation acceptor could not bring an action *upon the bill* against the drawer whom he had accommodated, but would be driven to an action on an implied contract on the part of the drawer to repay money which had been paid for the drawer's use and benefit. When one party gives his acceptance to another in return for the other's acceptance, it is not a true case of an accommodation acceptance, though sometimes so called. These "cross" acceptances are based upon a consideration, the one promise being a consideration for the other. They are certainly dangerous contracts, as either party may be called on to pay to a holder not only his own acceptance, but that of the other party. Without further pursuing this distinction, attention should be called to a peculiarity in this branch of the law which shows its close connection with the subject of currency. It is a well-settled general rule of the common law that a person having no title to goods can transfer none, even to a purchaser in good faith. A thief or a finder, for example, can create no better title than he possesses. There is a marked exception to this rule in the case of money. One who has stolen money may give a perfect title to one who takes it in good faith and for value. This exception is demanded by the necessities of commerce. The rule is extended to negotiable paper, payable to bearer, or even to order, when so endorsed as to pass from hand to hand without further endorsement.

It is plain that a bill when drawn imposes no obligation upon the drawee. It is necessary that he should assent to it in some legal form before he becomes liable. This act is termed "acceptance." Before acceptance the only person liable to the payee is the drawer. His liability is a contingent one, and implied by law. There is thus a marked distinction between the liability of a drawer and acceptor—one is implied, and the other is express and created by express contract. The implied obligation of the drawer is created by the custom of merchants, and is conditional. It requires certain acts to be performed as a condition precedent to recovery of the amount of the bill, such as presentment either for acceptance or payment, and due notice to be given of a failure to accept or pay, as the case may be. This distinction between the *implied* liability of the drawer and the *express* contract of an acceptor is of great consequence, and must be carefully attended to. The same remark may be made as to the liability of an endorser. This is also implied and conditional. The nature of a check upon a bank should be referred to. It resembles a bill of exchange, though it is not precisely equivalent to it. The check, according to the better opinion, creates no obligation against the bank in favor of the holder without acceptance. In mercantile phrase, a check when accepted by the act of an officer, such as a teller, is said to be "certified." The bank after such an act is liable to the holder. The drawer of a check having funds on deposit has an action against the bank for damages for a refusal to honor his check, on the ground of an implied obligation to pay checks according to the usual course of business. While checks are usually drawn payable immediately, they may be made payable at a future day, when their resemblance to a bill of exchange is still more close.

2. *Endorsement.*—The payee of a bill may transfer it by writing his name upon the back of it. He is then termed an endorser. When the name is simply written the endorsement is said to be "in blank;" when some person is pointed out to whom payment is to be made, it is said to be "in full." When a bill is endorsed in blank, it will pass from hand to hand, as though payable to bearer; when endorsed in full, an endorsement by the person to whom it is transferred will be necessary to its further transfer. There may be a series of endorsers, called first, second, third, etc. endorsers. Under these rules no holder can claim a title to a bill payable to order except through an endorsement made by the very person to whom it is payable, or some one holding under him, such as his executor, administrator, or assignee in bankruptcy. Accordingly, if it should come into the possession of another person of the same name as the owner, but acting without authority, he could give no title to one acting in good faith. When an owner of a bill endorses it for value, he can impose upon the purchaser no valid restriction preventing its further transfer. The right of sale is an inseparable incident to ownership. On the other hand, if a person endorse a bill to an agent, he may place valid restrictions upon the agent's authority to sell. These, if incorporated in the endorsement, will bind all purchasers. Where a bill is payable to several persons, all must, in general, unite in an endorsement. The regular effect of an endorsement is twofold: one consequence is to transfer the endorser's interest, and the other is to create an implied obligation on his part to pay the bill in case that the drawee does not accept or pay at maturity, and proper steps are taken to charge him. In an accommodation endorsement, as there would be no ownership, the sole effect would be to create an obligation to pay. This obligation closely resembles that of suretyship. Thus, when a bill is accepted the acceptor is primarily liable, and the endorser is, as it were, a surety. The rules governing suretyship may in the main be invoked in his favor. An endorser may avoid this liability by making use of suitable words in his endorsement, such as "without recourse." The endorsement would then simply operate as a transfer of such interest as he might have. Endorsers are commonly liable in the order of time of their endorsements. Thus, if there were three endorsers, if the third

(or last) was compelled to pay, he would be entitled to sue the second or first, and recover in full. A holder need not pursue any prescribed order as between the endorsers. He may select any one, who, if he pays, will be entitled to proceed in the same way as to any one preceding him. If, however, the bill is made payable to several payees, who endorse, they are liable jointly and not successively, and each, as between themselves, would be liable only for their respective shares. Every endorsement is a new contract. One of the consequences of this rule is, that though the original bill may be void, the endorser will still be liable, as if the bill be void for usury or be made by a married woman. Another consequence is, that the rules of private international law may cause a different effect to be given to the respective endorsements. Thus, if A should endorse in one country, and B should endorse the same bill in another, each endorsement would be governed as to its effect by the law of the state where it was made. The mere act of writing one's name is not an endorsement; there must also be a delivery. Accordingly, if one should write his name and die before delivery, an executor could not deliver the bill so as to make a valid "endorsement." The proper course would be for the executor to endorse it in his representative character.

3. *Acceptance.*—The object of acceptance is to show the assent of the drawee of the bill to pay it according to its terms. Without such assent he would not be liable. The regular and formal method of acceptance is to write the name of the drawee upon the front of the bill. But no particular mode of acceptance is necessary. It may be made by writing separate from the bill or orally. It may sometimes be implied, as, for example, by a detention on the part of the drawee beyond a reasonable time. It may be either absolute or conditional. A conditional acceptance may be illustrated by one purporting to be made "on the consignment of goods to the drawee." A holder could not collect in such a case if there was no such consignment. An acceptance should not differ from the terms of the bill. A holder may decline to take such an acceptance, and treat the case as though there was no acceptance. Should he assent to it, he would thereby discharge the drawer and existing endorsers. It is not always necessary that there should be presentment for acceptance as distinct from one for payment, though in some cases it is requisite. Where a bill is payable a fixed number of days "after sight," the word "sight" means acceptance, and it would be necessary to present it once for acceptance, and, if that act took place, again for payment. If, on the other hand, the bill were payable a certain number of days "after date," it would only be necessary to present it once for all for payment, though it would usually be an act of prudence to present it for acceptance, as the holder would in case of acceptance have an additional person to whom he could have recourse, and in case of non-acceptance he could take immediate steps to charge the other parties to the bill. There has been great controversy on the question whether bills payable "at sight" must be presented for acceptance as well as payment. In some of the States the doubt is settled by legislation. The effect of acceptance is to make the drawer the principal debtor. The other parties stand in the relation of sureties, and if they are compelled to pay, they have their remedy over against the acceptors. This is clearly the case in business paper: in the case of an accommodation bill the position of the parties is of course reversed, so that the acceptor, as already explained, has his remedy on an implied contract against the person to whom he lent his credit, though as to the holder of the bill he holds the place of a principal debtor. Under these rules an acceptor is bound to know the handwriting of the drawer, and if that be forged he is still liable to the original holder. If acceptance is refused, the proper course, in the case of foreign bills, is to have a protest made, and prompt notice sent to the drawer and endorsers. In case of inland bills, protest is not essential, though presentment and notice are. Statutes usually allow protest in case of inland bills as a convenient medium of proof that the necessary steps have been taken to charge the parties to the bill. The term "protest" is applied to an official act by an authorized person (notary public), whereby he affirms in a formal or prescribed manner, in writing, that the bill has been regularly presented for acceptance or payment, as the case may be, and that it has been refused. It is used as presumptive evidence at a trial to establish the facts in question. The office of a "notice" is to give immediate information to the drawer or endorsers of failure of acceptance, so that they may take such steps as they deem necessary for their protection. The protest and notice are thus entirely distinct acts for different purposes, and must not be confounded. Assuming that acceptance has been refused and due protest made, mercantile law allows any person to intervene and accept a bill "for the honor" of a drawer or endorser. A holder is not bound to take such an acceptance, though it is valid if assented to. It takes place before a notary public, and is termed an acceptance "*supra protest.*" The person thus intervening states for whose honor he accepts. In case he pays, he becomes the creditor of that party, and may also have recourse to all who precede him on the bill, in opposition to the general rule of law that one cannot become the creditor of another without his consent. When the bill matures it is again presented to the original drawee for payment, who may in the mean time have been placed in funds, and may now be willing to take up the bill. Should he again refuse, it is protested, and presented to the acceptor *supra protest* for payment, which, if he refuses to make another and final protest, will be necessary to charge drawer or endorsers.

4. *Presentment for Payment.*—It is a general rule that as between debtor and creditor no presentment for payment is necessary. It is the duty of the debtor to seek the creditor, and if the day for payment elapses without it, there is an immediate remedy by action. The better opinion in this country is, that this rule applies to an acceptor of a bill of exchange, even where it is made payable at a particular place, such as a specified bank. On this view it would not be necessary for the holder to prove a presentment, but the acceptor might show in his defence any facts that would relieve him or diminish liability, such as that he had left funds with the bank, which had failed. But to charge drawer and endorsers the case is entirely different. These enter into no absolute engagement, but only into an obligation implied by law. It is a part of the implied contract that presentment for payment shall be made, and protest, where that is necessary, and notice given. These acts must be alleged in the pleadings, and proved at the trial as conditions precedent to a right of recovery. The modes of performing these various acts branch out into much detail, and only the leading ones can be brought within the compass of this article. The general rule is, that the bill, when payable without designation of place, must be presented, when it matures, to the acceptor, either at his residence or place of business, and, if at the place of business, within business hours. If a particular place, as a bank, is designated, presentment must be made there within the usual hours devoted to banking business. This duty continues, though the place of business be closed or the acceptor be notoriously insolvent. In the case of an accommodation acceptance no presentment is necessary in behalf of the person to whom the accommodation is given, since he could have no action against such an acceptor. The duty of presentment, as well as of the performance of the succeeding acts, may be waived by a party to the bill by appropriate acts. This waiver may take place either before or after maturity of the bill. An instance would be a writing on the bill, "I hereby waive demand of the within bill," or "I hereby waive notice of demand." The latter expression would be imperfect, since a waiver of notice does not dispense with the necessity of presentment, while a waiver of demand is, from the nature of the case, a waiver of notice.

A bill does not ordinarily actually mature on the day on which it apparently falls due. Three days are allowed, termed "days of grace." These have become so fully a part of the contract that a presentment before the last day of grace is nugatory. Should the last day fall on Sunday or a public holiday, the bill matures on the preceding day. This matter is sometimes regulated by statute. If presentment is made and refused, protest should take place in the case of foreign bills, as already explained in reference to non-acceptance, and notice given to the parties to be charged. The subject of notice requires a more full explanation than has been given in connection with non-acceptance. The object of notice is to give information to the respective parties, to the end that they may protect themselves from loss. The test of its sufficiency is whether it gives the requisite information. No particular form is necessary. It may be either oral or written. It is a common practice to reduce it to writing, and either to give it to a party personally or to send it to him by mail. By the general rule of law the mail can only be used for the purpose of transmission, and accordingly cannot be resorted to where the holder and the person to be notified obtain their letters from the same post-office, though it is in some instances otherwise by statute. The law requires extreme diligence in despatching the notice. It should be sent as early as the next day, and some authorities require by the first convenient mail on the next day. If the notice is properly sent by the mail, it will suffice, though never received. Any endorser receiving notice has a day to send it to one preceding him. After notice the rights of the holder are fixed, and it is not necessary for him to bring his action any earlier than he would be required to do by the statute of limitations. Delay to collect the bill from the acceptor does not of itself discharge the drawer and endorsers. If, however, a bargain (based upon a consideration) is made between the holder and acceptor, whereby the time of payment is extended, the drawer and endorsers are discharged, unless their consent is obtained. The drawer is not only liable for the face of the bill, but for damages incidental to non-payment. These damages are in some cases fixed by statute. It is sometimes necessary to take into account the difference in exchange between two countries; as, if a bill drawn in New York were payable in London, exchange being in its favor, and the action on the bill were brought in New York, and it cost a certain per cent. to place the funds in London, that amount should be included in the recovery. The article on promissory notes may be referred to. (See Promissory Notes.) T. W. Dwight.

Bill of Lading, the written evidence of a contract for the carriage of goods by water. It is usually signed by the master of the vessel, either in duplicate or triplicate, acknowledges the receipt of the goods from a person (named the consignor), and undertakes to deliver them to a designated person (the consignee) or his assigns at a specified place, for the compensation and on the conditions therein specified. An endorsement of the bill of lading transfers the title to the goods, and, if made in good faith and for a valuable consideration, cuts off the right of stoppage *in transitu*. For most purposes, a bill of lading is assignable, and an assignee takes it subject to any defence existing between the original parties. For the single purpose of shutting out the right of stoppage *in transitu* it is negotiable. (See Stoppage in Transitu.) This instrument consists of two parts—a receipt and a contract. That portion of it which is a receipt can be contradicted, as between the original parties, by parol evidence. For example, if it were stated that the goods were in good order, evidence may be adduced to show the contrary. This proposition would not extend to a person who had made advances on the faith of the statement, as he could invoke the doctrine of estoppel. (See Estoppel.) The part of the bill which is a contract cannot be contradicted by parol evidence, even as between the original parties. Although the term was originally applied only to a memorandum of a contract for transportation by water, it is now frequently used to denote the memorandum given by *any* carrier of the terms on which he agrees to carry the goods received by him. T. W. Dwight.

Bill of Pains and Penalties, a special act of the legislature declaring a person guilty of some offence, without any conviction in the regular course of judicial proceedings, and inflicting upon him some punishment less than death. It differs from a strict bill of attainder in that the punishment inflicted by the latter is death. Bills of pains and penalties are within the provision of the U. S. Constitution that neither Congress nor a State shall pass a bill of attainder or an *ex post facto* law. Thus, a law of Congress requiring all attorneys of the Supreme Court to take an oath that they had not been engaged in rebellion, or else to be disqualified from practice, was held to be in the nature of "a bill of pains and penalties" as to those who had thus participated, and accordingly void. (*Ex parte Garland*, 4 Wallace R., 333.)

Bill of Rights, an English statute enacted at the time of the accession of William and Mary to the throne. It declared, among other things, the right of the subject to petition the king, freedom of election of members of Parliament, and freedom of speech in Parliament. It affirmed that standing armies without the consent of Parliament are illegal, and that the king had no power of suspending or dispensing with laws. It provided that excessive bail should not be required, nor excessive fines imposed, nor cruel and unusual punishments inflicted. The provisions of this act have had great influence in this country, and are deemed of high consequence, as securing liberty to the individual. A number of them are literally inserted among the amendments to the U. S. Constitution, and are also found in State constitutions. The phrase "bill of rights" is frequently employed in this country to designate all those portions of a constitution, State or national, designed to secure liberty to the individual.

Bill of Sale, a writing under seal conveying the title to goods and chattels. The seal by the common law is conclusive evidence of consideration. Accordingly, a bill of sale formally executed passes the title without any consideration or delivery of the property. Where there is no seal, there must be a consideration or delivery. A delivery without consideration would amount to a gift. A bill of sale may pass a title which would be valid as between the parties, and yet not of force as to creditors or purchasers, as if one who was indebted should make a bill of sale without actual consideration, or should sell, even with consideration, and still retain possession of the goods. The transaction might be regarded as infected with fraud, even though there were no fraudulent intent. (See Fraud and Constructive Fraud. As to the general law concerning sales of chattels and the requisites to their validity, see Sales.)

The phrase "bill of sale" is frequently used in a more popular sense to indicate any written instrument, though not under seal, executed as evidence of a sale. In sales of ships the term "grand bill of sale" is sometimes employed. The word "grand" indicates that the sale is made by the builder. All subsequent transfers would be indicated by the ordinary phrase "bill of sale."

Bilox'i, on R. R., Harrison co., Miss. (see map of Mississippi, ref. 9–H, for location of county), 79 miles E. N. E. of New Orleans, and on Biloxi Bay; lat. 30° 23.8′ N., lon. 88° 53.1′ W. It has an iron lighthouse, with a fixed white light 62 feet above the level of the sea, and is a place of summer resort. Pop. in 1870, 954; in 1880, 1540.

Bil'son (Thomas), an eminent English prelate, born at Winchester in 1536, became bishop of Worcester in 1596, and bishop of Winchester the year following. Bilson was a man of great learning, and a zealous enemy of Puritanism. He assisted in the translation of King James's Bible. He wrote, among other works, "The True Difference between Christian Subjection and Unchristian Rebellion" (1585), and "The Perpetual Government of Christ's Church" (1593), which is considered an able defence of the doctrine of apostolic succession. Died in 1616.

Bils'ton, a market-town of England, in the county of Staffordshire, 2 miles by rail S. E. of Wolverhampton. It forms part of the parliamentary borough of Wolverhampton, and is an important centre of the hardware trade. It is situated between numerous iron and coal mines, and has large manufactures of japanned ware. Pop. in 1881, 22,730.

Bi'mana [from the Lat. *bis*, "twice," "double," and *manus*, a "hand"], a Latin term applied by some zoologists to the first or highest order of Mammalia, of which man is the type and sole genus. Some persons have urged an absurd objection to this classification, because it ignores the spiritual and essential part of man, and does not make a sufficiently wide distinction between men and brutes; while others, again, object to the term on the ground that man in his anatomy is not sufficiently distinct from the higher Quadrumana to require to be placed in a separate order. (See Quadrumana, and also Man.)

Bi'nary Stars. See Double Stars.

Bi'nary The'ory, in chemistry, is the name given to an hypothesis proposed by Davy, and once supported by Liebig, which assumes that all salts are compounds of a metallic and a non-metallic element. A large class of compounds (like common salt, or sodium-chloride) readily come under this rule. But in order to bring most salts into such a class, it is necessary to suppose all the non-metallic elements in any given salt to be combined into one compound element. But, according to the later theories, it is not considered at all necessary to try to represent the probable arrangement of chemical atoms in compound bodies. (See Chemistry.)

Bin'che, a town of Belgium, province of Hainaut, well built on the river Haine, 6 miles E. S. E. of Mons. It has manufactures of cutlery, glass, pottery, etc.; also a trade in marble, coal, paper, and lace. Pop. 6678.

Bin'drabund', or **Bindraban'** (anc. *Vrindavana*), a town of British India, in the North-western Provinces, on the river Jumna, about 40 miles N. N. W. of Agra. It has several temples of Krishna, one of which is a remarkably massive structure. This town is visited by multitudes of pilgrims from distant parts of India, and their munificence is the chief support of the place. Pop. about 20,000.

Bing'en (anc. *Vin'cum* or *Bin'gium*), a town of Germany, in Hesse, is finely situated on the left bank of the Rhine, at the mouth of the Nahe, 20 miles by rail W. of Mentz. The Nahe is here crossed by an old bridge supposed to have been built by the Romans. Wine of superior quality is produced in the vicinity. Near Bingen the Rhine passes through a narrow channel called *Bingerloch* (*i. e.* the "hole of Bingen"), in which the rocks and rapid current once rendered the navigation dangerous, but in 1834 the obstruction was chiefly removed. Bingen is opposite Rüdesheim, from which it is separated by the Rhine. It has manufactures of flannel, fustian, and leather. Here are interesting ruins of an old castle, Klopp, originally founded by Drusus, and of the celebrated chapel of St. Roch on the Rochusberg. A little farther to the south, between Bingen and Bingerloch, rises in the middle of the stream a high rock, the so-called tower of Bishop Hatto. The surroundings belong to the most picturesque in Germany. Pop. in 1880, 7050.

Bingham (Rev. Hiram), born in Bennington, Vt., about 1790, graduated at Middlebury College in 1816, at Andover in 1819, and was one of the first Congregational missionaries sent to the Sandwich Islands, where he long exercised a powerful and salutary influence. He returned to the U. S. in 1841. Died at New Haven, Conn., Nov. 11, 1869.

Bingham (John A.), an American legislator, born in Pennsylvania in 1815, removed to Ohio. He was elected a member of Congress by the Republicans of the Western Reserve in 1854, and was often re-elected. He was chairman of the managers who conducted the impeachment of Andrew Johnson in April and May, 1868. He was again elected to Congress in 1870. Became U. S. minister to Japan 1873.

Bingham (Joseph), born at Wakefield, Yorkshire, England, in Sept., 1668, died at Havant, near Portsmouth, Aug. 17, 1723, studied at Oxford and became a fellow of University College, but was compelled to give up his fellowship and leave the university on account of a sermon he preached on the meaning of the word "person" when used by the Fathers, and which brought upon him a charge of heresy. In the same year, however, he was made rector of Headbournworthy, whence he was transferred to Havant in 1712. His great work, "Origines Ecclesiasticæ; or, The Antiquities of the Christian Church," first appeared in English (London, 1708–22, 8 vols.). It has often been reprinted, and is not yet superseded. The best edition is that by Pitman, revised by Richard Bingham (Oxford, 1855, 10 vols.). There is also a cheap edition for younger students (London, 1852, 2 vols.). It was translated into Latin by Griscovius (Halle, 1724–38, 10 vols.), and into German, but in the interest of the Roman Catholic Church (Augsburg, 1788–96, 4 vols.).

Bingham (Kinsley S.), born at Camillus, Onondaga co., N. Y., Dec. 16, 1808, studied law, went to Michigan in 1833, held many public offices, was a judge of probate, speaker of the house of representatives, member of Congress (1849–51), governor (1855–59), and U. S. Senator (1859–61). Died at Green Oak, Livingston co., Mich., Oct. 5, 1861.

Bingham (William), born in Philadelphia in 1751, graduated at Philadelphia College in 1768, was consul at St. Pierre, West Indies, in 1771, and afterward American agent at Martinique. In 1787–88 he was a delegate to Congress, and was U. S. Senator from Pennsylvania (1795–1801). He was a man of wealth and of strong aristocratic feelings. Died in England Feb. 7, 1804.

Bing'hamton, city and R. R. centre, capital of Broome co., N. Y. (see map of New York, ref. 6–G, for location of county), was incorporated a city in 1867. It is pleasantly situated at the junction of the Susquehanna and Chenango rivers, 216 miles N. W. of New York and 142 miles S. W. of Albany, and is the southern terminus of the Chenango Canal. The State inebriate asylum is situated here, and also Susquehanna Valley home for orphan and indigent children.

The public schools are under the management of a board of education consisting of ten commissioners. The average annual number of pupils who attend the high school is 296, and 2745 at the ward school-houses. Twelve teachers are employed at the high school and sixty-three in the ward schools. The school library contains 5000 volumes valued at $6500; philosophical apparatus and cabinet worth $2500; total value of public school property, $220,000. St. Joseph's (Catholic) Female Academy, conducted by Sisters of St. Joseph, has an average of 230 pupils; property valued at $40,000. St. James's (parochial) school for Catholic boys and girls has an average attendance of 200 pupils. Lowell's Business College and Telegraphic Institute is a flourishing and important school of its class. There are several excellent private schools.

The churches are—4 Presbyterian, 4 Methodist Episcopal, 2 Protestant Episcopal, 1 Baptist, 1 Catholic, and 2 colored Methodist.

The city is supplied by Holly waterworks, owned by the corporation. The gasworks are owned by a private company. Ten miles of street railway have been constructed. The principal business streets are sewered. Over 24 miles of water-pipe and 10 miles of gas-pipe have been laid throughout the city.

The business capital of the city is largely invested in mercantile and manufacturing establishments. The leading articles are cigars, shoes, children's sleighs and wagons, glassware, tools, machinery, scales, barrels, brushes, and combs. There are 4 national banks, 2 savings banks, and 1 private banking-house; also 4 daily and 4 weekly newspapers, and 1 Sunday paper. The city has an area of 2560 acres, and the assessors' valuation is $5,460,175 for real estate and $760,285 for personal property. About $100,000 are raised annually for city and school purposes. The public debt for which the city is bonded for building railroads, high school building, waterworks, and bridges is $269,000. Ross Park, of about 100 acres, is owned by the city, and is a delightful resort. Pop. in 1870, 12,692; in 1880, 17,317; in 1883, about 20,000.

Charles M. Dickinson, Ed. of "Republican."

Bing'ley, a town of England, in the West Riding of Yorkshire, is situated on an eminence on the river Aire, 15 miles W. N. W. of Leeds. The Leeds and Liverpool Canal passes by it. Here are manufactures of worsted goods, paper, etc. Pop. in 1881, 9465.

Bin'ney (Amos), M. D., an American naturalist, born at Boston, Oct. 18, 1803, graduated at Brown University in 1821, was the owner of an ample fortune. He was a liberal patron of artists and men of science, and was president of the Boston Society of Natural History. He wrote "Terrestrial and Air-Breathing Mollusks of the United States" (finely illustrated). Died at Rome Feb. 18, 1847.—His son, W. G. Binney, is also a distinguished conchologist.

Binney (Hibbert), D. D., born in Nova Scotia in 1819, was educated in London and Oxford, graduating at the latter university in 1842. In 1851 he was consecrated lord bishop (Anglican) of Nova Scotia and Prince Edward's Island, which was the first bishopric founded by England in her colonial dependencies, originally including not only Nova Scotia and Prince Edward's Island, but also New Brunswick and parts of Lower Canada.

Binney (Horace), LL.D., an eminent American lawyer, born in Philadelphia Jan. 4, 1780. He graduated at Harvard College in 1797, and divided the first honors with his classmate, the late Judge White of Salem, Mass. Having studied law with Jared Ingersoll in Philadelphia, he was admitted to the bar in 1800, and rose in a few years to the highest rank in his profession. He declined high judicial positions which were offered him, but as a lawyer he took a prominent part in important cases in the higher courts of Pennsylvania, and was several times called to the Supreme Court of the U. S. Elected to Congress in the latter part of Jackson's first administration, he distinguished himself by his eloquence and ability. In 1843 he made his celebrated argument in the Supreme Court of the U. S. in the case of Vidal *versus* the mayor of Philadelphia. This admirable argument is often cited by the bench and bar of the U. S. as authority on questions involving the law of charitable uses, and has been referred to by eminent English jurists in the highest terms of praise. Mr. Binney appeared for the last time before his legal brethren on the occasion of the death of his friend, the Hon. John Sergeant, whose character he delineated in terms of deep feeling and eloquence. Mr. Binney's principal works, besides the argument in the Vidal case, are "An Inquiry into the Formation of Washington's Farewell Address" (1859), eulogiums on Chief-Justice Tilghman (1827) and Chief-Justice Marshall (1836), and "Reports of Cases in the Supreme Court of Pennsylvania" (6 vols.). D. Aug. 12, 1875.

Binney (Horace, Jr.), a son of the foregoing, born in Philadelphia Jan. 21, 1809, graduated at Yale in 1828, and was admitted to the bar in 1831. He was eminent for his literary knowledge, and was for a time president of the Union League of Philadelphia. Died Feb. 23, 1870. A memoir of his life by Dr. C. J. Stillé was published in 1870.

Binney (Thomas), D. D., LL.D., born in 1798, an English dissenting minister, pastor of King's Weigh-house Chapel, London (1829–69); wrote many controversial papers, "Conscientious Clerical Nonconformity," "Service of Song," and several books for young men, besides several volumes the products of a controversy with the Australian bishop of Adelaide. Died Feb., 1874.

Binoc'ular Tel'escope [from the Lat. *binus*, "double," and *oculus*, an "eye"], a telescope to which both eyes may be applied at once, and by which an object may be observed with both eyes at the same time. There are also binocular microscopes, having two tubes, one for each eye. In some kinds of work they possess superior defining power.

Bino'mial [from the Lat. *bis*, "twice" and *nomen*, a "name"], in algebra, an expression having two terms joined by the sign + or −. The "binomial theorem" has for its object the expression of the law for the formation of any power of a binomial. By means of this theorem any power of $x+a$ can be at once written down without going through the actual multiplication. The older mathematicians were acquainted with this method of finding such powers, but Newton first demonstrated the universality of its application. This is considered one of his greatest discoveries, and the formula was placed upon his tomb. It is usually written thus:

$$(x+a)^m = x^m + max^{m-1} + m\frac{m-1}{2}a^2x^{m-2} + m\frac{(m-1)(m-2)}{2\qquad 3}a^3x^{m-3}, \text{ etc.}$$

Binturong' (*Ictides* or *Arctictis*), a genus of quadrupeds nearly allied to raccoons, comprises two species, natives of Java, Sumatra, and Malacca.

The Black Binturong.

Bi'obi'o, the largest river of Chili, rises in the Andes, and enters the sea at Concepcion, after a course of 200 miles.

Biogen'esis, the origin of life from life by parentage or descent; a term recently used in opposition to *abiogenesis*, or the origination of life in matter before not living. (See Spontaneous Generation.)

Biog'raphy [from the Gr. βίος, "life," and γράφω, "to write"] is the term applied to the literature which treats of the lives of individual persons. Anciently, the leading incidents of a man's life were narrated in their historical sequence, without elaborate attempts to analyze character. Ancient biography was possessed of a stately dignity, colored but sparingly with eulogy or censure. Modern biography, on the other hand, like modern history, is often full of criticism and disquisition. Of strictly biographical works, the most valuable that has come to us from the ancient Greeks is the "Lives" of Plutarch. Roman literature also possesses an admirable "Life of Agricola," by his son-in-law, Tacitus. Besides these may be mentioned the "Lives" ascribed to Cornelius Nepos, the writings of Suetonius, the "Life of Alexander the Great" by Curtius, "Lives of the Sophists" by Philostratus, and a "Life of Plato" by Olympiodorus. Later, we encounter the "Lives of the Fathers" by Saint Jerome and others, while biographies of saints, martyrs, etc. are scattered profusely through ecclesiastical literature. The monks of the Middle Ages worked at the manufacture of biographies in which the hunger for the marvellous was gratified. Modern biographical literature may be said to date from the seventeenth century. Among the most celebrated works written since the Reformation may be mentioned Vasari's "Lives of the Painters" (Florence, 1550); Tillemont's "Mémoires pour servir à l'Histoire Ecclésiastique des six Premières Siècles de l'Église," in 16 vols. 4to (Paris, 1693); Bayle's "Dictionnaire Historique et Critique" (Rotterdam, 1697); the "Acta Sanctorum" of the Bollandist Fathers; the "Lives of the Saints" by Alban Butler; the "Biographie Universelle" (1810–28); Charles Knight's "English Cyclopædia," Biographical Section, 1856–57. The "Nouvelle Biographie Générale" (42 vols., 1857–63) is of great value. Among individual Lives a high place is given to Boswell's "Life of Johnson" (1793), "The Life of Charles XII." by Voltaire, that of Voltaire by Condorcet, and that of Molière and Corneille by Taschereau. The biographical writings of Carlyle are of the first importance. In American literature we may mention in general biography the works of Sparks, Sprague, Allen, and Drake, and the special biographical writings of Irving and the Abbotts.

Revised by C. W. Greene.

Biol'ogy [from the Gr. βίος, "life," and λόγος, "discourse"] is that branch of the study of nature which treats of organized beings, under their diverse relations, in contradistinction to mineralogy, which relates to the inorganic or mineral substances; its subjects are therefore animals (zoology) and plants (botany or phytology), living and extinct. These agree with each other, and differ from minerals in (1) the physical and chemical characteristics of their primitive constituents or cells, and the concomitant phenomena of life exhibited under certain conditions; (2) the perpetual change during life in the organism by loss of substance proportioned to the demands on the system of exertion or existence, and the renewal of substance by derivation and assimilation of nutriment from without; (3) the segregation and specialization, when the demand for rapid growth has been fulfilled, of certain portions of the organism as reproductive organs, differentiated as receptive and procreative (female), and impregnating and vivifying (male); from the former of which (after the conjunction of the two under certain conditions) an organism originates essentially like that from which it proceeds; and (4) the existence, for a vaguely determinate period, of the organism, and finally a disturbance of the equilibrium or conditions of existence, death and dissolution; (5) originating as above indicated, the offspring repeats the same cycle of phenomena as the parent, and in turn contributes to the perpetuation of the race. Our limits will only allow us to briefly consider, in the order indicated, these characteristic features of the great empire of organic nature.

(1) The animal or vegetable organism is in the main constituted of four elements, three of which are separately known only in a gaseous state—*oxygen*, *hydrogen*, and *nitrogen*—and one —*carbon*—in a simple condition is only known in a solid form. From this predominance of gaseous elements results the degree of molecular mobility of the constituents of the organism, and, according to Herbert Spencer, "that comparative readiness displayed by organic matters to undergo those changes in the arrangement of parts which we call development, and those transformations of motion which we call function." The same author has also insisted on facts that (1) the elements in question (except oxygen) have affinities which are narrow in their range, but low in their intensity; (2) that in all allotropism (or the ability to assume different states) is inherent; and (3) that they all present certain extreme antitheses (as, for example, between oxygen and nitrogen as to chemical affinity, and between carbon and the gases as to molecular mobility); and that these extreme contrasts "fulfil, in the highest degree, a certain further condition to facility of differentiation and integration." The primary form into which these elements enter is a fluid substance called protoplasm, which may or may not be nucleated, but in most organisms assumes the nucleated condition (that is, of cells); of such elements, more or less modified and disguised according to circumstances (*i. e.* specialization and complexity of parts), the entire organism is built up.

(2) By the absorption or ingestion of extraneous substances the organism derives a nutriment which is assimilated and converted into its own substance, and supplies the material (1) for the power for work, (2) the repair of the system, and (3) for direct growth. Every action and exertion is attended with a loss of substance, and hence exists the necessity for a corresponding supply of nutriment. For a certain length of time (according to the species or race), in addition to the preservation of an unstable equilibrium, there is also a demand for supply for increase of bulk, or growth, of the organism. The period and extent to which this is carried is, within certain limits, constant for each species.

(3) When the full stature or phase of development has been more or less nearly attained, the organs of reproduction become functionally developed, and provision for the perpetuation of the race is made. In plants, the female element is termed a seed; in animals, an ovum or egg. The male and female elements may be united in the same individual, as in most plants and many animals, but in the highest animals the sexes are always differentiated in distinct individuals. In mollusks, hermaphroditism is almost of ordinal value, but not more, and in at least one case (Valvatidæ) hermaphroditism occurs in an order of which the other members are diœcious. Among vertebrates, true hermaphroditism is only known (as an exceptional development) in certain fishes (Serranidæ); it is entirely unknown in the higher forms (mammals, etc.), all the reported cases to the contrary being referable to males with the genitalia in an embryonic condition, or females with the clitoris hypertrophied. The homologies of the male and female organs render it impossible that there shall be a union of the sexes in the same individual in the mammals. Actual fecundation of individual germs (seeds or eggs) by the male element is necessary, in most cases, for their development, but in exceptional cases (*e. g.* certain insects, crus-

taceous mollusks), females produce broods of young without having had direct previous intercourse with the male. This peculiar capability has been designated *parthenogenesis:* the unimpregnated eggs (in some forms) produce only females. The question of the determination of sex is still involved in obscurity.

(4) After a certain period, if the individual has escaped all the liabilities to death that occur from enemies, accidents, and disease, there is a decline in the activity of the functions, the system becomes disordered, and death ensues. This period, like those of growth and development of the reproductive power, is also, within certain limits, a constant term, and all reports of extreme longevity—such as the reputed ages of H. Jenkins (169 years), T. Parr (150 years), the countess Desmond (140 years), and others —are either based on very unsatisfactory evidence or demonstrably false.

(5) The offspring, although as a rule very similar to the parent, is never exactly alike, being always distinguishable by some more or less obvious difference or *individuality* of character. Occasionally, however, the offspring differs very markedly in some one character, which may or may not be co-ordinated with other correspondingly important differences. The newly developed peculiarity is apt to be transmitted either to the immediate offspring or to a succeeding generation, and sometimes in an exaggerated degree. But such peculiarities, if the individuals so distinguished pair with those not exhibiting them, generally disappear in their descendants after a longer or shorter course. If, however, the individuals thus characterized are set aside, and their immediate and remote descendants selected in ratio to their possession of some peculiarity, that peculiarity will be indefinitely perpetuated, and a new race distinguished thereby will be thus originated. By means of such *artificial selection,* unintentional or studied, the various races of domesticated animals have been produced. And as, in most cases, there is an obvious fitness of organized beings to the conditions under which they are found, it has been assumed that such relations are the result of the survival of beings possessing characteristics which may have spontaneously arisen, and which have gradually become (relatively) perpetuated in the "struggle for existence;" and hence the hypothesis of *natural selection* has originated. Inasmuch, also, as no offspring is exactly like the parents, it follows that no generation is exactly like the preceding; and although there must be a certain unstable equilibrium, resulting from constant interbreeding, in the incessant surge of variations, the descendants must necessarily depart more and more from their progenitors. While in an historical epoch no very obvious changes may be perceptible, eventually (unless by the interposition of miraculous agency) there must be a contrast between the extremes of a lineage, and the exhibition of such must be merely a question of time, determined to a greater or less degree by the changes of condition. The assumption of this hypothesis, and the inductive evidence furnished by various departments of science, have culminated in the theory of *evolution,* and for an explanation of the *modus operandi* of evolution, natural selection (or Darwinism) has been evoked. The evidence relied upon is chiefly derived from morphology (and the contrast between it and teleology), embryology, the geological succession and the geographical distribution of organisms.

While animals and plants differ from minerals, and agree with each other in all the characters thus specified, there are no such salient differences between themselves. It is, indeed, easy to distinguish the higher animals and plants, and they are, to a certain extent, antetypes and complementary to each other. On the one hand, plants derive their nourishment by absorption from the inorganic world through the external surfaces of their roots and leaves, and (under most conditions) decompose carbonic acid gas, assimilate carbon (and nitrogen), and eliminate oxygen. On the other hand, animals derive their nutriment, immediately or mediately, from plants, and ingest it either through a provisional or specialized alimentary cavity, imbibe oxygen, and exhale carbonic acid gas. The mode of taking nutriment is the most characteristic feature, and specialization especially tends to that end, but supplemented, in the animal, by a specialization of other systems to guide it in the selection and pursuit of its food. Some rather high animals (*e. g.* certain Entozoa) take their nutriment through their external surfaces, but this is rather a teleological modification co-ordinated with atrophy of the intestinal tube, superinduced by peculiar conditions of life. In view of the slight differences between animals and plants, and their contrast with minerals, it is evident that the ternary division of natural objects into animals, plants, and minerals does not express the degree of the relations between them; and hence the animal and plant kingdoms have been combined in an *organic empire* or realm on the one hand, and on the other minerals have been denominated an *inorganic empire.* The impossibility or great difficulty of discriminating the lowest plants and animals has also led some naturalists to separate them from the animal and vegetable kingdoms, and combine them in a peculiar one, which has received, with some varying limits, numerous names; *e. g.* Infusory world (Infusorienwelt), règne de Zoophytes, règnes Psychodaire, règne chaotique, règne Plantanimal, regnum Amphorganicorum, règne organique Primitive, kingdom of Protozoa, regnum Primigenium, kingdom of Primalia, and Protistenreichs. Such propositions, however, do not remove the difficulty, but only shift and complicate the questions, and obscure the recognition of the tendencies of the two antitypically functional divisions of nature. It need only be added that there is also, to some extent, a contrast in respect to individuality in the respective kingdoms, numerous individuals (flowers) being developed from the outgrowth of the contents of a single seed, while in all except some of the lower animals a single individual only originates from one egg. The subject of individuality, however, is a somewhat obscure one, and has provoked much discussion; and the question has been involved by the confusion of potential and actual individuality. (For more detailed information respecting the various subjects of biology, consult EVOLUTION, HERMAPHRODITISM, LONGEVITY, MORPHOLOGY, PALÆONTOLOGY, PARTHENOGENESIS, TAXONOMY, TELEOLOGY, ZOOLOGICAL GEOGRAPHY, and ZOOLOGY and BOTANY, and their respective subdivisions.)

THEO. GILL, *Smithsonian Inst.*

Bi′on of Smyrna, a Greek pastoral poet, was a friend and contemporary of Moschus, and lived about 250 B. C. His style is graceful and polished. He composed bucolic and erotic poems. Among his extant works is a lament for Adonis.

Biot (JEAN BAPTISTE), an eminent French natural philosopher and astronomer, was born in Paris April 21, 1774. He became in 1800 professor of physics in the College of France. In 1803 he was admitted into the Institute, and in 1805 published "An Elementary Treatise on Physical Astronomy" (2 vols.). An enlarged edition of this appeared in 5 vols., 1841–57. Having been appointed a member of the bureau of longitudes, he was sent to Spain with Arago to measure the arc of the meridian. He contributed many able articles to the "Biographie Universelle" and the "Annales de Chimie et de Physique," and published, besides other works, a "Treatise on Experimental Physics and Mathematics" (4 vols., 1816), which is highly esteemed, and "Researches in Ancient Astronomy" (1829). In 1840 he received the Rumford medal of the Royal Society of London for his researches on the circular polarization of light. He was admitted into the French Academy in 1856. Died Feb. 3, 1862.

Bi′otite, called also **Uniax′ial,** or **Magne′sian Mi′ca,** occurs in six-sided tubular prisms, having a perfect basal cleavage, and generally dark green, brown, or nearly black. It has a vitreous lustre, varies from transparent to opaque, is sectile, flexible, and elastic when reduced to thin laminæ. It consists chiefly of silica, alumina, magnesia, and oxide of iron, with some potassa.

Bi′ped [from the Lat. *bis,* "twice," "double," and *pes, pedis,* a "foot"], an animal which has two feet. Men and birds are almost the only animals to which the term is applicable. The two-footed saurians are thought to furnish a link between reptiles and serpents; certain two-footed batrachians seem to approach the character of fishes; while there are fossil biped reptiles which appear to have resembled birds.

Bi′pont Edi′tions, the name of certain editions of the Greek and Latin classics, the publication of which was commenced in 1779 at the German town of Zweibrücken (Deux-Ponts), called in Latin *Bipontium.*

Bir, or **Beer** [anc. *Bir′tha;* Turk. *Bireh-jik*], a town of Asiatic Turkey, on the left (E.) bank of the Euphrates, 74 miles N. E. of Aleppo. It has about 2000 houses, a citadel or castle on a steep rock, and several mosques. Caravans from Aleppo to Diarbekir and Bagdad cross the Euphrates at this point. Pop. about 6000.

Birch (*Bet′ula*), a genus of trees or shrubs of the order Betulaceæ, natives of temperate and cold regions in Asia, Europe, and America (several species are found among the Himalayas). The genus *Betula* is distinguished by ten to twelve stamens and winged seeds (achenia), has alternate, simple leaves, and flowers in scaly catkins. The common birch of Europe and Asia (*Betula alba*) is a handsome tree with triangular or deltoid leaves, which are doubly serrate. The bark is smooth and chalky white, and separable in thin sheets or layers. This bark is very durable, and is used for tanning, dyeing yellow, and other purposes. In some countries hats, shoes, and boots are made of it. The wood is firm, tough, and valuable, and is much used by coopers, turners, and wheelwrights. The sap is esteemed as a beverage in Scotland, both in a fresh state and fermented. Europe produces a graceful variety called weeping birch (*Betula pendula* of some botanists), which attains a height of sixty feet, and has very slender and pendulous branches. The American white birch, which, according to Gray, is a variety of the above, is a small, graceful tree with tremulous, deltoid, and shining leaves, but is not valuable for timber. Among the other species indigenous in the U. S. are the *Betula lenta* (sweet or black birch), *Betula excelsa* (yellow birch), and *Betula papyracea* (canoe or paper birch). The *Betula lenta* is a rather large tree, the bark of which is aromatic, yielding an essential oil identical with that of *Gaultheria*, and the timber is fine-grained and valuable for cabinet-work. The *Betula papyracea* grows in the Northern States to the height of about seventy feet, has a fine-grained wood, and a very tough, durable white bark, splitting freely into thin layers, which have been used as paper. The Indians make canoes of this bark. The *Betula lutea* (or *excelsa*) sometimes attains a height of nearly eighty feet, and is remarkable for the brilliant yellow tint of its bark or epidermis. The leaves are from three to five inches long. Besides the above and several less important species, the U. S. have the *Betula nigra*, or river birch, which grows on the banks of streams and has remarkably tough wood. Russia leather is tanned with birch bark. "Russian oil" is a tar-like, empyreumatic substance obtained from birch-wood in Russia, and is useful in certain skin diseases.

Birch (Samuel), LL.D., born in London Nov. 3, 1813, was educated at Greenwich and Blackheath, and afterwards at Merchant Taylors' School, which he left in 1831, and was first employed under the commissioners of public records. In 1836 he was appointed assistant in the department of antiquities of the British Museum, from which he rose to be assistant-keeper in 1844, and in 1861 keeper of the Oriental, mediæval, and British antiquities and ethnographical collections. He was considered one of the best modern Egyptologists, was the author of nearly all the last volume of Bunsen's work on Egypt, and published a treatise on "Hieroglyphics" (1857), the "Rhind Papyri" (1866), etc. In 1878 he edited Wilkinson's "Manners and Customs of the Ancient Egyptians," and was editor of "The Records of the Past" from 1873 to 1880. Died Dec., 1885.

Birch (Thomas), D. D., F. R. S., an English biographer and historian, born in London Nov. 23, 1705. He took orders in the Anglican Church, and became rector of a parish in London. Among his numerous works are "The General Dictionary, Historical and Critical" (10 vols., 1734–41), a "Life of Archbishop Tillotson" (1752), "Memoirs of the Reign of Queen Elizabeth" (2 vols., 1754), and a "History of the Royal Society" (4 vols., 1757). Died Jan. 9, 1766.

Birch-Pfeiffer (Charlotte), a German actress and dramatic writer, born at Stuttgart June 2, 1800, was married to Dr. Birch of Copenhagen in 1825. She attained success as a performer and a writer. Among her dramas are "Die Günstlinge," "Hinko," "Dorf and Stadt" (1848), and "Anna of Austria" ("Anna von Oestreich," 1850). Died Aug. 25, 1868.

Bird. See Birds.

Bird (Edward), an English painter of genre and rural scenes, was born at Wolverhampton in 1772. His "Field of Chevy Chase the Day after the Battle" is called his masterpiece. Died in 1819.

Bird (Frederick Mayer), son of Robert Montgomery Bird, noticed below, was born in Philadelphia June 28, 1838, graduated at the University of Pennsylvania in 1857, and at the Union Theological Seminary in New York City in 1860. For several years he was a minister in the Lutheran Church, serving as chaplain in the Union army during the winter of 1862–63. In 1868 he entered the Protestant Episcopal Church, and in 1870 became rector of St. Peter's church in Spottswood, N. J. He owns the largest hymnological library, and is the best-informed hymnologist, in the U. S. He was main editor of the Lutheran Hymn-Book (1865), published "Charles Wesley seen in his Finer and less Familiar Poems" (1867), assisted Bishop Odenheimer in compiling "Hymns of the Spirit" (1872), and has contributed many articles to reviews and newspapers. He became in 1881 professor in Lehigh University, Pa.

Bird (Golding), M. D., an English physician and writer, born in Norfolk in 1815, practised in London, where he also lectured on medical botany. He published a valuable work on the urine. Died in 1854.

Bird (Robert Montgomery), M. D., an American author, born at New Castle, Del., in 1808. He practised medicine in Philadelphia, and wrote, besides other works, "The Gladiator," a tragedy which was successful; "Calavar, a Romance of Mexico" (1834), and the "Infidel," a novel (1835). He became in 1847 one of the chief editors of "The North American and United States Gazette," a daily paper of Philadelphia. Died Jan. 22, 1854.

Bird-Catching Spider (*Mygale avicularia*), a spider of Cayenne and Surinam. Its body is nearly two inches long, but its legs when stretched out occupy a space almost a foot in diameter. The hooks of its mandibles are black and very strong. It does not construct a net or web for the capture of its prey, but it obtains it by the chase, and hunts only in the night. This spider and other species of *Mygale* will attack and kill small birds. It is asserted that in some tropical countries there are spiders which feed upon birds caught in their webs.

Bird-Catching Spider.

Bird Cherry, a name given in England to the *Prunus Padus*, which is a small tree growing wild in Europe, and called *hagberry* in Scotland. It bears racemes of small drupes of a sweetish and bitterish taste, which are used in the north of Europe to make spirituous liquors. Nearly allied to this is the wild cherry or choke cherry of the U. S. (See Prunus Virginiana.)

Birde, or **Byrd** (William), a distinguished English composer of church music, born in 1540. In conjunction with Thomas Tallis he became organist to Queen Elizabeth in 1575. He produced, among other works, "Sacred Songs," and a magnificent canon entitled "Non Nobis, Domine." Died in 1623.

Bird Lime [Lat. *vis'cus*], a viscous adhesive substance placed on the branches of trees to catch birds which may perch there. It is prepared by boiling the middle bark of the holly (*Ilex*), the mistletoe (*Viscum album*), or other glutinous plants, and concentrating the decoction by evaporation. The gluten of wheat flour is sometimes used as a substitute for bird lime. A tame bird in a cage is sometimes employed to decoy the birds to the tree on which the bird lime is smeared.

Bird of Paradise, the name of several species of birds of the genus *Paradisea* and kindred genera, of the order Insessores, and of the tribe Conirostres, natives of Papua and the neighboring islands, remarkable for the beautiful form and splendor of their plumage. The name was originally applied to the *Paradisea apoda*, which was supposed to be destitute of feet, because the skins, which are exported to Europe, are usually deprived of wings and feet. The older naturalists imagined that they passed all their lives floating in the air and feeding on ethereal food or nectar. For these fabulous and fanciful ideas science substitutes the prosaic truth that they are nearly allied to the Corvidæ (crow family), and are omnivorous. The value of these birds arises chiefly from the extraordinary development and light and beautiful structure of the plumes which grow from the scapular and lateral portions of the body. The plumage of the males is remarkable not only for brightness of tints, but also for a velvety texture and brilliant metallic reflections. Tufts of feathers growing from the shoulders are so prolonged that they extend even beyond the tail, and they constitute the most beautiful part of the plumes of the bird of paradise, which are a highly prized article of commerce for female ornament. The principal species of this genus are the common bird of paradise (*Paradisea apoda*), the royal bird of paradise (*Cicinnurus regius*), the red bird of paradise (*Paradisea rubra*), the magnificent bird of paradise (*Diphyllodes magnifica* or *speciosa*), and the six-threaded (or golden) bird of paradise (*Parotia sefilata*), from the head of which grow six long and thread-like feathers, each ornamented with an ovate black racket, three on each side. The common bird of paradise is about as large as a jay, and is mostly of a cinnamon color, with a throat of emerald green, whence it is sometimes called the EMERALD BIRD OF PARADISE (which see). The royal bird of paradise has two long feathers or filaments, which extend behind the tail and terminate in disks, like the tail-feathers of a peacock. The red bird of paradise has two very long filaments, extending far beyond its rich and beautiful tail-feathers. Birds of paradise are generally gregarious, and they sometimes fly in flocks from one island to another. It is stated that they can fly more easily against than with the wind. In confinement they are lively and bold, and bestow great care on their plumage. We are now acquainted with twenty-five species.

REDMAN-KENNY.N.Y.

Bird of Paradise.

Red Bird of Paradise.

A recent writer, referring to what he calls "the supremely glorious members of the feathered tribe which have by common consent been termed BIRDS OF PARADISE," observes that "The plumage of these birds is wonderfully rich and varied, and not even the humming-birds themselves present such an inexhaustible treasury of form and color as is found among the comparatively few species of the birds of paradise." (See WALLACE, "Malay Archipelago.") J. S. NEWBERRY.

Birds [Lat. *aves;* Fr. *oiseau*, plu. *oiseaux;* Ger. *Vögel*], a class of oviparous vertebrate animals, which in several respects are peculiar, and separated from other animals by a very distinct line of demarcation. They are all bipeds, and are all covered with feathers, which nature has given to no animals of other classes. Nearly all birds have the power of flight, which is enjoyed by few other vertebrate animals. The most conspicuous external characteristic of birds is the plumage, which invests their bodies and wings, serves as clothing, and assists in motion through the air. The feathers entangle among their fibres a considerable quantity of air, and are well adapted to protect the bird from extremes of cold and heat. The internal temperature of birds is from 105° to 112° F., much higher than that of men and beasts. Their buoyancy and muscular energy are increased by numerous air-cells which are connected with the lungs, penetrate the substance of the bones, insinuate themselves between the skin and subjacent muscles, and enter the quills, so that the whole organism is permeated by air. The general form of birds is adapted to aërial navigation, and the body is somewhat boat-shaped. The number of vertebræ in the neck varies from ten to twenty-six, and is always greater than is found in any mammal. Among their peculiar organs are the toothless jaws, covered with a hard, horny sheath, forming the beak or bill. (See BILL.) The head is so articulated to the neck by a single condyle or pivot that a bird can turn its head round in a manner impossible to Mammalia. The number of toes of each foot is generally four, of which three extend forward and one backward: but the Zygodactyli (climbers) have two before and two behind. The various forms of the toes are the characters which distinguish the five primary orders. (See ORNITHOLOGY for further details.) The sternum or breast-bone is very large and strong, with a prominent keel, except in Ratitæ, serving for the attachment of the powerful muscles which move the expanded wings. The wing of a bird is the homologue of the arm of a man, and is composed of bones which correspond to those of a human arm or the fore leg of a quadruped. The wing is furnished with numerous feathers, called quills, which display an admirable combination of strength and lightness. The names of the several varieties of wing-feathers are *primaries, secondaries, tertiaries*, and *coverts*. The primaries are quill-feathers arising from the first or terminal joint—*i. e.* the part of the wing which corresponds to the hand and fingers of a man. The form of these indicates the bird's capacity of flight, and birds of powerful flight have long and firm primaries. Next to these are the secondaries, which are attached to the middle bone, the homologue of man's fore arm. The tertiaries grow from the part of the wing between the elbow and the shoulder. The leg of a bird is formed of bones which are homologous to those of Mammalia, but are subject to modifications. The thigh-bone is very short, and is so concealed within the body or under the feathers that it is not apparent as a part of the leg on a superficial view. The next division, often mistaken for the thigh, is the *tibia* or proper leg-bone, which is always the largest bone of the limb. The feet vary according to the habits of the birds, some of which have strong, hooked, and retractile claws fitted for seizing prey, and others are adapted for swimming by a membrane which unites their toes.

The digestive apparatus is modified in accordance with the nature of their food. Birds do not masticate their food, which passes from the mouth into the crop or craw, which is merely an enlargement of the gullet. The *crop*, or first stomach, is large in birds that feed on grain and seeds, and is wanting in those that eat fish. The second stomach, or *proventriculus*, is largest in those birds in which the crop is small or wanting. The third and principal stomach is the *gizzard*, which is a powerful grinding apparatus, especially in those birds which feed on grain and swallow gravel and pebbles, as the common domestic fowl. Birds sleep generally with the head under their wing, and some prefer to stand on one foot while asleep. Others pass the night on branches of trees, which without effort they clasp with their claws, for the tendons of the muscles which close the claws pass over the joints of the leg in such a manner as to be stretched by the mere pressure when the weight of the bird rests on the legs. The sense of sight in this class is exceedingly keen, and is remarkable for its perfect adaptation to near or distant objects. The swallow, when darting through the air with a swiftness which has become proverbial, is capable of accommodating its sight to the insect which it pursues, even in the short time which is occupied by its swoop at its victim. Some birds of prey have an acute sense of smell, and nocturnal birds, such as owls, have sensitive organs of hearing. Birds are distinguished among all dumb animals for their musical powers, and song-birds are doubtless sensitive to sound and differences of pitch. All the best singing-birds belong to the *Passeres*.

Among the most interesting subjects connected with the birds are their migrations and the vastly diversified instincts and ingenuity which they exhibit in building nests. The number of eggs in a state of nature varies from one to twenty, and birds generally breed only once a year, which is in spring. Many species of birds are gregarious, but large rapacious birds are quite solitary in their mode of life. They all moult—*i. e.* change their feathers once a year—and the summer plumage of many birds is very different from the winter dress. The plumage of the males is generally richer and more brilliant than that of the females. Birds perform an important part in the economy of nature. Their flesh and eggs are valuable as food for man, and many species render him great service by checking the increase of insects. "There are few objects," says J. G. Wood, "which will better repay investigation than the young bird in its various stages of development. It is so wonderful to see the manner in which a living creature is gradually evolved from the apparently lifeless substances that are contained within an egg. The being seems to grow under our very gaze, and we arise from the wondrous spectacle with an involuntary feeling that we have been present at a veritable act of creation." (For the classification of birds, see ORNITHOLOGY.)

The earliest traces of the existence of birds on the globe have been supposed to be the so-called birds' tracks in the triassic sandstones of the Connecticut Valley; but it is now generally conceded that most if not all these tracks were made by reptiles and amphibians. It is especially noteworthy that the earlier birds (Jurassic and cretaceous) had true teeth in their jaws. In the lithographic slates of Solenhofen (Jurassic) have been found a feather and two nearly complete bodies of birds exhibiting some remarkable features and representing a peculiar order (Saururæ) that is supposed to form a kind of connecting link between birds and reptiles. (See ARCHÆOPTERYX.) The remains of birds have been found in the greensand of England, the eocene of the island of Sheppy, and the Paris basin, as well as in the more recent tertiaries at various European localities. In America fossil birds were unknown until quite recently; they have now been found, however, in the greensand of New Jersey, the cretaceous beds of Kansas, and the tertiary deposits of Wyoming and Idaho. The cretaceous birds, according to Prof. O. C. Marsh, belong to two distinct orders named Odontormæ and Odontalcæ. The most important of his discoveries in this branch of palæontology is that of birds with teeth in the cretaceous beds at Fort Harker, Kan. In the superficial deposits of New Zealand and Madagascar the remains of several kinds of extinct birds have been met with, some of which far exceed in dimensions the largest now living. The great bird of Madagascar is called *Æpiornis maximus*. It is supposed to have been at least twelve feet in height, and very massive. The egg of this bird was over a foot in length. The contents of one of these eggs were equal to those of six ostrichs' eggs or 148 hens' eggs. The largest extinct birds of New Zealand have been described under the name of *Dinornis* by Prof. Owen. They were from six to ten feet in height; and one species, *Dinornis elephantopus*, had legs and feet nearly as massive as those of the elephant. J. S. NEWBERRY.

Birdsall (WILLIAM RANDALL), M. D. See APPENDIX.

Bird's-Eye Limestone, a compact, dove-colored stone, with whitish crystalline points, belonging to the lower division of the Trenton group of the lower Silurian strata of North America, apparently corresponding to the Llandeilo flags. It contains many orthoceratites of enormous size, and fossil brachiopods.

Bird's-Eye View, a term used in the fine arts to denote a picture or view arranged according to the laws of perspective, in which the point of sight or situation of the eye is placed at a considerable height above the object. If the eye is considered as looking perpendicularly down while it sweeps over each point of the scene in succession, we have an exact ground-plan, no object covering another, and horizontal angles being exactly delineated. This is a convenient method of representing battles, or of depicting a large city or a small tract of country. In sketching a locality for military purposes this kind of perspective is used. The common kind of bird's-eye view differs from ordinary perspective only in that the horizontal line is placed considerably above the picture.

Bird's Foot (*Ornith'opus*), a genus of plants of the order Leguminosæ, sub-order Papilionaceæ, derives its name from the resemblance of the curved pods to birds' claws. One species, the *Ornithopus sativus*, an annual plant, a native of Portugal, is cultivated in that country, and affords a nutritious green fodder for cattle.

Bird's Foot Trefoil (*Lotus*), a genus of plants of the order Leguminosæ, sub-order Papilionaceæ, comprises numerous species, natives of the temperate and cold regions of the Old World. They are so called because a cluster of their pods resembles a bird's foot. The *Lotus corniculatus* is common in the pastures of Great Britain, and is eaten with avidity by cattle. It bears yellow flowers, which have a honey-like smell, and leaves which are trifoliate, like those of clover. A larger species or variety, called *Lotus major*, is also a native of England.

Birds' Nests, Edible, the nest of the sea-swallow (*Hirundo esculenta*) of the Malay Archipelago, a bird of the size of a common martin. It builds its nest of a glutinous substance which it is said to derive from a sea-weed. This weed is swallowed and partly digested, and then disgorged and fashioned into a nest as large as a common coffee-cup. When fresh these nests are of a waxy white color, and are said to be worth twice their weight in silver in the markets of China, where alone they are sold. The poorer sorts bring $5 or more a pound, according to the age of the nests. The taste of dishes prepared from these nests is said to be insipid, but the Chinese prize them, not perhaps so much for their taste as for their supposed tonic and aphrodisiac powers.

Birds of Passage are birds which are migratory, passing instinctively and habitually from one country or latitude to another on account of the change of the season. The migration of birds is generally from north to south, or from south to north, in the temperate zones. They migrate twice in a year, moving northward in the spring, and southward in the autumn, directed by a sagacious instinct to the regions in which their proper food is then most abundant. Migratory birds which breed in the U. S. are called summer birds of passage with reference to those States. They return in autumn to the tropical regions, and are winter birds of passage in the countries where they pass the winter. Wild-geese and other waterfowl that breed in the Arctic regions in summer annually visit the U. S. and Great Britain in autumn, and return northward in the spring. Several other species that are not aquatic, as the woodcock, fieldfare, and snow-bird, pass the winter in the temperate parts of Europe or the U. S., and spend the summer in a more northern latitude. On the approach of cold weather the swallows of Europe pass across the Mediterranean into Africa. "Before the time of migration," says Wood, "they may be seen assembled in great numbers, chattering eagerly and appearing to be holding a great parliament for the settlement of affairs before starting on their long journey. They do not migrate in flocks, but pass in little families of two or three in number across the vast space that separates them from the end of their journey. Although such powerful and swift fliers, they become fatigued in passing the sea, and will flock in great numbers to rest upon the rigging of some ship that may happen to pass their course. It is rather curious that the birds almost invariably fly in a line directly north and south."

Bi'ren, Biron, or **Bu'ren** (Ernest John), duke of Courland, was born in 1687. He gained the favor of Anna (a niece of Peter the Great), who became empress of Russia in 1730, and gave him the title of duke. He was a powerful favorite during her reign, and abused his power by the execution of many innocent persons. On the death of Anna in 1740 he became regent, but he was exiled to Siberia in 1741. When Elizabeth ascended the throne in 1741 she permitted him to return to Russia, and in 1763 the duchy of Courland was restored to him. Died Dec. 28, 1772. (See Ruehl, "Geschichte E. J. von Biron," 1764.)

Birk'enhead, a seaport-town of England, in Cheshire, is on the left bank and near the mouth of the Mersey, opposite Liverpool, and 15 miles N. N. W. of Chester, with which it is connected by railway. It is about 1½ miles S. W. of Liverpool, and is the residence of many merchants who do business in that city. Steamers cross the river between these places once in fifteen minutes, or oftener, and a tunnel to connect them is being built. Birkenhead was only a small fishing-village as recently as 1824, since which it has increased rapidly in consequence of the construction of extensive docks and important public works. It has wide streets, a fine public park, a college called St. Aidan's (designed for the education of young men for the Anglican ministry), and many handsome villas. One of the docks occupies 120 acres. Pop. in 1881, 83,324.

Bir'mingham, one of the greatest manufacturing cities of England, is situated in the county of Warwick, on the river Rea, 79 miles by rail S. E. of Liverpool, and 130 miles by rail N. W. of London. It is built on the eastern slope of three undulating hills, and has a gravelly foundation. Its suburbs extend into Staffordshire and Worcestershire. It returns three members to Parliament. Birmingham is the chief town of Great Britain for the manufacture of hardware and metallic products made of gold, silver, brass, iron, steel, and mixed metal, including firearms, swords, jewelry, buttons, tools, steel pens, locks, steam-engines, and all sorts of machinery. The value of the goods manufactured here in a year is estimated at more than £4,500,000. From a very early period Birmingham has been a seat of manufactures in metal, and from the close of the seventeenth century it became one of the principal centres of that industry, partly on account of its easy access to cheap coal and iron, and partly on account of its freedom, there being no guilds or companies, or restrictions of any kind. The chief variety is the brass-working trade, in which more than 10,000 people are engaged, and which annually consumes more than 50,000 tons of metal. Next come jewelry, gold, silver, and gilt. Then follow small-arms of all kinds, some of the larger factories being able to turn out 2000 stand per week. Further specialties are buttons, hooks and eyes, pins, and other articles of dress; screws and nails, of which trade Birmingham has a kind of monopoly; steel pens, of which there are produced about 20,000,000 a week, one factory consuming five tons of steel every week; electro-plating, which was first established there in 1848; bell-founding, the making of steel toys, etc. Here are also extensive manufactures of glass and papier-maché. Several railways extend from this city to London, Liverpool, Manchester, etc. Birmingham contains about 100 churches; Queen's College, connected with the London University; a free public library; a botanic garden; a Roman Catholic cathedral; and a town-hall, which is a handsome edifice of the classic style, with a very fine organ. A musical festival is held in this hall once in three years. In the vicinity of Birmingham are the famous Soho and Smethwick Works, founded by Watt and Boulton, who there manufactured their first steam-engines. Among the charitable institutions are an asylum for the deaf and dumb and an asylum for the blind. Pop. in 1881, 400,757.

Birmingham, a city and important R. R. centre, capital of Jefferson co., Ala. (see map of Alabama, ref. 3–C, for location of county). Extensive beds of coal and iron ore lie in its vicinity, and contribute essentially to the prosperity of the place. It has been proposed to make it the capital of the State. Pop. in 1880, 3086.

Birmingham, a manufacturing borough of New Haven co., Conn. (see map of Connecticut, ref. 6–D, for location of county), on R. R. and the Housatonic River, at the mouth of the Naugatuck, 9 miles W. of New Haven. A bridge across the Naugatuck connects it with the village of Old Derby, on R. R. It has several rolling-mills, and manufactures of augers, chains, pins, and carriage-axles and springs. Steamboats ply daily between this place and New York. Here is the first pin-factory established in the U. S. Pop. in 1870, 2103; in 1880, 3026.

Birmingham, a former borough of Alleghany co., Pa., on the left (W.) bank of the Monongahela River, 1 mile S. of Pittsburg, with which it is connected by a bridge 1500 feet long. It derives its prosperity chiefly from manufactures of glass and iron. In 1872 it was united to Pittsburg.

Bir'nam, a hill of Scotland, in Perthshire, 12 miles N. W. of Perth, is 1580 feet high, and commands a fine view of the valley of the Tay. It was formerly covered by part of a royal forest, to which Shakspeare has given celebrity in his tragedy of "Macbeth."

Bir'ney (David Bell), an American general, born at Huntsville, Ala., May 29, 1825, practised law in Philadelphia. He became a brigadier-general of Union volunteers in 1861, and as such served at Fredericksburg, Dec., 1862. He was raised to the rank of major-general, and commanded a division at Gettysburg in July, 1863, and in several battles in Virginia in 1864. Died Oct. 18, 1864.

Birney (James G.), a distinguished opponent of slavery, the father of the preceding, was born at Danville, Ky., Feb. 4, 1792, graduated at Princeton in 1812, and became a lawyer. He was the owner of about twenty slaves, whom he liberated, and he founded at Cincinnati an anti-slavery paper called "The Philanthropist." His office was soon attacked by a mob, which threw his press into the river. Having become secretary of the American Anti-Slavery Society, he removed to New York City about 1836. He was nominated in 1840 for the presidency of the U. S. by the Liberty party, which also supported him in the election of 1844. Died Nov. 24, 1857.

Biron, de (Charles de Gontaut), Duke, a French general, born in 1562, was a son of Armand (died 1592). He served with distinction at Ivry 1590, became a favorite of Henry IV., marshal of France in 1595, and was appointed governor of Burgundy. He was ambitious, and was convicted of forming a treasonable plot with the duke of Savoy, for which he was put to death July 31, 1602. (See De Thou, "Historia sui Temporis;" Martir-Rizo, "Historia de la Vida del Duque de Biron," 1629.)

Birth-Marks. See Nævus.

Bisa'ccia (anc. *Romulea*), a town of Italy, in the province of Avellino, on a hill 32 miles E. N. E. of Avellino. Here is a much-frequented sulphur spring. Pop. 5342.

Bisaqui'no, Busaqui'no, or **Busacchi'no,** a town of Sicily, in Palermo, 30 miles S. S. E. of Palermo, has an extensive trade in grain and oil. Pop. 8585.

Bis'cay, or **Bisca'ya** [Sp. *Vizca'ya*], one of the four Basque provinces of Spain, is bounded on the N. by the Bay of Biscay, on the E. by Guipúzcoa, on the S. by Alava, and on the W. by Santander. Area, 834 square miles. It consists partly of mountains and partly of level plains. The chief products are wine, fruit, walnuts, chestnuts, figs, and grain. Capital, Bilbao. Pop. 189,954.

Biscay, Bay of [Fr. *Golfe de Gascogne;* anc. *Gal'licus Oce'anus*, or *Aquitan'icus Si'nus*], a portion of the Atlantic Ocean bordering on France and Spain, extends from the French island of Ushant to Cape Ortegal. The depth, which is greatest near the coast of Spain, varies from 20 to 200 fathoms. The southern or Spanish coast is bold and rocky, but the E. coast, from the Adour to the mouth of the Gironde, is low and sandy. The largest rivers that flow into this bay are the Loire and the Gironde. The principal ports on it are Nantes, Bordeaux, Bayonne, La Rochelle, the new port La Pallice, and Rochefort in France, and Bilbao and Santander in Spain. Violent currents and winds render the navigation of this bay difficult.

Biscayne, a post-village of Dade co., Fla. (see map of Florida, ref. 5–F, for location of county), on Biscayne Bay. It is celebrated for its healthfulness and delightful climate, and it has been proposed to establish here a tropical botanic garden. On Key Biscayne there is a lighthouse with a fixed white light 100 feet above the sea; lat. 25° 39′ 51″ N., lon. 80° 09′ 24″ W. It has important sponge-fisheries. Pop. not given in census of 1880.

Bisce'glia [Lat. *Vigiliæ*], or **Bise'glie,** a fortified seaport-town of Italy, in the province of Terra di Bari, on the Adriatic, 25 miles W. N. W. of Bari. It has a cathedral, a college, and several churches and convents. Excellent currants and olives are raised in the vicinity. It is connected by rail with Foggia and all the points along the coast S. of Barletta to Brindisi. Pop. in 1881, 23,877.

Bisch'of (Karl Gustav), a German chemist, born at Wörd, near Nuremberg, Jan. 18, 1792. He became professor of chemistry at Bonn in 1822. His chief work is a "Manual of Chemical and Physical Geology" (2 vols., 1847–54; 2d ed., Bonn, 1863–66). Died Nov. 30, 1870.

Bischoff (Theodor Ludwig Wilhelm), a German physiologist and anatomist, born at Hanover Oct. 28, 1807. He became professor of anatomy at Heidelberg in 1836, at Giessen in 1843, and obtained a chair at Munich in 1854.

He gained distinction by his researches in embryology, on which he wrote several treatises.

Bisch'weiler, a town of Alsace, on the river Moder, 14 miles by rail E. N. E. of Strasburg. It has manufactures of linens, coarse woollen cloths, gloves, and earthenware. It is the centre of the hop-trade in Lower Alsace. Near it is a rich mine of iron. It was formerly fortified. Pop. in 1880, 6827.

Bis'cuit [Fr. *bis*, "twice," and *cuit*, passive part., from *cuire*, to "cook" or "bake"], a hard kind of unfermented bread formed into small cakes or flat pieces, and sometimes called ship-bread or sea-biscuit. It is composed of wheat flour, water, and salt, and is rendered hard and dry by baking, in order that it may be preserved for a long time. Biscuits are exposed to the heat of an oven for about twelve minutes, and afterwards dried in a warm room for two or three days. "Captain's biscuit" is prepared with butter, in addition to the ingredients mentioned above, and sometimes contains milk. Water or hard biscuits are made of flour, water, with variable quantities of butter, eggs, and sugar. Soft biscuits contain increased proportions of butter and sugar. Several varieties of fermented biscuits are manufactured. Meat biscuit consists of wheat flour, combined with the essential or soluble part of beef, so that the nutritive qualities of the meat may be preserved for a long time. To prepare this biscuit large pieces of beef, with water sufficient to cover them, are subjected to slow ebullition. The fat is skimmed off, the liquor is reduced by evaporation to the consistency of syrup, and is then mixed with wheat flour, rolled out to the thickness of ordinary ship-biscuit, and cut, baked, and dried in the same manner as common biscuits. One pound of meat biscuit contains about one half pound of flour and the soluble part of five pounds of meat. It is used in the form of soup, which is made by boiling the biscuit in twenty times its weight of water for half an hour. (See Pemmican.)

Biscuit, in pottery, is applied to porcelain and earthenware after it has been hardened in the fire, and before it has received the glaze. In this state it is porous and permeable to water. Biscuit in sculpture is a species of porcelain, of which groups and figures in miniature are formed, which are twice passed through the furnace or oven.

Bish'areen', a name given to several nomadic tribes who live in the desert between the Red Sea and the valley of the Nile. Their most valuable possessions are camels, horses, sheep, and goats. They have no firearms, but are armed with bows and arrows, and are addicted to robbery. They profess the Mohammedan religion. One tribe of Bishareen is the largest Arab tribe of Nubia. Like all the Arabs of Upper Egypt, they pay taxes to the khedive.

Bish'op [Gr. ἐπίσκοπος (*i. e.* "overseer"); Lat. *epis'copus;* Fr. *évêque;* Ger. *Bisch'of;* Dutch, *bis'cop*], the name applied to an ecclesiastic of the highest rank in the Christian Church—all archbishops, patriarchs, and the pope himself belonging to the order of bishops. In many Protestant denominations the order of bishops is held to be identical with that of presbyters or elders; and in such sects these names are used in preference to that of bishop. Other churches claim for their bishops, by direct succession, an authority derived from the twelve apostles. The principal churches recognizing the superior rank of bishops are the Greek, the Roman Catholic, the Armenian, Coptic, Abyssinian, Nestorian, and Jacobite, the various parts of the Anglican, the Moravian, the Mormon, the Catholic Apostolic (Irvingite), and a part of the Lutheran churches. The Methodist Episcopal churches and some others give their bishops a superiority of office, but not of order. In the Roman Catholic and Anglican churches bishops have the title of "right reverend." In the former, bishops are of six classes: 1st, the pope; 2d, patriarchs; 3d, primates, who are archbishops of the principal sees of some countries; 4th, metropolitans, who are bishops of the large cities, and have a certain authority over smaller sees; 5th, simple bishops; 6th, inferior bishops, as *episcopi vacui*, bishops without cures; bishops *in partibus infidelium*, who are titular bishops, either without office or coadjutors to diocesan bishops. The assistants of metropolitans are called suffragans, but the bishops under a metropolitan are also termed his suffragans. The insignia of bishops in the Greek and Roman Catholic churches are the ring, staff, mitre, gloves, pallium (now worn only by superior bishops), and pectoral. In Great Britain and its dependencies bishops are called lord bishops; and all English bishops, except the bishop of Sodor and Man, and the junior bishop in England proper, are entitled to votes in the House of Lords. The Church of England has 33 bishops, including the archbishops of Canterbury and York. (See Vicar Apostolic.)

Bishop (Anna), born in London in 1814, was the daughter of Mr. Rivière, an artist. In 1831 she married Sir H. R. Bishop. Her *début* was made in 1837. She has won the highest distinction as a singer, both in classical music and modern opera. D. Mar. 19, 1884. Her second husband was Mr. M. Schultz of New York, whom she married in 1858.

Bishop (Sir Henry Rowley), Mus. Dr., an eminent English composer of music, born in London in 1780. He produced numerous popular operas, which are commended for their long flowing melodies and animated style. Among them are "Guy Mannering," "Maid Marian," "Native Land," and "The Virgin of the Sun." His glees are very fine. He was knighted in 1842, and was appointed professor of music in the Univ. of Oxford in 1848. Died Apr. 30, 1855. His second wife was Anna Bishop, noticed above.

Bishop Seabury Mission. See Appendix.

Bismarck, on Northern Pacific R. R. and E. bank of Missouri River, capital of Dakota and Burleigh co. (see map of Dakota, ref. 3–D, for location of county), is situated within 43 miles of the centre of the Territory. The Missouri River is navigable for boats of 250 to 700 tons for 1200 miles above Bismarck, which contains the Capitol (costing $300,000), the penitentiary ($50,000), a courthouse ($30,000), graded schools, 2 brick public-school buildings (one costing $25,000), also Presbyterian, Methodist Episcopal, Baptist, and Catholic churches. In 1883, 217 buildings, costing $850,000, were erected. The bridge across the Missouri River cost $1,500,000. Pop. in 1880, 1758; in 1885, 3067. "Bismarck Tribune."

Bis'marck-Schön'hausen, von (Otto Edward Leopold), Prince, Prussian statesman, born at Schönhausen on the 1st of April, 1815. He was educated at the universities of Göttingen and Berlin, and wholly adopted the ideas of Fred. Jul. Stahl with respect to state and government. After he had studied law, he resided for some years on his paternal estate in Pomerania, and married Johanna von Putkammer in 1847. He was chosen the same year a member of the united Diet or parliament, in which he distinguished himself as a Junker and an advocate of ultra-royalist principles. In 1851 he began his diplomatic career as Prussian secretary of legation at the Federal Diet in Frankfort. Here he manifested his hostility to Austria, and his determination to aggrandize the Prussian monarchy. He was sent to Vienna in 1852, and to St. Petersburg in 1859. He soon acquired the confidence of the king, who sent him early in 1862 on a mission to Paris, and in the autumn of that year he was appointed minister of foreign affairs and prime minister. His reactionary policy being vehemently resisted by the liberals, he dissolved the chamber in Oct., 1862, and declared that he would enforce his measures without the sanction of the deputies. He rendered himself very unpopular, especially with the party of progress and the friends of constitutional government, though there was one point in which he fully agreed with the liberal party, and which later on brought him in close alliance with them—his proud feeling of nationality and his enthusiasm for the unity of Germany. Already the war with Denmark in 1864 gave him an opportunity of revealing this side of his policy, and had a conciliatory effect.

The rivalry of Austria and Prussia was the great obstacle to the reunion or reconstruction of Germany as a nation. Bismarck adopted the plan of excluding Austria from Germany and uniting the German states under the leadership of Prussia. Both powers prepared for war, and as Austria was supported by a majority of the Federal Diet, Prussia seceded from the confederation and appealed to arms in June, 1866. The Prussian armies, assuming the offensive, marched rapidly into Bohemia, Saxony, and Hanover, and defeated the Austrians at the decisive battle of Sadowa, July 3, 1866. The war was ended by a treaty signed in August of that year, by which Austria was excluded from the German federation. Hanover, Electoral Hesse, Holstein, and other states were annexed to Prussia, and the North German Confederation, including all the states N. of the river Maine, was formed. Bismarck negotiated in 1866 secret treaties of alliance with Bavaria, Baden, and Würtemberg, which powers agreed that the king of Prussia should command their armies in time of war, and in 1867 he was appointed chancellor of the North German Confederation.

The prestige of Napoleon was much impaired by the great step which had been made in 1866 toward the unity of Germany, and the rise of a new military power so alarming to the French. The streets of Paris resounded with the cry of "Revenge!" for Sadowa, and in July, 1870, Napoleon, for some futile reason, declared war against Prussia, which was ready for the contest after a few days' notice, and was aided by all the German states except those of Austria. Bismarck accompanied the German army which invaded France, and which gained a series of decisive victories. He was present at the capture of Napoleon at Sedan, and followed King William to the siege of Paris. At an interview with Jules Favre, the French minister of foreign affairs, who made overtures of peace in September, Bismarck demanded the cession of Alsace and part of Lorraine. After the surrender of Paris in Feb., 1871, he negotiated the treaty of peace by which France ceded to the victors Alsace and a part of Lorraine, including the important fortress of Metz, and agreed to pay an indemnity of $1,000,000,000. The definitive treaty was signed at Frankfort in May. Bismarck received the title of prince and became chancellor of the new empire Jan. 19, 1871.

Having thus accomplished one of his great aims—the unity of Germany—he concentrated his whole energy on the internal organization of the empire. But in that field it soon became evident that he could not work together with the liberal party, and a rupture took place. He was willing to take the lead against the Ultramontanists so far as the Church seemed to encroach upon the State, and against the Socialists so far as their unions aspired to be independent of the State; but, monarchical by principle and despotic by character, he must seek, and has found, the principal support for his internal policy in the reactionary camp, and, with respect to the Socialists, he shares their hatred of the principle of free competition and cordially accepts their fundamental proposition that in the State everything shall be done by the State. A very happy outline of his personal character, hitting with great felicity all its most prominent features without distorting them, is found in "Edinburgh Review," October, 1869: "He is a first-rate diplomatist and negotiator. No man can captivate more adroitly those he wants to win; nobody knows better to strike at the right moment, or to wait when the tide is running in his favor. His personal courage is great, physically as well as morally; he shrinks from nothing conducive to his end. He is not naturally eloquent, but his speeches are generally impressive and full of terse argument. He is a capital companion in society—witty, genial, sparkling in his conversation. . . . But by the side of these virtues the darker shades are not wanting. He can tell the very reverse of the truth with an amazing coolness; still oftener will he tell the plain truth when he knows he will not be believed." He received in 1886 from the pope the decoration of the Order of Christ. (See "Prince Bismarck," by Charles Lowe, M. A., 2 vols. 8vo, 1885.) Clemens Petersen.

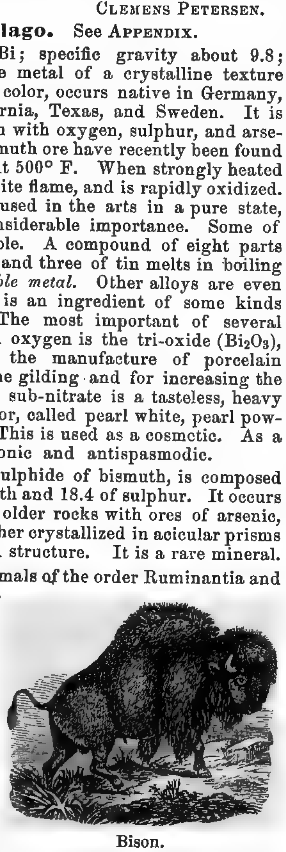
Bismarck Archipelago. See Appendix.

Bis′muth (symbol Bi; specific gravity about 9.8; equivalent 210), a brittle metal of a crystalline texture and of a yellowish-white color, occurs native in Germany, France, Cornwall, California, Texas, and Sweden. It is also found in combination with oxygen, sulphur, and arsenic. Rich deposits of bismuth ore have recently been found in Utah. It fuses at about 500° F. When strongly heated it burns with a bluish-white flame, and is rapidly oxidized. This metal is not often used in the arts in a pure state, but its alloys are of considerable importance. Some of them are extremely fusible. A compound of eight parts of bismuth, five of lead, and three of tin melts in boiling water, and is called *fusible metal.* Other alloys are even more fusible. Bismuth is an ingredient of some kinds of stereotype metal. The most important of several compounds it forms with oxygen is the tri-oxide (Bi_2O_3), which is employed in the manufacture of porcelain as an agent for fixing the gilding and for increasing the fusibility of fluxes. The sub-nitrate is a tasteless, heavy powder of pure white color, called pearl white, pearl powder, blanc de fard, etc. This is used as a cosmetic. As a medicine it acts as a tonic and antispasmodic.

Bis′muthine, a tri-sulphide of bismuth, is composed of 81.6 per cent. of bismuth and 18.4 of sulphur. It occurs in lodes and beds in the older rocks with ores of arsenic, copper, iron, and lead, either crystallized in acicular prisms or massive with a foliated structure. It is a rare mineral.

Bi′son, a genus of animals of the order Ruminantia and family Bovidæ, nearly allied to the ox, natives of Europe and North America. The bisons have short horns, which are curved inward at the point. They are distinguished from the ox by an additional pair of ribs (having fourteen pairs), and by long woolly or shaggy hair, which covers the neck and shoulders of the males. At least three species of fossil bison have been discovered. (For the European bison, see Aurochs.) The American bison (*Bison Americanus*) is known in the U. S. by the incorrect name of buffalo. This is the only species of the ox family indigenous to America, except the musk ox. It is similar to the European bison, but the fore parts are more shaggy, and it is a powerful and ferocious-looking animal, which no American beast can overcome or resist except the grizzly bear. The color of its hair is mostly brown. Vast herds of bisons roam over the plains and prairies between the Mississippi River and the Rocky Mountains, feeding on grass and brushwood. They are generally inoffensive, and will not attack men, but prefer to run rather than to fight. During their migration they move in enormous herds, which are innumerable and irresistible. Great numbers of them are killed by Indians, who pursue them on horseback and subsist on their flesh. Their hides are also valuable, and under the name of buffalo robes are an important article of commerce. The flesh of the cows is highly esteemed, and is similar to beef, being very juicy and savory. The bisons are swift in running, and have so keen a sense of smell that the hunter cannot easily approach near enough to shoot them. The Indians sometimes circumvent them by setting fire to the prairie grass on several sides, and thus driving them in confusion towards a central position. They also drive them over precipices in large herds, the momentum of which is such that the leaders cannot stop or retreat, being forced forward by the mass behind them. The chase of bisons is attended with some danger, as they sometimes turn upon an assailant, who is liable to be trampled under the feet of the herd. Numerous tribes of aborigines are mainly dependent on the bison for their food and clothing. Their skins, which are covered with soft hair or fur, are much used for blankets, and their flesh and fat are converted into *pemmican,* the favorite food of the fur-hunters and *voyageurs* of North America. The bison differs from the true buffaloes in having a hump upon the back, and in the absence of the dewlap, which is small in the buffaloes. The buffaloes have cavities in their horns communicating with the nasal passages—the bison has not; the horns turn outward in the true buffaloes, and inward in the bisons. (See Buffalo.)

Revised by C. W. Greene.



Bison.

Bissa′gos, or **Bijoo′ja Islands,** a group of numerous small volcanic islands in the Atlantic, near the W. coast of Africa, between lat. 10° and 12° N., and between lon. 15° and 17° W. They have several good ports. Some of them are densely peopled with a savage negro race who cultivate maize, bananas, etc., and raise cattle. Bissão, an island of the above group, is a settlement of Portuguese, who formerly traded in slaves, and who export hides, wax, and rice; it has about 8000 inhabitants.

Bis′sell (William H.), M. D., born in Cooperstown, N. Y., April 1, 1811, removed to Illinois in 1837. He practised law for several years, served as a colonel in the Mexican war (1846–47), and was elected a member of Congress by the Democrats in 1848, and served six years. In 1856 he was chosen governor of Illinois by the Republicans. Died Mar. 18, 1860.

Bissex′tile [Lat. *bissextilis,* from *bis,* "twice," and *sextilis,* "sixth"], called in English **Leap-Year,** a name given to the year which contains 366 days. In the Julian calendar the length of the year was fixed at 365¼ days, about 11 minutes more than the actual length. In order that the year should always begin with the beginning of a day, it was directed that every fourth year should contain 366 days, and the other years 365. The additional day was given to February, and was inserted next after the 24th, which the Romans called *Sexto Kalendas Martii.* This was reckoned twice, and the repeated day was *Bis Sexto Kalendas;* hence the name *bissextile.*

Bistineau, bis′te-nō′, a lake in the N. W. part of Louisiana, forms the boundary between Bienville and Bossier parishes. It is about 25 miles long, and has a mean width of nearly 2 miles. Its water is discharged through a short outlet into Red River. It is navigable by steamboats.

Bis′tort (*Polygonum Bistorta*), a perennial herbaceous plant of the order Polygonaceæ, is a native of Europe and Asia. It bears flowers in a dense terminal spike. The whole plant is astringent, containing much tannin. The tortuous root is one of the most powerful vegetable astringents, and is used both internally and externally.

Bis′tre, or **Bis′ter,** a pigment of a warm brown color or reddish brown, used by painters in water-colors. It is prepared from the soot of wood, especially the beech.

Bistric′za, a town of Austria, in Croatia, 14 miles N. E. of Agram. Pop. 6117.

Bis′tritz, a fortified town of Transylvania, is situated in a beautiful valley on the Bistritz River, 52 miles N. E. of Klausenburg. It has two monasteries, a gymnasium, and several large cattle-fairs every year. Near it are the ruins of an ancient castle, the former residence of the family of Huniades. Pop. in 1880, 8063.

Bit, in ships, is a frame composed of two short but strong vertical timbers fixed upon the deck in the fore part of the vessel. Its main purpose is for fastening the cable when the ship rides at anchor, and for "leading" the principal ropes of the rigging. To "bit the cable" is to fasten it round the bit. Various kinds are called "riding-bits," "paul-bits," "jeer-bits," "topsail-sheet-bits," etc. To resist strains, the bits are strongly bolted to the beams that support the deck.

Bit'hoor', or **Bittoor,** a town of India, in the North-western Provinces, and on the right bank of the Ganges, about 12 miles N. W. of Cawnpore. It has numerous pagodas, and is visited by multitudes of pilgrims. During the mutiny of 1857 it was a stronghold of Nana Sahib, and was taken by Gen. Havelock in Aug., 1857. Pop. about 8000.

Bithyn'ia, an ancient country of Asia Minor, was bounded on the N. by the Pontus Euxinus (Black Sea), on the E. by Paphlagonia, on the S. by Galatia and Phrygia, and on the W. by the Propontis (Sea of Mármora), which separated it from Europe. The chief towns were Nicomedia, Chalcedon, Nicæa, Prusa, and Heraclea. Bithynia was annexed to the Persian empire in 543 B. C., and afterwards became an independent kingdom. Nicomedes I. began to reign over it in 278 B. C., and died in 246. Prusias II. was king of Bithynia in the time of Hannibal, who sought refuge at his court. In 74 B. C., Bithynia became a province of the Roman empire. Nicomedia was for a long time the capital of the kingdom. In 1298 the Turks conquered the country, and in 1328 made Prusa the capital of their whole empire.

Bit'lis, Betlis, or **Bedlis,** a town of Asiatic Turkey, 60 miles W. S. W. of Van. It is built in a wide ravine between limestone ridges or hills which rise about 2000 feet higher than the town. It contains three mosques, several convents, and an ancient castle, and has manufactures of firearms, and cotton cloths of a bright-red dye. Pop. from 10,000 to 12,000, of which about one-third are Armenians. The Persians defeated the army of Solyman the Magnificent near Bitlis in 1554.

Biton'to (anc. *Butuntum* or *Bituntum*), a town of Italy, in the province of Bari, 11 miles W. of Bari. It is well built, and has a fine cathedral and several monasteries. Good wine is made in the vicinity. The Spaniards gained a decisive victory over the Austrians here May 25, 1734. Pop. in 1878, 26,204.

Bitsch [Fr. *Bitche;* Lat. *Bicina*], a small fortified town of Lorraine, in a pass of the Vosges, about 36 miles N. N. W. of Strasburg and 64 miles E. of Metz. Here is a citadel on a steep isolated rock that is nearly impregnable. It was originally a countship held by the counts of Alsace and Flanders, but was given to the duke of Lorraine by Frederick III., and finally passed to France with the duchy of Lorraine in 1738. It was in the French department of Moselle until 1870, when possession was taken of it by the Germans at the general cession of the country; for, in spite of a long siege and bombardment, it was not surrendered. Pop. in 1880, 2908.

Bitter Almond Oil. See Almonds, Oil of.

Bit'terfeld, a town of Prussia, in the province of Saxony, on the Mulde River, 20 miles by rail N. of Leipsic. It is on the railway from Berlin to Leipsic, with branches to Halle and other places. It has important manufactures of cloth, iron, machines, etc. Pop. in 1880, 6531.

Bitter King (*Soulaurea amara*), a shrub or small tree of the order Polygalaceæ, derives its name from its intense bitterness. It is a native of the East Indian Islands, has large oval leaves and axillary racemes of regular flowers. It is used as a remedy for fevers and other diseases.

Bit'tern (*Ardea* or *Botaurus*), a bird of the order Grallatores or waders, is regarded by some naturalists as a species of heron (*Ardea*). It has a long, straight, and sharp bill, long legs, and a long neck. The neck is furnished with a loose plumage or fringe of feathers which it can erect at pleasure. This handsome bird frequents marshy fens and reedy shores of rivers and lakes, where it lies hid during the day, and feeds by night on frogs, fish, etc. The *Ardea stellaris* (common bittern of England) is widely diffused in Europe, Asia, and Africa. It utters a peculiar hollow and booming sound, which is noticed in Goldsmith's line, "The hollow-sounding bittern guards its nest." When assailed it defends itself bravely with its sharp bill, which is about four inches long. In the U. S. are found two bitterns similar in habits to the *Ardea stellaris*—viz. *Botaurus minor* ("bittern" or "bog bull") and *Ardea exilis* ("least bittern").

Bittern.

Bittern, the mother-liquid remaining after the removal of common salt from brines which have been partially evaporated. The bitter taste is due to the magnesium salts present. Sea-water and many salt-wells yield a bittern which is valuable in the production of Epsom salts (sulphate of magnesia), and especially of bromine.

Bitter Principle, a term applied to a great variety of bitter substances of vegetable origin, most of which are alkaloids or glucosides. Welter applies this name to carbazotic or picric acid, a crystallizable bitter substance composed of carbon, nitrogen, and oxygen, obtained by the action of nitric acid on indigo, etc.

Bitter Root River of Montana Territory rises in the Rocky Mountains, flows northward, and enters Clark's River in Missoula co. Length, estimated at 110 miles. Gold is found near it.

Bit'ters, the name applied to certain medicines, simple or compound, chiefly of vegetable origin, characterized by a bitter taste, and for the most part having tonic virtues. The simple bitter medicines are *aromatic,* if they have a fragrant odor; *pure,* if bitterness is their principal characteristic to the taste; and *styptic,* if they have an astringent effect upon the tongue. "Bitters," as popularly used, are generally compounds of dilute alcohol with various bitter drugs, as aloes if a cathartic effect be desired; if a tonic effect is sought, the bitters used are calisaya bark, gentian, quassia, columbo, and others. An aromatic is often added.

Bitter Spar, a name given to an easily cleavable variety of Dolomite (which see). It usually occurs in obtuse rhombohedrons, and consists of about 55 per cent. of carbonate of lime and 45 of carbonate of magnesia. Fine transparent crystals of it are found at Gap in France and Traversella in Piedmont.

Bitter-Sweet, or **Woody Nightshade** (*Solanum Dulcamara*), a perennial plant with a shrubby stem, nearly allied to the potato, is a native of Europe and Asia, and is naturalized in the U. S. It has ovate, heart-shaped leaves, the upper ones halberd-shaped or with two ear-like lobes at the base, and purple flowers. The fruit is a poisonous red berry. The stems or twigs gathered in autumn are sometimes used in medicine in chorea and some cutaneous disorders.

The name bitter-sweet is frequently given in this country to a climbing woody vine, the *Celastrus scandens,* of the natural order Celastraceæ, which grows wild in the Northern and Atlantic States. This vine is also called wax-work and staff tree. It has been used in medicine, and is popularly believed to have great virtues as an alterative.

Bitter Wood, a name given to several trees and shrubs of the genus *Xylopia* and the order Anonaceæ, natives of Brazil and the West Indies. They are remarkable for the bitterness of their wood. The fruit of *Xylopia sericea* is aromatic and pungent like pepper. The term is also applied to the *Picræna excelsa* and *Quassia excelsa,* the wood of which is used in medicine as a tonic. (See Quassia.)

Bittle (David Frederick), D. D. See Appendix.

Bitu'men [perhaps from the Gr. *πίτυς*, a "pitch-pine tree"]. This term applies to those mineral substances, both solid and liquid, of an oily or resinous nature, composed principally of hydrogen and carbon, sometimes united with oxygen, for which the general formula is $n(C^xH^y) + m(C^{x'}H^{y'}O^{z'})$. In general, therefore, bitumens are mixtures in sundry proportions of many simple carbonated hydrogens, accompanied in the solid and viscous varieties by many oxygenated carburets of hydrogen.

In general, the whole series of bitumens arrange themselves between two extremes, represented by pit-coal and naphtha as types, as follows:

Pit-coal.	
Carbon	89.31
Hydrogen	4.92
Oxygen and azote	5.77
	100.00

Naphtha.	
Carbon	88.20
Hydrogen	11.80
	100.00

Bitumen is employed as the binding substance in a variety of bituminous mastics and cements, which, though principally used as a surface-coating for timber to protect it from decay, and for roofs, arches, walls, area and cellar floors, etc., to render them watertight, is also quite often employed in masonry constructions, both as a matrix for concrete and as a cement between bricks and stone, instead of lime and calcareous cements. It is also used extensively for street and other pavements, and in some of its forms for fuel and for making illuminating gas and varnish.

A knowledge of bitumen dates back to a remote period, but its extensive and varied application in the builder's art is of quite recent origin. It is found in numerous localities and in a variety of forms, principally in the secondary, tertiary, and alluvial formations, seldom in the primitive or older strata. The several varieties pass into each other, from *naphtha*, the most fluid, to *petroleum* and *mineral tar*, which are less so, thence to *maltha*, which is more or less cohesive, to *asphaltum* and *elastic bitumen*, which are solid. They are insoluble in water or alcohol, but combine with the fixed and essential oils. They are most commonly soluble in ether, and generally the more solid varieties are soluble, to a greater or less extent, in those that are more fluid.

Naphtha is a carburet of hydrogen (H_5C_6), is fluid and transparent, exhales a strong odor, burns on the approach of a lighted taper, and will unite with pure ammonia and the fluid caustic alkalies. The principal use of naphtha as an ingredient of cements and mastics is its power of dissolving the more solid bitumens. It also possesses the remarkable property of dissolving india-rubber, which gelatinizes when digested in it with gentle heat, and in this pulpy state is used to render fabrics waterproof. Naphtha is found near Baku, on the western shore of the Caspian Sea, and various parts of Persia; also at Monte Cain, near Piacenza in Italy, and near Amiano in the duchy of Parma. It is also found in Calabria, in Sicily, and in America.

Petroleum is less limpid than naphtha, is unctuous to the touch, blackish or brownish in color, more or less translucid, has a strong odor and a pungent, acrid taste, and is very inflammable, though less so than naphtha. When warm it is as fluid as common tar, but at the freezing-point of water it becomes very viscid. It is much more abundant than naphtha, being found in the secondary rocks, particularly in the coal-strata and in the vicinity of beds of coal. It rises in a spring on the base of Mount Vesuvius, and is found in a stream at Gobian, France. At Beckelbronn in Alsace it is found mixed with about 10 per cent. of sand, from which it is extracted by boiling in water. It is viscous, of a brown color, and is much used as a lubricator for machinery and carriage axles. At Amiano, Italy, it is extracted from a compact, greenish clay, and near Modena it is found on the surface of certain springs. In Transylvania it occurs in most of the salt-mines. The most remarkable and abundant sources of petroleum are found in the U. S., in the vicinity of the coal-beds of Pennsylvania, West Virginia, Ohio, and Kentucky, where it is procured by means of artesian wells, and gives employment to immense capital. The aggregate yield of the oil-wells of Pennsylvania alone has reached as high as 18,000 barrels per day.

Petroleum is a more or less perfect solvent of the more solid bitumens, and when rectified will dissolve india-rubber; and it is in this way that it is useful for cements and mastics. The residuum of refined petroleum will dissolve solid asphaltum.

The viscous bitumens generally, when submitted to distillation, yield a more or less pale-yellow, oily liquid, called by Boussingault *petrolene*, because it is an essential ingredient of petroleum. When pure, this oil, light yellow in color, has a bituminous odor, little taste, boils at 536° F., yielding a vapor of the density of 9.415. It is therefore isomeric with the essential oils of lemon and turpentine. Petroleum at $69\frac{8}{10}$° F. has a specific gravity of .891, and contains 1 equivalent of hydrogen and 1 of carbon, and dissolves sparingly in alcohol. Its composition by analysis is—

Carbon	88.	= 1 equivalent.
Hydrogen	12.	= 1 equivalent.
	100.	

If the petroleum of Beckelbronn and other similar varieties be heated in an oil-bath at a temperature of 482° F., the petrolene is separated and passes off as vapor, and there remains a brilliantly black body, heavier than water, with a conchoidal fracture, and which burns like the resins in general, leaving an abundant coke. As this body possesses the character of asphaltum, and forms an essential part of that bitumen, it is called *asphaltene*. It is oxidized *petroleum*, containing by analysis—

Carbon	75.
Hydrogen	9.9
Oxygen	15.1
	100.00

Mineral tar is regarded as asphaltum containing a larger proportion of bituminous oil than the solid asphaltum. It is more viscid than petroleum, and of a glossy, black color. The principal sources of the mineral tar of commerce are, in France, at Bastenne (Landes) and at Pyrimont-Seyssel (Ain), and in Switzerland at Val-de-Travers in the canton of Neufchâtel, where it is found in the Jurassic limestone formation. At Bastenne, and also at Gaujac, the bitumen flows out from several openings or springs mixed with water, and is also found richly impregnating a quartzy sandstone, from which it is separated by the process of boiling. The Bastenne mines are nearly exhausted. At Seyssel the bitumen is found impregnating both sandstones and limestones. It is procured from the sandstone (called *molasse*) by boiling in water. The tar rises to the surface or adheres to the sides of the vessels in brown lumps, or in a semi-transparent brownish coating. Thus purified it is called *graisse*. A specimen of this sandstone, considerably richer than the average, gave by analysis—

Bituminous oil	8.6	Bitumen	10.60
Carbon	2.		
Quartzy grains			69.00
Calcareous grains			20.40
			100.00

Taken in bulk, the product of the mine is much less rich than this specimen.

The bituminous limestone called asphalt rock is found both at Seyssel and at Val-de-Travers. That from Seyssel contains on an average about 90 per cent. of carbonate of lime and 10 per cent. of bitumen. The Val-de-Travers asphaltic rock is richer, containing about 80 per cent. of carbonate of lime and 20 per cent. of bitumen. The stone is massive, of irregular fracture, and of a liver-brown color. Though easily scratched with the finger nail, it is difficult to break up with a hammer, showing malleable properties under the blows. Its specific gravity is 2.114, water being 1000.

Asphaltum is a dry and solid variety of bitumen, usually very brittle, and at ordinary temperatures too hard to be easily impressed with the finger nail. It is opaque, smooth, slightly translucent at the edges, of black or brownish color, and has little odor unless rubbed or heated. It is very inflammable, melts easily, and if pure burns with little or no residue. It is soluble in alcohol, and not readily so in the fixed and essential oils or ether, but naphtha dissolves one-fifth of its weight of asphaltum at ordinary temperatures, and forms a saturated solution of a deep-black color.

Asphaltum is found floating in the Dead Sea, and in veins with calcareous spar and brown iron ore at Karmsdorf in Saxony. In Cornwall it occurs with sulphurets of lead and copper; near Syrsan on the Wolga in compact limestone; in embedded veins in the secondary limestone in Fifeshire; in clay iron-stone at East Lothian; in veins in Shropshire, England; and in the Hartz Mountains, Germany, along with sparry iron, heavy spar, and brown iron ore. It is also found in the Ural and Caucasus Mountains. It is found in many places in Mexico, and abounds in the islands of Barbadoes and Trinidad. In Trinidad there is a remarkable lake about three miles in circuit, covered almost entirely with a stratum of asphaltum, traversed by fissures and crevices filled with water. The color is ashy or gray, approaching to black, and in portions of the lake quite black. Near the shore it is generally hard, giving a dull conchoidal fracture. Towards the centre it is softer, and at some points fluid petroleum is formed, which gradually indurates on exposure to the air. A gentle heat renders the Trinidad asphaltum ductile, but it is quite brittle at the freezing-point of water. It is employed on the island in making roads and in paving courtyard areas, etc., and for covering roofs, terraces, etc. Within the last few years it has been imported into the U. S. to a considerable extent, where it is used in the fabrication of various road and roof coverings, and for other kindred purposes. The products of its distillation are inflammable gas resembling that obtained from pit-coal, a species of bituminous oil, a tarry substance resembling coal-tar, and a substance resembling coke.

The other forms of solid bitumen (cohesive mineral pitch, elastic bitumen, retinite or retin asphaltum, fossil copal, and hatchetine or mineral adipocere) have little or no useful application in the industrial arts, and require no extended notice. The elastic bitumen, known also as mineral caoutchouc, possesses the property, like india-rubber, of effacing pencil-marks from paper, but is little used for that purpose, as it soils the paper.

The bitumen employed by the ancient Babylonians was a semi-fluid variety, obtained from the fountains of Is (the modern *Hit*), on the right bank of the Euphrates. These thermal fountains still flow copiously, yielding large quantities of petroleum, mixed with intensely saline sulphureous water. It was used to unite the sun-dried bricks with which the Babylonians constructed their public and private buildings, and the state in which the ruins of many colossal structures are still found indicates the imperishable character of the cement used. It was probably applied in the plastic state, and indurated gradually by the evaporation, and absorption of a portion of the bituminous oils.

In the fabrication of bituminous mastics and cements the forms of bitumen employed are principally petroleum, mineral tar, asphaltum, and, to a limited extent, naphtha. Of petroleum, it is the residuum only (known as "still bottoms"), obtained in the refining process, that is used for this purpose. This is a suitable solvent for solid asphaltum.

Bituminous mastic (sometimes called asphaltic mastic or asphaltic cement) is generally composed of mineral tar and some calcareous, silicious, or earthy substances in powder. Instead of the mineral tar, solid asphaltum, that has been softened by a liquid bitumen or other suitable solvent, may be used. The bituminous mastics of Seyssel and Val-de-Travers are generally made by mixing the bituminous limestones of these localities, previously pulverized, with a suitable proportion of the mineral tar extracted from the bituminous sandstone or *molasse*. Seven to eight per cent. of mineral tar will be required for the Seyssel mastic, while 4½ to 5 per cent. will answer for that of Val-de-Travers. The tar is first heated in cast- or wrought-iron boilers over a brisk fire, until the boiling liquid begins to emit a thin whitish vapor. The heat is then moderated, and maintained at a uniform state, while the powdered stone is added gradually, care being taken to avoid lowering the temperature suddenly by adding too much at once. A yellowish or brownish vapor indicates a degree of heat calculated to scorch and injure the mastic. In such case the material should be stirred rapidly and the fire drawn or reduced. For convenience of transportation the mastic is moulded into blocks about twenty inches long, twelve inches wide, and five or six inches deep. When remelted for use it is necessary to add 2 to 3 per cent. of mineral tar, to compensate for loss of oil by evaporation in reheating.

The bituminous limestone may be reduced to powder by either grinding or roasting. For grinding, the stone is first broken up into pieces not much larger than a hen's egg, and is then passed through some suitable mill. The cast-iron mill, consisting of two horizontal iron plates, one revolving eccentrically upon the face of the other, answers very well. Cold, dry weather is the best season for this operation, which should be conducted under cover. If the weather be too warm the stone is apt to cake. For roasting, the stone is first broken up as for grinding; the fragments are then gently heated in a closed iron vessel. They gradually lose their coherence, and are reduced to powder by stirring with an iron instrument. This process is not only less economical than grinding when large operations are carried on, but there is a loss of tar by evaporation, and there is also danger of injury by too high heat.

Instead of the bituminous limestone, powdered limestone, marl, or chalk has sometimes been used with the mineral tar, giving very good results, the proportion of the tar being of course increased to compensate for its absence in the powdered mineral.

Trinidad Bituminous Mastic.—A good mastic may be made from the Trinidad asphaltum, provided a suitable solvent for it be employed. This asphaltum melts readily at a gentle heat, and is very brittle when cold. When mixed up, without a solvent, with any pulverized material, whether silicious, calcareous, or argillaceous, the mastic produced is not, as it should be, hard, firm, and in some degree malleable through the wide range of temperature peculiar to the U. S. If the proportion of mineral ingredient be so much increased as to give a hard and firm mastic at 100° F., it will be quite brittle at the freezing-point of water; while, on the contrary, if the proportions be adjusted with a view to firmness and tenacity in cold weather, it will be much too soft at a summer heat. The residuum produced in refining crude petroleum is so far a solvent for solid Trinidad asphaltum that when the two are thoroughly mixed together by stirring in an iron boiler over a gentle heat, in the proportion, by weight, of 3 of residuum to 7½ or 8 of asphaltum, a mineral tar is produced much resembling that of Bastennes or Seyssel, and which, like the latter, may be employed for making mastic, in combination with the bituminous limestone or other mineral substance.

The following formulæ give a good mastic for covering pavements, cellars, areas, and arches, and for other similar purposes:

1.	Solid Trinidad asphaltum	21¾ lbs.	= tar 30 lbs.
	Residuum of refined petroleum	8¼ "	
	Powdered marl or other amorphous limestone	70 "	
		100 "	
2.	Solid Trinidad asphaltum	17½ lbs.	= tar 24 lbs.
	Residuum of refined petroleum	6½ "	
	Powdered amorphous limestone	76 "	
		100 "	

From the trials that have been made there appears no reason to doubt that the Trinidad asphaltum, suitably softened with some of the liquid bitumens, or with substances derived from them possessing the properties of a solvent, is quite as good as the natural mineral tar in the fabrication of mastics. But it must be conceded that nothing has yet been discovered which can replace, with entire satisfaction, the bituminous limestone of Seyssel and Val-de-Travers. An amorphous carbonate of lime, and even well-slacked quicklime, have both been used with very good results; but in the natural asphaltic rock the calcareous matter is so intimately and impalpably combined with the bitumen, resists so thoroughly the action of air and water, and even muriatic acid, and is so entirely free from moisture—properties due perhaps to the vast pressure and intense heat under which the ingredients have been incorporated by nature—that we are forced to attribute the excellence of this material to the existence of certain natural conditions which the most skilful artificial methods fail to reproduce.

The North American Neufchâtel Rock Paving Company use for their pavement and other coverings in the U. S. the Val-de-Travers asphalt rock, Trinidad bitumen, and "still bottoms" or residuum of petroleum. They manufacture by the following processes:

1. *Mineral tar* is produced by mixing together in an iron boiler, with constant stirring, at a temperature of 470° F.,

Trinidad asphaltum	85 lbs.
Still bottoms	15 "
	100 "

2. *Bituminous mastic* is produced by mixing together, at 400° F.,

Pulverized Val-de-Travers asphalt rock	98½ lbs.
Mineral tar (No. 1, as above)	1½ "

3. The *pavement covering* for sidewalks, roadways for light traffic, areas, cellars, warehouses, and for similar purposes, is made by mixing together at 400° F. the following:

Bituminous mastic (No. 2, as above)	98¾ lbs.	= 100.
Mineral tar (No. 1, as above)	1¼ "	
Grits or pulverized limestone	35 "	

This is laid one-half to three-quarters of an inch thick on a concrete foundation four and a half to six inches thick, and then rubbed down smooth with a dry mixture of hydraulic cement and fine sand. The thickness of the foundation should vary to suit the kind and quantity of traffic to which the pavement is to be subjected. This mixture (No. 3) is also suitable for covering roofs, arches, and for watersheds generally. For pavements subjected to traffic with heavy vehicles the covering should be Val-de-Travers asphalt rock alone, and the pavement is laid as follows: 1, prepare a concrete foundation seven to nine inches thick; 2, pulverize the Val-de-Travers rock at a temperature of 260° F.; 3, spread it over the foundation with a rake, and ram it with red-hot rammers in a layer one and a half to two inches thick; 4, smooth it off with a hot smoothing-iron; 5, roll it with a heavy roller, to remove marks of rammer and compress it more solidly.

Q. A. Gillmore.

Bitu′minous Coal, a variety of coal which is valuable for fuel and burns with a smoky flame. It is softer than anthracite, and ignites more easily, but is less durable in combustion. It is composed of carbon, with a small proportion of hydrogen. Bituminous coal-fields of great extent occur in Western Pennsylvania, Ohio, Indiana, Illinois, Iowa, Kansas, Kentucky, Missouri, etc. This substance is also found in several parts of Europe, especially in Great Britain. It is extensively used in the manufacture of illuminating gas, and is burned as fuel in steamboats, manufactories, etc. (See Coal, Coke, and Gas.)

Bituminous Limestone, carbonate of lime impregnated with bituminous matter, derived from decayed vegetables or from the decomposed remains of those animals the hard parts of which form a large portion of the rock, which is sometimes very extensive. Within a few miles of Chicago, Ill., it has been estimated by Prof. T. S. Hunt that the limestone rocks contain as much petroleum as the oil-wells of Pennsylvania yield in ten years. It is not, however, believed to be separable for use. (For the uses of this stone, see Bitumen, by Gen. Q. A. Gillmore, U. S. A.)

Bituminous Shale, an indurated bed of clay, or a tough clayey substance which occurs in many coal-fields, and contains portions of carbon and volatile matter. These shales have a slaty fracture, are often repeated like other beds of clay, and occupy a definite position with regard to coal. Oil, gas, and paraffine are obtained from them by distillation.

Bi′valve [from the Lat. *bis*, "twice," "double," and *valva*, plu. *valvæ*, "folding doors"], a term applied in conchology to a shell which consists of two concave calcareous plates or valves joined together by a hinge and an elastic ligament, as the oyster.

Bivalve Shells, or Bivalves, are those coverings of mollusks which consist of two concave plates or valves, united by a hinge. (See Conchology.) A majority of recent bivalve shells belong to the acephalous or lamellibranchiate Mollusca. There are also mollusks of the class Brachiopoda which possess bivalve shells. The structure and chemical composition of the shell, however, is different in the two classes. A very large proportion of the bivalve shells of the older fossiliferous rocks belong to the class Brachiopoda. In the Brachiopoda one valve is ventral and the other dorsal; in the Lamellibranchiata both are lateral.

Bivouac, biv′wăk [from the Ger. *bei*, "near," and *Wache*, "watch"], a French word signifying an encampment of soldiers by night in the open air, without tents, or the system by which soldiers on a march, or in expectation of a battle, remain all night in the open air, resting with their arms by their side and ready for action. This practice is said to have been common among the crusaders. The generals of the French republic or the First Empire introduced the plan of dispensing with the use of tents and passing the night *en bivouac*. The same system was adopted by the other great powers on the continent of Europe. In recent times it is common for soldiers on the march to use the *tente d'abri* or shelter-tent.

Bix′in, the coloring principle of annotto, the paste obtained by bruising the seeds of *Bixa Orellana*.

Bizer′ta, or **Benzer′ta** (anc. *Hippo Zarytus*), a fortified seaport of Tunis, and the most northern town of Africa, about 38 miles N. W. of Tunis. The port, which was formerly good, has been filled up, so that it will now admit only small vessels. It is surrounded by walls and defended by two castles, but is commanded by the adjacent heights. This place was fortified by Agathocles about 308 B. C. Pop. about 10,000.

Björne′borg, or **Biornborg,** a seaport of Finland, at the mouth of the Kumo, 115 miles S. of Vasa; lat. 61° 29′ N., lon. 39° 23′ E. It has various manufactures and a considerable trade. Pop. 8718.

Björn′son (Björnstjerne) was born Dec. 8, 1832, in a lonesome and dreary parsonage in North-western Norway, where his father was a minister. He was educated in the Latin school at Molde, from which he went to the University of Christiania in 1851. But already in the next year he broke off his scientific education and commenced a literary life, in which there, as yet, have been no failures and only a few mistakes, while its beneficial consequences will reach far into the future, for with him begins the Norwegian Literature. (See that article.) His first book, published in 1856, was a little novel, "Synnöve Solbakken," descriptive of peasant life in Norway. It made a very deep impression. The plot was simple, but at every movement it touched the deepest laws of life, and nowhere smacked of any narrow tendency. The characters were pure psychological developments, never marred by explanations or remarks from a merely individual moral standpoint. The style was the short, pithy sentence from the Saga, with all its power of signification, all its strength of passion, and all its sweetness of feeling. The effect of this book was truly wonderful, and the impression it made was both deepened and widened by the novels which followed, "Arne," "En glad gut," "Fiskerjenten," etc. In spite of the great variety of characters and situations which they depict, they are all so singularly alike that in the reader's mind they melt together into one book, into one picture of life in Norway; and so touching and charming is this picture that more than one reader exclaimed in delight, "I wish I had been born in Norway!" Alternating with the novels he wrote dramas, and in this field he experienced some opposition. When his first tragedy, "Halte-Hulda," was published in 1858, there were people who felt that a new dramatic genius had arisen, greater perhaps than any since the days of Shakspeare; but the great public was, and will always be, incapable of appreciating a drama by reading it only. Actual representation on the stage is necessary, and the Scandinavian theatres were, at first, singularly unwilling to try the new author. Moreover, the expressions are, in "Halte-Hulda," often forced and obscure. The young poet had not yet learnt to say unimportant things in an unassuming manner, which alone can set off the important in due relief. His next drama, "Kong Sverre," was better in this respect, but it was not until he published his great tragedy, "Sigurd Slembe" (1862), that the public thoroughly felt the eminent greatness of his dramatical powers. "Sigurd Slembe" is a grand conception, masterly executed; and when in 1866 the Royal Theatre in Copenhagen represented his lovely little comedy, "The Newly Married," and next year his tragedy, "Marie Stuart" (translated in "Scandinavia," Chicago, 1883–84), the impression was irresistible. Meanwhile, he worked alternately as a stage-manager and as an editor, in peace with the whole world; but between 1870 and 1875 he went through a spiritual development from which he stepped forward as the spokesman for the most advanced ideas in politics and religion. He travelled all over Norway, giving lectures (in 1880–81 he also visited America and lectured to his countrymen settled there), and everywhere the republic and the free thought were the themes of his burning eloquence. In his dramas "A Failure" (1871), "The New System" (1877), "The King" (1879), "The Glove" (1883), "The Enthusiasts" ("Over Evne") (1884), etc. he treats the same ideas specialized into psychological or moral problems.

Clemens Petersen.

Björn′stjer′na (Magnus Fredrik Ferdinand), Count, a Swedish general and author, born at Dresden Oct. 10, 1779. He fought against the French in 1809–13, and negotiated the treaty by which Sweden and Norway were united. He was ambassador at London for many years (1828–46). Among his works is "The Theogony, Philosophy, and Cosmogony of the Hindoos" (1843). Died Oct., 1847.

Blacas (Pierre Louis Jean Casimir), Duke of, a French statesman, born at Aups, in the department of Var, Jan. 12, 1771, was a faithful adherent of the Bourbons. He negotiated the concordat of 1817, and was employed on various important embassies. He founded the Egyptian Museum in Paris, and became a member of the Institute. Died Nov. 17, 1839.

Black [Lat. *ni′ger*], a term applied to things that absorb all the rays of light. It is considered the privation or negation of color, and a symbol of evil, darkness, and mourning. In blazonry, black (sable) denotes constancy, wisdom, and prudence. Black dyes are produced by logwood, catechu, galls, or other substance containing tannic acid, used with iron; or by various aniline compounds. Black pigments are usually carbonaceous.

Black (Jeremiah S.), an American jurist and Democratic politician, born in Somerset co., Pa., Jan. 10, 1810, became a judge of the supreme court of Pennsylvania in 1851, attorney-general in the Cabinet of Buchanan in 1857, and secretary of state in 1860. Died Aug. 19, 1883.

Black (Joseph), an eminent chemist of Scottish extraction, was born at Bordeaux in 1728. He graduated as doctor of medicine at Edinburgh in 1754, and became professor of anatomy at Glasgow in 1756. His reputation is founded chiefly on the theory of latent heat, which he propounded between 1759 and 1763. He obtained in 1766 the chair of chemistry in the University of Edinburgh, where he lectured for thirty years, and acquired great popularity. Died Nov. 26, 1799. His "Lectures on Chemistry" were published by Dr. Robison (2 vols. 4to, 1803).

Black (William), a Wesleyan divine, born in England in 1760, removed to Nova Scotia in 1775, and founded there the Wesleyan Church. He was subsequently general superintendent of the Wesleyan missions in British America. His purity of life and eminent services to his denomination have made him one of its most memorable characters. He died Sept, 8, 1834.

Black (William). See Appendix.

Black Acts, the acts of the Scottish Parliaments passed between 1425 and 1586—so called because they were printed in the characters known as *black letter*. In English lawbooks the term "black act" is applied to the 9 Geo. I. c. 22 (1722), because it was occasioned by the outrages committed by persons whose faces were blackened. They destroyed the deer in Epping Forest and committed other offences. The act was repealed in 1827.

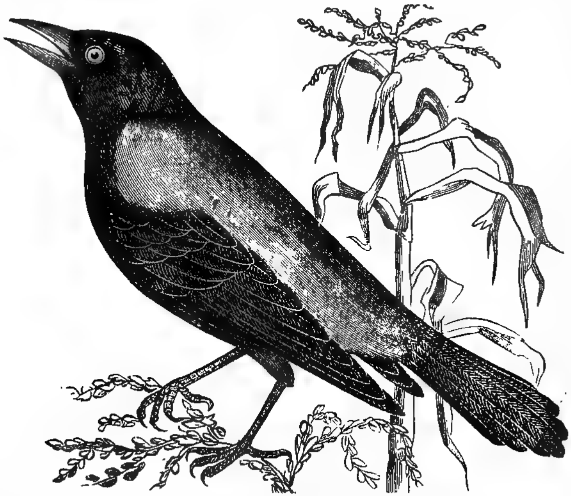
Black Art. See Magic.

Black′ball. In the elections of clubs and other associations a black ball is deposited in the ballot-box or urn by each person who votes in the negative, or votes against a candidate for admission. Those candidates who are thus rejected are said to be blackballed.

Black Band, a variety of clay iron-stone or compact carbonate of iron, containing 25 or 30 per cent. of carbonaceous matter. It occurs abundantly in the coal-fields of Scotland, and is the ore almost exclusively used for the production of iron in that country. It is not very rich, and does not yield iron ore of the first quality when smelted by itself, but it is easily reduced. Black band also occurs in the coal-measures of Ohio, and is extensively used for the production of iron. Many black bands are so filled with fossil bone and other phosphatic matter that they cannot be profitably wrought.

Black Bass, a common name for two centrachid fishes of the genus Micropterus, highly esteemed as game-fishes. The small-mouthed species is now known as *M. Dolomieu*, and the large-mouthed one as *M. Salmoides*.

Black′berry, the common name of several species of *Rubus*, natives of the U. S. They are shrubby plants called brambles, armed with stout, curved prickles. The fruit (which is not a berry in the botanical sense, but a collection of drupes) is edible and pleasant. The common or high blackberry (the *Rubus villosus*) has compound leaves, with leaflets ovate, pointed, and unequally serrate. Several valuable varieties have been extensively introduced into cultivation. Among these are the sorts known as the Dorchester, the Lawton (or New Rochelle), the Kittatinny, and the Wilson. A leading requisite for success in their management is to keep the bushes "pinched in" during summer, so as to prevent a loose, straggling growth, and to give them a neat, small, compact shape, by which their productiveness is greatly increased. The low blackberry, or dewberry, is *Rubus Canadensis*. Similar fruits are common in Asia and Europe.


The Rusty Crow-Blackbird.

Black'bird, or **Merle,** a popular name given in England to the *Turdus merula* or *Merula vulgaris*, a species of thrush which abounds in Europe. In size it is intermediate between the song-thrush or mavis and the missel-thrush. The plumage of the male is all deep black, but that of the female is brown. It has a powerful voice, and its song is more mellow than that of the song-thrush, but inferior in compass and variety. The blackbird is often kept in cages, and is very susceptible of being trained. It feeds on worms, insects, and fruits, and frequents hedges, woods, and thickets. Quite distinct from this bird is the blackbird of the U. S. (*Quiscalus versicolor*), sometimes called "crow-blackbird" or purple grakle. The "rusty crow-blackbird" (*Scolecephagus ferrugineus*) is a rather less common bird of the U. S. It is a great depredator of corn-fields. The swamps and meadows of the U. S. are frequented by the *Agelaius Phœniceus*, or red-winged blackbird. It is gregarious, and feeds on insects and grain.

Black'burn, a manufacturing town of England, in Lancashire, is situated in a barren district on a small stream called "The Brook," 24 miles by rail N. N. W. of Manchester. It has a beautiful Gothic parish church, a fine new exchange, also in the Gothic style, and numerous chapels of the dissenters, a grammar school founded by Queen Elizabeth, a hospital, a theological academy, and a theatre. The principal business of the town is the manufacture of cotton stuffs, chiefly coarse calicoes and muslins, in which 10,000 persons or more are employed. Coal and lime are abundant in the vicinity. James Hargreaves, who invented the spinning-jenny in 1767, was born here. Railways extend from this point in various directions. Blackburn sends two members to Parliament. It has a public park which is 700 feet above the level of the sea. Pop. in 1881, 104,012.

Blackburn (Gideon), D. D., born in Augusta co., Va., Aug. 27, 1772, was a noted Presbyterian clergyman; licensed to preach by Abingdon presbytery in 1795; settled many years at Marysville, Tenn.; pastor at Franklin, Tenn., 1811–23, and at Louisville, Ky., 1823–27. He labored zealously in the Western States during the last forty years of his life, preaching and organizing churches, missions, and schools, and was president of Centre College, Ky., 1827–30. Died Aug. 23, 1838.

Blackburn (William Maxwell), D. D., born at Carlisle, Ind., Dec. 30, 1828, graduated at Hanover College, Ind., in 1850, and studied theology at Princeton. He was prof. of biblical and ecclesiastical history in Presb. Theological Seminary at Chicago 1868–81, when he became a pastor in Cincinnati, O. He has been many years an active contributor to religious literature in church history and books for the young, and has also contributed largely to "Princeton" and "American Presbyterian" Reviews.

Black Cap, Black Cap Warbler, or **Fauvette** (*Curruca atricapilla*), a bird of the family Sylviadæ or warblers, is nearly allied to the nightingale. It is regarded as the sweetest song-bird in Great Britain, except the nightingale, to which it is somewhat inferior in size. The back, wings, and tail are of an ash-brown color, the belly is white, and the top of the head is jet black (in the male). Its note is rich in tone, and has a great variety of sweet and gentle modulations. It is a summer bird of passage in England, which it enters in early spring, and from which it migrates in September. It is highly prized as a cage-bird, not only for its song, but for its pleasant manners and temper.

BLACK CAP is also the name applied to a species of raspberry (the *Rubus occidentalis*), of which several varieties have recently been introduced for cultivation into gardens in the U. S.

Black Chalk, a variety of shale, containing a large proportion of carbon, is found in France, Spain, Scotland, Wales, etc. It is made into artists' crayons and used for drawing, and is ground to powder for paint.

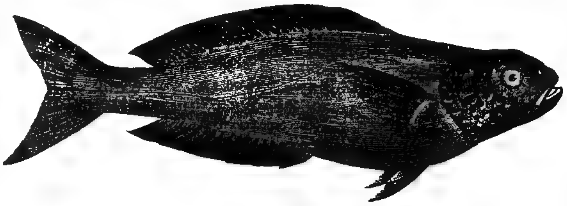
Black Cock, Heath Fowl, or **Black Grouse** (*Lyrurus tetrix*), a bird of the family Tetraonidæ abundant in Scotland and the N. of England. It also occurs in the mountains and marshy parts of the continent of Europe, and abounds in Scandinavia and Russia. Its favorite haunts are moors, bogs, and morasses covered with rank herbage. The male, which weighs nearly four pounds, is of a shining bluish-black color, with a conspicuous white bar on the wings below the ends of the great wing-covers. The outer tail-feathers on each side are elongated and curved outward. The female is of a rust color, and is called the "gray hen." This species of grouse is gregarious, but in winter the males and females form separate flocks. They build nests of very simple construction on the ground, and lay in each six or eight eggs, which are about two inches long. Their food consists of seeds, berries, insects, and the young shoots of the pine, fir, and birch. Their flesh is highly esteemed for food.

Black Death. See PLAGUE, by E. D. HUDSON, JR., M. D.

Black Duck (*Anas obscura*), one of the best known and most highly prized of American wild ducks, breeds abundantly throughout the continent from Mexico to Labrador and from the Atlantic to the Pacific. It might be readily domesticated. It is of a generally blackish-brown color, with bright tints about the bill, neck, wings, etc.

Black'feet, a tribe of American Indians who infest the Territory of Montana and Wyoming on the E. side of the Rocky Mountains, and between the Yellowstone and the Missouri Rivers. They are divided into the true Blackfeet, the Bloods, the Piegans, and the Small Robes. They were once a powerful and ferocious tribe, very hostile to the white people, and addicted to robbery. They are distinct from the "Blackfeet Sioux," who belong to the Dakota confederacy. The Blackfeet are also found in British America, and are of Algonquin stock. A small vocabulary of their language was published by George Catlin in the second volume of his "Letters and Notes on the Manners, etc. of the North American Indians" (1841).

Black'fish, a name applied to various fishes. The blackfish or tautog of the Northern U. S. is the *Tautoga Americana*, a species of the family Labridæ, of an oblong form, with smooth scaly skin. It is one of the chief market-fishes of New York. In England the name is given to the *Centrolophus pompilus*, a species of the family Stromateidæ. It is a species more common in the Mediterranean and contiguous waters. The name is also applied


European Blackfish.

to porpoises of the genus Globicephalus—*e. g. G. intermedius* of the Atlantic coast, and *G. Scammoni* of the Pacific coast, of the U. S.

Blackfish (*Physeter tursio*) is also the name of a whale closely akin to the spermaceti whale. It is sometimes nearly sixty feet long, but usually much smaller. This huge animal has an eye about the size of that of a common haddock, yields oil and spermaceti, and is found in the Atlantic. Quite recently the existence of the *Physeter tursio* has been denied. Several other whales are known by this name.

Black Flux, a mixture of carbonate of potash and finely-divided carbon or powdered charcoal. It is prepared by mixing in a crucible one part of nitre with two or three parts of crude cream of tartar, and deflagrating the mixture by ignited charcoal; or by heating in a covered crucible crude cream of tartar or bitartrate of potash, when the tartaric acid is decomposed and charred, forming carbonic acid, which remains in combination with the potash. It is a valuable flux in reducing ores. The metal potassium can be obtained by heating this flux in iron vessels.

Blackford (Isaac Newton), born at Bound Brook, N. J., Nov. 6, 1786, graduated at College of New Jersey in 1806; studied law at Morristown, N. J.; removed to Indiana in 1812 and settled at Vincennes; was clerk of the Territorial legislature 1813; judge of first judicial circuit 1814–15; speaker of first State legislature 1816; judge of Indiana supreme court 1819–35, and a judge of U. S. court of claims from Mar., 1855, until his death, at Washington, D. C., Dec. 31, 1859.

Black Forest [Ger. *Schwarzwald;* anc. *Hyrcinia Sylva*], a mountainous and wooded region in Baden and Würtemberg, with a chain of mountains which extends about 85 miles, and separates the basin of the Rhine from that of the Neckar. It was a part of the ancient Hercynian Forest. This region is remarkable for its extensive forests and its mines of silver, copper, zinc, lead, and iron. The highest point of this chain is the Feldberg, which rises 4903 feet above the level of the sea. The Danube, Neckar, Kinzig, Murg, and Elz rise in the Black Forest. A number of small lakes are found here at elevations of 2500–3500 feet. Granite and gneiss form the foundations of these mountains, and porphyry occurs on their sides, which are also covered with abundance of fir trees. The descent is precipitous on the western side, but the eastern slope is very gentle. A valley called Murgthal, situated in this forest, is famous for its beautiful scenery. In the vicinity of Neustadt is the mountain-pass of Hölle, which was celebrated in connection with Moreau's retreat in 1796. The soil of these highlands is not adapted to tillage. The inhabitants are extensively employed in the manufacture of wooden clocks and toys.

Black'friars, a term applied, on account of the color of their garments, to the Dominican order of monks, who first came to England about A. D. 1220, and settled at Oxford. Their second house was the Blackfriars in London, and from it the district still bears the name of the order, which had nearly sixty houses in England and Wales at the time of the abolition of monasteries. (See Dominican.)

Black'guard. It is said that when the kings of England made a progress with the court from one royal residence to another, it was customary for the scullions and other menials to follow with loads of kitchen utensils, and even coals; and from their dirty appearance they received the derisive name of *black guard,* which has come to be applied to any person of a vile character, or one who uses vulgar or ruffianly language. (See Trench, "English, Past and Present.")

Black Gum, a popular name of the *Nyssa multiflora,* an American tree, sometimes called pepperidge, hornpipe, tupelo, and sour gum. It has oval or obovate leaves, commonly acuminate, which turn bright crimson in autumn. The fruit is a bluish-black drupe, the wood close-grained, tough, and very difficult to split. It is used for cog-wheels, hatters' blocks, and wheel-naves. It belongs to the order Cornaceæ.

Black Hawk, on R. R., Gilpin co., Col., 36 miles W. of Denver (see map of Colorado, ref. 2–D, for location of county). It contains, and is adjacent to, rich mines of gold and silver. It has numerous quartz-mills and also smelting-works. Pop. in 1880, 1540; in 1885, 1209.

Black Hawk, an American Indian, chief of the Sac tribe, born in 1767. He waged war against the U. S. in 1832 for the recovery of lands which certain chiefs of the Sacs and Foxes had ceded to the whites. Died Oct. 3, 1838.

Black'heath, an elevated open common in the county of Kent, England, 5 miles S. E. of London, adjoining Greenwich Park, is a favorite holiday resort for Londoners. It commands an extensive view, and is bordered by numerous handsome villas. The Roman Watling Street crosses this heath, which is the site of Morden College. This heath was the scene of the insurrections of Wat Tyler and Jack Cade, and was formerly infested by highway robbers.

Black Hills, a mountain-range in the S. W. part of Dakota and the eastern part of Wyoming Territory. The highest point of this range, Laramie Peak, in Wyoming, rises about 8000 feet above the sea. Gold and tin have been discovered and mined in the Dakota portion of these hills.

Black Hole, the name of a small dungeon or cell in Calcutta which was the scene of a nefarious crime committed by the nabob Suraja Dowlah in June, 1756. Having captured the English garrison of a fort at Calcutta, he confined the prisoners, 146 in number, in a cell twenty feet square, with only two windows. They suffered great agonies from thirst, heat, and foul air, and 123 died from suffocation in the first night. The twenty-three survivors were taken out the next morning. One of them, John Z. Holwell, published a narrative of their sufferings.

Blackie (George Stodart). See Appendix.

Black'ie (John Stuart), a Scottish classical scholar, born in Glasgow in July, 1809, studied at Edinburgh and Göttingen. He translated Goethe's "Faust" into English verse, and produced in 1850 an able translation of the works of Æschylus. In 1852 he became professor of Greek in the University of Edinburgh. He contributed to the "Encyclopædia Britannica" and the "Imperial Dictionary of Biography." Among his other works are "Lays and Legends of Ancient Greece" (1857), "Lyrical Poems" (1860), "Homer and the Iliad" (4 vols., 1866), "The Wise Men of Greece" (1877), "Lay Sermons" (1881), and "Altavona" (1882).

Black'ing, a compound of bone-black, oil, sulphuric acid, and sugar or molasses, employed in polishing boots, shoes, or leather, on which it produces a black-glazed and shining surface. The ingredients in Day & Martin's blacking are finely powdered bone-black ground with sperm oil, raw sugar or molasses, a little vinegar, and concentrated sulphuric acid, which unites with the lime of the bone-black to form sulphate of lime.

Black Jack, the name given by miners to blende (sulphide of zinc). It is also a popular name of a small species of American oak (*Quercus nigra*), sometimes called barren oak and iron oak. Its wood is very hard and makes a good firewood, but is rather perishable.

Black Lead. See Graphite.

Black Letter, a term applied to the Gothic or Old English types or letters, which were used in the typography of the first books ever printed in England. Books printed before 1500 are generally in this character, which was commonly used in manuscripts by Europeans long before the invention of the art of printing. A form of type similar to this is still used by the Germans.

Black List, the name applied in Great Britain to printed lists connected with insolvency, bankruptcy, and other matters affecting the credit of firms and individuals, and which are circulated for the guidance of the mercantile community. These lists, which serve an important purpose, are well known by commercial men in the United Kingdom. The lists are extracts from public registers, as are the ordinary lists of bankruptcies in the newspapers. Similar information is furnished in America by commercial agencies.

Black Mail was an impost formerly submitted to in parts of Scotland and the north of England as a compromise with robbers. A class of men, often belonging to families in good standing, levied a tax upon their neighbors (generally about 4 per cent. of the rental of their property), on the pretext of protecting them from cattle-thieves. The celebrated Rob Roy was one of these blackmailers. The practice ceased in Scotland after the rebellion of 1745. It had already been long extinct in England. In modern usage, black mail signifies money extorted from a person by threats of accusation or exposure in the public prints. Those who practise this extortion are said to "levy black mail."

Blackman (George Curtis), M. D., one of the first of American surgeons, was born at Newtown, Conn., April 20, 1819, and graduated in medicine at the College of Physicians and Surgeons, N. Y., in 1840. He afterwards studied in the London hospitals, "studying covered with bedclothes to avoid the expense of a fire, and subsisting on two penny rolls a day." His excellent attainments and enthusiasm for his profession won him many eminent friends, and he became a member of the Royal Medical and Chirurgical Society, an honor rarely given to foreigners. He became a resident of Cincinnati in 1854, and was appointed professor of the principles and practice of surgery in the Medical College of Ohio. He served as an army surgeon throughout the late civil war. He was an able writer, a brilliant lecturer, and a bold and skilful operator. He crossed the Atlantic more than thirty-six times on account of his feeble health. He published numerous contributions to professional journals, and several valuable translations. Died July 21, 1871.

Black'more (Sir Richard), a court-physician of William III. and of Queen Anne, a voluminous writer of prose and verse, was born about 1650. He was the object of the satire of Pope and of the ridicule of the wits of his time, but deserves mention as an honest man and a steady friend of virtue at a time when virtue had but few influential friends. His chief works are "Prince Arthur" (1696) and "The Creation" (1712). Died Oct. 8, 1729.

Black Mountain, of North Carolina, is in Yancey co., a few miles W. of the Blue Ridge. This group of mountains derives its name from the forests of dark balsam firs which crown its summits. It has the shape of a horseshoe. The highest of its peaks rises to 6707 feet, and is called the Black Dome, or Mitchell's High Peak in honor of Dr. Mitchell of the University of North Carolina, who perished while exploring this inhospitable region, and was buried on its top. This is the highest point of the U. S. east of the Rocky Mountains. Arnold Guyot.

Black Oak, a large tree of the U. S., common eastward of the Mississippi, generally considered a distinct species (*Quercus tinctoria*), but regarded by Gray as a variety of *Quercus coccinea*. It is a handsome tree, affording useful timber, but is best known for its thick yellow bark, prized for tanning purposes, and yielding quercitron, a valuable yellow dye. It is also called yellow oak and dyers' oak.

Blackpool', a municipal borough of Lancashire, England, was incorporated in 1875 and extended in 1879. It is situated on the Irish Sea, 20 miles by R. R. W. of Preston, and is much frequented for sea-bathing. P. in 1881, 7836.

Black Quarter, Quarter Evil, or **Black Leg,** a disease which attacks animals, especially thrifty young neat cattle, which are kept on fertile but undrained land. It is characterized by swelling of a joint, leg, or quarter, diarrhœa, extravasation of blood, and formation of abscesses. It is usually fatal. It is probably the same disease which is known in man as malignant pustule. Its causes are not well understood. It is a hard disease to cure, but stimulants, free incision in the affected part, with the application of weak solutions of chloride of zinc and carbolic acid, may prove useful. The best preventive is thorough underdrainage of pastures.

Black River of Louisiana. That part of Washita River below the mouth of the Tensas River, and between it and Red River, is sometimes called Black River.

Black River, or **Big Black River,** of Missouri and Arkansas, rises in Iron co., Mo., and flows nearly southward to the N. line of Arkansas. It afterwards runs south-westward, and enters the White River at Jacksonport, Ark. Length, about 350 miles. It is navigable by steamboats 100 miles except when the water is low.

Black River of New York rises in Herkimer co., flows in a general N. W. direction, and enters Lake Ontario about 6 miles below Watertown. The whole length is about 125 miles. It falls 63 feet near Turin, in Lewis co.

Black River of Wisconsin rises in Marathon co., flows southward and south-westward through Clarke and Jackson cos., and enters the Mississippi about 15 miles above La Crosse. Its length is about 225 miles.

Black River of Vermont [Indian name *Kaskatuac*] rises in ponds in the town of Plymouth, Windsor co., flows S. by E., and empties into the Connecticut River. It furnishes abundant water-power, which is employed in numerous manufactories.

Black River Falls, capital of Jackson county, Wis. (see map of Wisconsin, ref. 5–C, for location of county), on R. R. and Black River, 50 miles N. of La Crosse. It has numerous saw-mills and flouring-mills, a graded high school, and iron in unlimited quantities. Pop. in 1870, 1101; in 1880, 1427; in 1885, 2076.

Black Rood (of Scotland), a cross of gold which was alleged to contain a piece of the true cross, was brought into Scotland in 1067 by Margaret, sister of Edgar Atheling, queen of Malcolm III. It was regarded as a national palladium. It was taken twice, at least, by the English, who after 1346 kept it in Durham Cathedral. It disappeared at the Reformation.

Blacks'burg, Montgomery co., Va. (see map of Virginia, ref. 7–D, for location of county), is the seat of the Virginia Agricultural and Mechanical College. Pop. in 1880, 688.

Black Sea, or **Eux'ine** [anc. *Pontus Euxinus;* Turk. *Kara Diegis*], a large inland sea between Europe and Asia. It extends from lat. 40° 45′ to 46° 45′ N., and from lon. 27° 30′ to 41° 50′ E. The extreme length is about 700 miles, and its greatest breadth about 380 miles. Area, estimated at 185,000 square miles. It communicates with the Sea of Mármora by the Bosphorus, and with the Sea of Azof by the Strait of Kertch. The shores of this sea are high and bold on all sides except the N. W., between the Crimea and the mouth of the Danube. In the middle of it no soundings were obtained at 160 fathoms. It encloses no islands except a few small ones at the mouth of the Danube, and the Symplegades, near the Bosphorus. The largest rivers that flow into it are the Danube, Dniester, Bug, Don, Dnieper, Kooban, and Kizil Irmâk. This sea has no tide, but strong currents are produced by the influx of the large rivers, in consequence of which the water is fresher than that of the Mediterranean. The navigation of the Euxine is not dangerous except during violent storms. It is supposed that this sea once extended much farther E. than it does now. In ancient times it was an important highway of commerce. The Turks excluded the ships of all foreign powers from it until 1774, when the Russians obtained the right to navigate its waters. By the treaty of Paris, 1856, this sea was neutralized—that is, the Russians and Turks were not permitted to keep ships of war in it. In 1871 the Russians again were permitted to have men-of-war on this sea.

Black'shear, on R. R., capital of Pierce co., Ga. (see map of Georgia, ref. 7–J, for location of county), 86 miles S. W. of Savannah. Pop. in 1870, 490; in 1880, 778.

Black Snake (*Bascanion constrictor*), a species of snake which is common in nearly all parts of the U. S. Its length varies from four to six or seven feet. It is remarkable for agility, climbs trees with ease, and moves along the ground very swiftly. It feeds on frogs, mice, lizards, eggs, birds, etc. Although it is harmless and has no poison-fangs, it will sometimes attack or resist its human enemies. The *Bascanion Alleghaniensis* is another large black snake of the same regions, easily distinguished by the keeled scales on its back.

Blackstone River of Massachusetts rises in Worcester co., flows south-eastward into Rhode Island, and enters through Providence River into Narragansett Bay. The name Pawtucket River is given to that part of it which is below the town of Pawtucket. It affords abundant water-power, and flows through several manufacturing villages.

Blackstone (Sir William), an English jurist and eminent commentator on law, was born in London July 10, 1723. He was admitted to the bar in 1746, but obtained little practice. In 1758 he became Vinerian professor of law at Oxford, of which he was a graduate, and in 1761 was elected to Parliament. He was appointed solicitor-general in 1763, and a justice of the court of common pleas in 1770. His principal work is "Commentaries on the Laws of England" (4 vols., 1765–69), which acquired a high reputation and is extensively used by students of law. His style is clear, ornate, and graceful, but his method is not scientific, and he was not well qualified to judge of the law from a legislator's point of view. Died Feb. 14, 1780. His "Commentaries" were severely criticised by Bentham. According to Horne Tooke, his work is "a good gentleman's law-book—clear, but not deep." (See Clitheroe, "Life of Sir W. Blackstone," 1780; Foss, "The Judges of England.")

Blackstone (William), a clergyman of the Church of England, and the first white inhabitant of Boston, Mass., who settled at Shawmut, now Boston, in 1623, but left the place in 1633, not liking his Puritan neighbors. He is said to have died in Rhode Island in 1675.

Black Tin, the name given by miners to tin ore ready for the process of smelting.

Black Vomit, the name of the hæmorrhagic discharge from the stomach peculiar to Yellow Fever (which see).

Black Wad, a name sometimes given to the native black oxide of manganese. (See Manganese.)

Black Walnut (the *Juglans nigra*), a valuable timber tree of the U. S., belonging to the order Juglandaceæ, and growing from Florida northward, and especially westward, being rare at present in New England. It is a handsome tree, which produces a nut which, though edible, is less so than that of the European walnut, while its timber is even more valuable. The wood is employed for gunstocks, furniture, the finishing and flooring of rooms, and a great variety of purposes.

Black War'rior, a river of Alabama, is formed by the junction of the Locust Fork and Mulberry Fork, which unite near the S. extremity of Walker county. It flows south-westward, and enters the Tombigbee about 2 miles above Demopolis. Its length is estimated at 175 miles. Steamboats ascend this river from its mouth to Tuscaloosa. Bituminous coal is found on this river.

Black'well (Antoinette Brown), an American lady, born in Henrietta, N. Y., May 20, 1825, studied theology at Oberlin College, O., and was ordained pastor of a Congregational church at South Butler, N. Y., in 1853. She has taken an active part in the Woman's Rights movement and other reforms. She was married in 1856 to Samuel C. Blackwell.

Blackwell (Elizabeth), M. D., born at Bristol, in England, in 1821, was the first woman who ever obtained the degree of M. D. in the U. S. She came to the U. S. with her parents in 1831, and taught school at Cincinnati from 1838 to 1847. Having studied medicine in private, she applied for admission to the medical colleges of Philadelphia, New York, and Boston without success. She was at last admitted by a unanimous vote into the College of Geneva, N. Y., in 1847, and graduated as M. D. with honor in 1849. She afterwards studied midwifery in Paris, and began to practise in New York City in 1851, where she has for the most part since resided. In 1854, with her sister Emily, she opened the New York Infirmary for Women and Children. In 1859 she delivered a course of medical lectures in London.

Blackwell (Lucy Stone). See Stone (Lucy).

Blackwell's Island, in the East River, is a part of New York City, and has a lunatic asylum, workhouse, almshouse, penitentiary, smallpox, charity, and fever hospitals, one for incurables, one for epileptics and paralytics, and an asylum for the blind. The island has an area of 120 acres, and was named from a family which long owned it. At its N. end is a stone lighthouse with a fixed red light, which is 54 feet above the sea; lat. 40° 46′ 15″ N., lon. 73° 56′ 08″ W.

Black'wood (William), a Scottish publisher, born in Edinburgh in 1776, was the founder of "Blackwood's Magazine." He commenced business as a bookseller in 1804, and issued the first number of his magazine in 1817. It obtained speedy success and a high reputation, to which the writings of Scott, John Wilson, and J. G. Lockhart greatly contributed. Its editors advocated the political creed of the Tories with powerful sarcasm and considerable virulence. Mr. Blackwood was chief manager of the magazine until his death in 1834, and was succeeded by his sons, under whom it maintained its reputation, and received contributions from many eminent authors, including Bulwer, W. S. Landor, and De Quincey.—His son John, who succeeded him, was born in 1818, and died Oct. 29, 1879.

Blad'der [Lat. *vesica;* Fr. *vessie*], a musculo-membranous sac contained in the anterior part of the pelvis. It is absent in all invertebrate animals. A few cartilaginous fishes possess it; so do Batrachia (frogs, etc.) and Chelonia (turtles). No birds have it, although the ostrich and cassowary have a dilatation of the cloaca somewhat resembling it. It is present in all Mammalia. In man the bladder is nearly triangular when empty, oval when full. The ureters (one on each side) convey the urine to it from the kidneys; and this is voided, by the contraction of the bladder, through the urethra. The entrance to the latter is guarded by a valve, partly muscular, called by some anatomists the *sphincter vesicæ.* Distension of the bladder (retention of urine) from any obstruction of the urethra is a very painful and sometimes dangerous affection. It may be spasmodic, but it is more often the effect of a stricture or contraction of the passage from local disease. In low fevers it is not uncommon for a kind of paralytic distension of the bladder to occur. In either of these cases the removal of the urine by means of a catheter is of great importance. The bladder is also liable to inflammation (*cystitis*) and to chronic irritability; either of which may cause great distress. (For stone in the bladder see Calculus.)

Blad'der-Nut (*Staphylea*), a popular name of several plants of the order Sapindaceæ. They are so called because the fruit is a bladdery, membranous, and inflated capsule enclosing hard, bony seeds. They are shrubs or small trees with pinnate leaves, five stamens, and five petals. The *Staphylea pinnata* is a native of Europe, and is planted as an ornamental tree in English shrubberies. Another species, the *Staphylea trifolia,* or American bladder-nut, is a native of the U. S. It is a shrub about ten feet high, having three ovate leaflets. The seed of these species is aperient, and the wood is suitable for turning.

Blad'derwort (*Utricularia*), a genus of aquatic plants of the order Lentibulaceæ, comprises numerous species which abound in tropical and temperate parts of both hemispheres. Their flowers adorn the surface of lakes, ponds, and stagnant or shallow waters. Fourteen species or more of them are found in the Atlantic U. S. They are remarkable for a provision by which the plant, which is ordinarily submerged in water, is raised to the surface, in order that the flowers may expand in the air. The leaves and stems are furnished with little bladders or vesicles, which become filled with air at the time of flowering. The air is afterwards removed, so that the plant sinks again, and ripens its seeds at the bottom. A few species which do not grow in the water have no bladders.

Bla'densburg, Prince George co., Md. (see map of Maryland, ref. 3–E, for location of county), on R. R. and the Eastern Branch of the Potomac, 6 miles N. E. of Washington. A battle fought here Aug. 24, 1814, between the British and Americans, resulted in the capture of Washington. Pop. in 1870, 410; in 1880, 466.

Bladen Springs, Choctaw co., Ala. (see map of Alabama, ref. 6–A, for location of county), 3 miles from the Tombigbee River and 85 from Mobile, has six copious saline chalybeate springs, much resorted to for the cure of bowel and kidney complaints and chronic rheumatism and dyspepsia.

Blagoweshtshensk' (*i. e.* "good news"), the capital of the province of Amoor, in Siberia. It was founded in 1858, and consists mostly of government buildings. Some trade is carried on here between the Chinese and the Russians. Pop. in 1882, 3385.

Blain, a town of France, department of Loire-Inférieure, 22 miles N. N. W. of Nantes. Here are the ruins of a strong castle. Pop. in 1881, 6660.

Blaine (James Gillespie), LL.D., an American legislator, b. in Washington co., Pa., Jan. 31, 1830; graduated at Washington College in 1847; removed to Maine in early life, and became editor of the "Portland Advertiser." He was elected to Congress by the Republicans of Maine in 1862, and was re-elected five times. He gained distinction as a debater, and was chosen Speaker of the House of Representatives in Mar., 1869, and again in 1871 and 1873. He was a member of the House of Representatives in 1876, and in that year was appointed by the governor of Maine to fill a vacancy in the U. S. Senate caused by the resignation of Lot M. Morrill, who was appointed Sec. of Treasury. Mr. Blaine was chosen by the Maine legislature to fill the unexpired term of Mr. Morrill, and also for the succeeding term, ending Mar. 4, 1883. Mar. 5, 1881, was appointed Sec. of State by Pres. Garfield; resigned Dec., 1881. Nominated June 6, 1884, by Republican convention, Chicago, Ill., for Pres. of the U. S., but was not elected. Author of "Twenty Years in Congress."

Blainville, de (Henri Marie Ducrotay), M. D., F. R. S., a distinguished French zoologist and anatomist, b. at Arques, near Dieppe, Sept. 12, 1777. He studied comparative anatomy under Cuvier, who employed him as his assistant; in 1808 received the degree of doctor of medicine; was appointed professor of anatomy and zoology in the Faculty of Sciences of Paris in 1812, and admitted into the Institute in 1825. In 1832 he succeeded Cuvier as professor of comparative anatomy in the Museum of Natural History. He acquired a high reputation as a teacher and writer. Among his works are "Lectures on General and Comparative Physiology," and "Osteography, or a Comparative Iconographic Description of the Skeleton and Dentary System of the Five Classes of Vertebrated Animals" (unfinished). D. May 1, 1850.

Blair, R. R. junction, a city, capital of Washington co., Neb. (see map of Nebraska, ref. 10–H, for location of county), on the Missouri River. Pop. in 1880, 1317; in 1885, 2132.

Blair (Austin) was born at Caroline, Tompkins co., N. Y., Feb. 8, 1818, and graduated at Union College in 1839, studied law, removed to Michigan, and has held many public offices; was governor of the State (1861–65), and member of Congress (1867–73).

Blair (Francis Preston), an American journalist, born at Abingdon, Va., April 12, 1791. He graduated at Transylvania University, and became in 1830 editor of the "Globe," a Democratic daily paper published at Washington, D. C. He was a personal friend and adviser of Gen. Jackson while the latter was President, and continued to edit the "Globe" until 1845. He supported Van Buren as a candidate for the Presidency in 1848, and joined the Republican party in 1855. D. at Silver Spring, Md., Oct. 18, 1876.

Blair (Francis Preston, Jr.), a lawyer, son of the preceding, was born at Lexington, Ky., Feb. 19, 1821. He graduated at Princeton in 1841, was elected a member of Congress by the Free-Soil party of St. Louis, Mo., in 1856, after which he acted and voted with the Republicans for several years. He joined the Union army in 1861, and obtained the rank of major-general. In 1864 he commanded a corps of Sherman's army in the campaign which resulted in the capture of Atlanta. Having joined the Democratic party, he was selected as a candidate for the vice-presidency by the convention which nominated Horatio Seymour for the presidency in 1868. He was chosen a U. S. Senator for Missouri in Jan., 1871. D. at St. Louis, Mo., July 8, 1875.

Blair (Hugh), D. D., an eminent Scottish divine, born in Edinburgh April 7, 1718, was licensed as a minister of the Church of Scotland in 1741. In 1758 he became one of the ministers of the High Church of Edinburgh, the highest promotion that a Scottish clergyman can obtain. His sermons were admired for their polished style, but were not remarkable for originality or profoundness. In 1762 he was appointed professor of rhetoric and belles-lettres in the University of Edinburgh. He published five volumes of sermons (1777–1800), which were once very popular, but their reputation has declined. His "Lectures on Rhetoric" were published in 1783, and were used in many schools. Died Dec. 27, 1800. (See James Finlayson, "Life of Hugh Blair," 1801.)

Blair (James), D. D., born in Scotland in 1656, entered the Anglican ministry, came to America in 1685, in 1689 became commissary of the bishop of London for Virginia and Maryland, was the founder and first president of William and Mary College (1693), and rector of Williamsburg, holding all these and other important offices till his death, Aug. 1, 1743. Besides other works, he published a commentary on the "Sermon on the Mount" (5 vols. 8vo, 1722), highly commended by Waterland, Doddridge, and Bickersteth.

Blair (James), born in Lancaster, S. C., was member of Congress from South Carolina 1821–22 and 1829–34. Died Apr. 1, 1834.

Blair (John), born at Williamsburg, Va., 1689; member of the House of Burgesses as early as 1736; president of the council of Virginia and acting governor of Virginia 1757–58 and 1768. Died Nov. 5, 1771.

Blair (John), an American jurist, born at Williamsburg, Va., in 1732. He graduated at William and Mary College, and studied law in London. Having previously filled several high offices, he was appointed by Washington judge of the Supreme Court of the U. S. (1789). Died Aug. 31, 1800.

Blair (John), born in Washington co., Tenn., was member of Congress from Tennessee 1823–37. He had previously served in both branches of the State legislature. Died in July, 1863.

Blair (Montgomery), an American officer and politician, born May 10, 1813, in Franklin co., Ky., graduated at West Point in 1835, serving while in artillery in Florida war till he resigned, May 20, 1836; counsellor-at-law in St. Louis, and U. S. attorney for the district of Missouri 1839–43, judge of the St. Louis court of common pleas 1843–49, solicitor of the U. S. in the court of claims 1855–58, counsellor-at-law in Montgomery co., Md., 1853–61, and since 1863, being counsel for plaintiff in the famous Dred Scott case; president of the Republican committee of Maryland 1860, and postmaster-general of the U. S. 1861–64. Died July 26, 1883. George W. Cullum.

Blair (Robert), a Scottish poet, born at Edinburgh in 1699, was a relative of Hugh Blair, noticed above. He was ordained minister of Athelstaneford in 1731. He wrote a poem of undoubted merit entitled "The Grave," which was not printed until after his death. Died Feb. 4, 1746.

Blairs'ville, capital of Union co., Ga. (see map of Georgia, ref. 1–G, for location of county). Gold and marble are found in the vicinity. Pop. in 1880, 101.

Blairsville, R. R. junction, Indiana co., Pa. (see map of Pennsylvania, ref. 5–C, for location of county), on the Conemaugh River, 56 miles E. of Pittsburg. Grain, pork, lumber, and coal in great quantities are shipped here. Pop. in 1870, 1054; in 1880, 1162.

Blake (Charles F.), U. S. N., born in 1842 in Pennsylvania, graduated at the Naval Academy in 1861, became an ensign in 1863, a lieutenant in 1864, and a lieutenant-commander in 1866. He served on board the steam sloop-of-war Brooklyn at the battle of Mobile Bay Aug. 5, 1864, and is thus referred to in the report of Capt. James Alden, her commanding officer: "The other division officers, Captain Houston of the marines, Lieutenant Charles F. Blake, Ensigns Cassel and Sigsbee, with their assistants, Master's Mates Duncan and Stevens, fought their guns nobly and well." Foxhall A. Parker.

Blake (Francis B.), U. S. N., born Nov. 8, 1837, in Pennsylvania, graduated at the Naval Academy in 1857, became a lieutenant in 1861, and a lieutenant-commander in 1863, resigned June 15, 1870. On the night of Sept. 14, 1861, while serving on board the frigate Colorado, he participated in the very gallant exploit of destroying the privateer Judith, "moored at the S. end of the Pensacola navy-yard, under the protection of a battery and field-piece." He was attached to the steam gunboat Kennebec in her attempted passage of Forts St. Philip and Jackson, April 24, 1862, and at Vicksburg, June 28, 1862.

Foxhall A. Parker.

Blake (George A. H.), colonel of U. S. cavalry and brevet brigadier-general U. S. army, was born in Pennsylvania, and became first lieutenant in the Second Dragoons in 1836. He served honorably in Florida, Mexico, on the frontiers, and in the late civil war. He was wounded at Gaines's Mill in 1862, and received his brevet for his conduct at Gettysburg. Retired Dec. 15, 1870.

Blake (George Smith), a naval officer, born at Worcester, Mass., in 1803. He served in the Mexican war, and was made superintendent of the U. S. Naval Academy at Annapolis in 1857, and a commodore in 1862. D. June 24, 1877.

Blake (Homer C.), U. S. N., born Feb. 1, 1822, in Duchess co., N.Y., entered the navy as a midshipman Mar. 2, 1840, became a passed midshipman in 1846, a lieutenant in 1855, a lieutenant-commander in 1862, a commander in 1866, and a captain in 1871. On the evening of the 11th of Jan., 1863, Blake, in the merchant steamer Hatteras, which had been converted into a government vessel for blockading purposes, encountered the privateer Alabama, built in England with all the latest improvements of a man-of-war, and after a most spirited resistance was forced to surrender, "the Hatteras going down, bow first, ten minutes after the crew left her decks." Capt. Blake, in his official report of the action, dated Jan. 21, 1863, says: "The battery upon the Alabama brought into action against the Hatteras numbered seven guns, consisting of four long 32-pounders, one 100-pounder rifled gun, one 68-pounder, and one 24-pounder rifled gun. The guns used in the action by the Hatteras were two short 32-pounders, one 30-pounder rifled Parrot, and one 20-pounder rifled Dahlgren." Blake was carried in the Alabama to Port Royal, Jamaica, whence, after being paroled, he returned to the U. S., and so soon as he was regularly exchanged he obtained a command in the N. Atlantic blockading squadron, where he did good service until the close of the civil war. Became commodore. Died Jan. 21, 1880.

Foxhall A. Parker.

Blake (John Lauris), D. D., an American biographer and compiler, born in Northwood, N. H., Dec. 21, 1788. He graduated at Brown University in 1812, became rector of an Episcopal church in Boston. He published many school-books and a "Gen. Biographical Dictionary." D. July, 1857.

Blake (Lillie Devereux). See Appendix.

Blake (Robert), born at Bridgewater, in Somersetshire, in 1599, was elected to Parliament in 1640, and when the civil war began in 1642 raised a troop with which he fought against the royalists. He gained distinction by his defence of Taunton in 1645. In 1649 he was appointed "general of the sea." He destroyed or captured nearly all of Prince Rupert's fleet in the Tagus in 1651. In 1652 he became chief admiral, and in May of that year gained a victory over Van Tromp, who attacked Blake in the ensuing November near Goodwin Sands. Blake was defeated, but in Feb., 1653, he attacked Van Tromp and gained a victory in a running fight of three days. In 1654 he chastised the dey of Tunis. He destroyed the Spanish plate-fleet at Santa Cruz in 1657. He died at Plymouth Aug. 17, 1657.

Blake (William). See Appendix.

Blake (William Phipps), A. M., Ph. B., was born in New York City June 1, 1826, and graduated at the Sheffield Scientific School, New Haven, Conn., in 1852. In 1853 he was mineralogist and geologist for the U. S. Pacific R. R. exploring expedition in California, in connection with which he wrote several reports; was editor of the "Mining Magazine" 1859–60; he was 1861–63 mining engineer for the Japanese government; in 1863 engaged in explorations in California and Nevada, became professor of mineralogy, geology, etc. in the College of California, and geologist to the State board of agriculture; in 1867 was commissioner of California to the Paris Exposition, removed in 1867 to New Haven, Conn., was chosen executive commissioner of the Centennial Commission, and in 1873 went as special agent to the Vienna Exhibition. He was a prominent officer of the International Patent Congress. In 1875 was appointed by the Smithsonian Institution director of the mineral collection of the U. S. at the Centennial; in 1878 was commissioner to the Paris Exposition and a member of the international jury, and secretary of the additional commissioners; at that exposition was created by the French government chevalier of the Legion of Honor of France. Among his numerous professional writings are "Report of a Geological Reconnaissance in California" (1854–58), several reports on ceramics, and various contributions to the "Transactions of the American Institute of Mining Engineers," "Silver Ores and Silver Mines"

(1861), a "Report on the Production of the Precious Metals," etc., and various contributions to U. S. reports on Paris Exposition, which were edited by him. In 1871 he published "Mining Machinery," etc.

Blake (William Rufus), born in 1805 at Halifax, Nova Scotia, studied medicine, but in 1825 (after playing some time in the theatre at Halifax) he appeared at the Old Chatham Theatre, N. Y. He soon attained the first rank as a comedian, excelling particularly in eccentric characters. Died at Boston April 22, 1863.

Blakely, on R. R., capital of Early co., Ga. (see map of Georgia, ref. 7–F, for location of county), is about 88 miles S. of Columbus. Pop. in 1880, 279.

Blakely (Johnston), a naval officer, born in Ireland Oct., 1781. He came with his parents to the U. S., graduated at the University of North Carolina in 1800, entered the U. S. navy Feb. 5, 1800, and obtained command of the sloop Wasp in 1813. In June, 1814, he captured the British sloop-of-war Reindeer, and in the ensuing September defeated and sunk the sloop Avon. The Wasp never returned to port, and the fate of Captain Blakely and his crew was never ascertained.

Blanc (Auguste-Alexandre-Philippe-Charles), a distinguished writer on the fine arts, born at Castres, France, Nov. 15, 1813. He was a brother of Louis Blanc. Besides a long series of valuable contributions on subjects connected with the fine arts to various French journals, he was the author of a "History of French Painters of the Nineteenth Century," of which only the first volume has been published; of a biographical notice of Grandville, and of "The Works of Rembrandt," which first appeared in folio in 1853, and in 1859 was republished with additions in two vols. 4to. A new edition, enriched with many additional illustrations, appeared in 1873. He was the most important contributor to the "History of the Painters of all the Schools," a very complete and extensive work begun in 1849 by Armengaud, and continued till its completion in 1859, under the editorship of Blanc, with the assistance of able writers, such as Delaborde, Mantz, Silvestre, and P. Chasles. Blanc was twice Director of Fine Arts in France —once in 1848, when he replaced M. Garraud, and again in 1871. Died Jan. 18, 1882. Clarence Cook.

Blanc (Jean Joseph Louis), a French historian and radical, born in Madrid Oct. 28, 1813, was educated in France. He founded in Paris in 1839 the "Revue du Progrès," which advocated social and political reform. In 1840 he published an able work on the "Organization of Labor." His next important work was a "History of Ten Years—1830–40," which had a very damaging influence on the popularity of Louis Philippe. He was a member of the provisional government formed in Feb., 1848, and was very popular with the Socialists and workingmen of Paris, who revolted and were defeated in June, 1848. He then went into exile, and resided in England for many years. Early in 1871 he was elected to the National Assembly by the voters of Paris. Among his works is a "History of the French Revolution" (12 vols. 8vo, 1847–62), the style of which is eloquent and dignified. Died Dec. 6, 1882.

Blanchard (François), a French aëronaut, born at Andeleys in 1753, was noted for his mechanical ingenuity. He constructed a balloon with wings and a rudder, with which he ascended in Mar., 1784. In 1785 he crossed the Channel in this balloon, and landed in England, for which exploit the king of France gave him a pension. He made many other ascents. Died Mar. 7, 1809. His wife, who had been his companion in several aërial voyages, was killed in consequence of the burning of her balloon in 1819.

Blanchard (Joseph), born at Dunstable, near Nashua, N. H., Feb. 11, 1705, was a mandamus councillor 1740–58; judge of the supreme court of New Hampshire 1749–58; commanded a New Hampshire regiment in 1755, and was engaged at Crown Point. Died April 7, 1758.

Blanchard (Thomas), an American mechanic and inventor, born in Sutton, Mass., June 24, 1788. He invented a wonderfully ingenious machine for turning gunstocks, which is still in use, and he obtained twenty-four patents for his various inventions. Died April 16, 1864.

Blanche of Castile, queen of France, a daughter of Alfonso IX. of Castile, was born in 1187. She was married in 1200 to the dauphin of France, who became King Louis VIII., and she acquired much influence in affairs of state. When Louis died, in 1226, she became regent of the kingdom, which she governed with ability during the minority of her son, Saint Louis. She was eminent for virtue and wisdom. Died Dec. 1, 1252. (See Macheco, "Vie de Blanche Castile," 1820; T. Nisard, "Histoire de la Reine Blanche," 1842.)

Blanch′ing [from the Fr. *blanche*, "white"], a process by which gardeners arrest the progress of secretions in the leaves of plants, in order to render them more wholesome and palatable as food. Celery, sea-kale, and other plants are usually blanched by the exclusion of light from them, which deprives them of their natural green color and of certain bitter properties. The blanching is effected in various modes, as heaping up the earth against the growing plants, or covering them with boxes or blanching-pots made of earthenware and perforated with many holes.

Blanco, capital of Blanco co., Tex. (see map of Texas, ref. 5–G, for location of county), is 45 miles W. S. W. of Austin City. Pop. in 1880, 245.

Bland (Richard), an American writer and patriot, born in Virginia in 1708, was educated at William and Mary College and the University of Edinburgh, and was elected to Congress in 1774. He published "An Inquiry into the Rights of the British Colonies" (1766). Died Oct. 27, 1776.

Bland (Col. Theodoric), M. D., born in Prince George co., Va., in 1742, was an uncle of John Randolph of Roanoke. He entered the army in 1777, and gained the confidence of Washington, who employed him in several important affairs. In 1780 he was elected a member of Congress, in which he remained till 1783, and was again chosen a member of that body in 1789. Died June 1, 1790.

Bland (Theodoric), born in 1777, a noted jurist, was for twenty-two years chancellor of Maryland. He commenced his judicial life as judge of the county court of Baltimore, and afterward became judge of the U. S. district court for Maryland; published "Reports of Cases decided in the High Court of Chancery, Maryland." Died at Annapolis, Md., Nov. 16, 1846.

Bland Court-house, capital of Bland co., Va. (see map of Virginia, ref. 7–D, for location of county). Pop. not in census.

Blandville, capital of Ballard co., Ky. (see map of Kentucky, ref. 4–B, for location of county), about 28 miles W. S. W. of Paducah. Pop. in 1870, 385; in 1880, 476.

Blane (Sir Gilbert), F. R. S., a Scottish physician, born at Blanefield, in Ayrshire, Aug. 24, 1749. He became private physician to Lord Rodney, who took command of the fleet in the West Indies in 1780. Dr. Blane served as chief physician to that fleet during the war, and published in 1783 "Observations on the Diseases of Seamen." He was physician to St. Thomas's Hospital, London, from 1785 to 1795, and became first physician to William IV. in 1830. Among his works is "Elements of Medical Logic" (1819). Died June 26, 1834.

Bla′nes, a seaport-town of Spain, in the province of Gerona, on the Mediterranean, 30 miles by rail S. of Gerona. It is on the railway from Barcelona to Gerona. Pop. 5323.

Blank Verse, the name applied to the heroic verse of five feet without rhymes. Blank verse is peculiar to the Italian, English, and German languages, having been imported into the two latter from the first. In Italian the line is of eleven syllables, and is used invariably in the drama, and frequently in serious poetry, epic or didactic. In England it was first adopted by the earl of Surrey in his translation of the fourth book of the "Æneid" (1547), and first applied to dramatic uses by Lord Buckhurst in his tragedy of "Gorboduc" (1561). It has since been the accepted metre of English dramatic and heroic verse. The Miltonic verse is constructed with closer attention to the melody of the cadence and cæsura than the dramatic; it admits also less frequently of the eleventh syllable, which in English poetry must be regarded as a sort of license; while Shakspeare and other dramatists occasionally double the short syllable at the end, and thus extend the number to twelve.

Blanqui (Jérome Adolphe), a French political economist, born at Nice Nov. 20, 1798. He became in 1833 professor of economy in the Conservatory of Arts and Trades in Paris. He advocated free trade. Among his works are a "Summary of the History of Commerce and Industry" (1826), and a "History of Political Economy in Europe from the Ancients to the Present Time" (2 vols., 1837–38), which is highly esteemed. Died Jan. 28, 1854.

Blanqui (Louis Auguste), a French communist, a younger brother of the preceding, was born in Paris in 1805. He was a member of the Society of Political and Moral Sciences. While young he studied for the law, and his intellectual gifts were widely remarked; but his love of study was less strong than his passion for politics, and at an early age, affiliating with the most rabid members of French revolutionary societies, he underwent his first imprisonment at the age of twenty-one. A year later he took part in the insurrection of Rue St. Denis, receiving his first wound. In the revolution of 1830 he took up arms against Charles X., was again wounded, and received the decoration of July; became an active member of the Society of Friends of the People; found himself on trial for participating in the "conspiracy of the Nineteen," and was placed in close confinement for a year; was accused in 1835 of being engaged in a conspiracy to manufacture gunpowder for revolutionary uses, found guilty, sentenced to imprisonment for two years and to pay a fine of three thousand francs, but was amnestied in 1837. The insurrection of the Montagnards, with Blanqui and Barbes at their head, followed, and upon its prompt suppression Blanqui was condemned to death. The sentence was, however, commuted to perpetual imprisonment. The revolution of 1848 set him free, and he immediately organized the Central Republican Society, productive of the great popular agitation resulting in three days' insurrection and an attempt to dissolve the National Assembly May 15, 1848. Blanqui was sentenced to ten years' imprisonment at Belle Isle. At the age of fifty-three he returned to France, but in less than a month he was in exile again. Disregarding the mandate which placed him beyond French territory, he ventured back to Paris, and his incarceration for conspiracy followed: again on trial, he was returned to his cell for months longer, and upon his release was conveyed to the frontier. Again he was an exile for a period of eight years. In 1870, Blanqui was once more in Paris, the editor of a journal whose influence culminated in the Commune. He was captured by the Versaillists; the communists offered in exchange for him the archbishop of Paris, but he was considered too dangerous a man to be released. He was sentenced to transportation for life to New Caledonia, but in consideration of his old age and his feeble health he was imprisoned at Clairvaux instead. In 1880, while still a prisoner, Blanqui was returned to the chamber of deputies by the radical republicans of Bordeaux, but the chamber refused to ratify this election. He was soon afterward released, and lived in seclusion till his death, which occurred Jan. 1, 1881. Blanqui went beyond the most advanced in radical ideas, and he clung to his convictions to the end of his days.

Blaps [probably from the Gr. βλάπτω, to "injure," so called on account of its supposed dangerous character; see below], a genus of insects of the order Coleoptera, is the type of a family called Blapsidæ. There are numerous species of this genus, all of a dark color and destitute of wings. They feed on decayed vegetable matter, frequent dark and damp places, and have the power of secreting an acrid, irritating fluid of a peculiar and penetrating odor, which they can throw to a distance of six inches. A British species, the *Blaps mortisaga*, is called darkling beetle and churchyard beetle. In some parts of Europe the peasantry have a superstitious dread of this insect. No *Blaps* is found in the U. S.

Blar'ney, a village and castle of Ireland, in Munster, is on a rivulet of its own name, 4 miles N. W. of Cork, and surrounded by beautiful scenery. The castle and groves of Blarney are celebrated in song. The castle, which once belonged to the earls of Clancarty, stands on a steep rock, at the base of which is a deep valley. Among the relics of this ruined castle is the famous "Blarney stone," which, according to the popular opinion, imparts to those who kiss it a peculiar style of eloquence, or great skill in the use of complimentary speech.

Blä'ser (Gustav), an excellent German sculptor, born at Düsseldorf May 9, 1813. Among his numerous works may be mentioned equestrian statues of Frederick William III. and Frederick William IV., the colossal statue of "Borussia" (Prussia) at Berlin, and a bust of Humboldt in the New York Central Park.

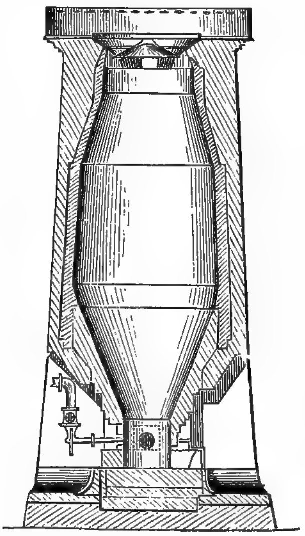
Blas'phemy [Gr. βλασφημία], an indignity offered to the Deity or to religion. According to Blackstone, it is denying the being and providence of God, contumelious reproaches of our Saviour Christ, and profane scoffing at the Holy Scripture, or exposing it to contempt and ridicule. It has been otherwise defined to be the act of wantonly uttering or publishing words casting contumelious reproach or profane ridicule upon God, Jesus Christ, the Holy Ghost, the Holy Scriptures, or the Christian religion. If the words were written or printed, there might be a case of blasphemous libel. If oral, the case would be one simply of blasphemy. The law does not brand as a crime serious discussion or the promulgation in a temperate manner of opinions opposed to Christianity. Blasphemy is an offence punishable as a misdemeanor at common law. In many of the States the crime is punishable by statute.

Christianity is declared by the courts to be a part of the common law, which recognizes that the good morals and orderly conduct of the community are closely connected with a respect for religion, and that insults to the Author of Christianity and malicious attacks on his religion tend to the dissolution of civil government. While the law of this country grants the fullest enjoyment of liberty of conscience and religious belief, and free and decent discussion on any religious subject, it will not allow malicious and blasphemous revilings of the Author of the religion professed by the majority of the community, nor of the religion itself, nor of the Scriptures in which it is taught.

Blaste'ma [Gr. βλάστημα, a "bud" or "budding"], in botany, the embryo in a seed, or the axis of growth of an embryo; that is, the plumule and the radicle, with the part which connects them. In biology, blastema is the name applied to the rudimental mass or protoplasm from which tissue is developed.

Blast Furnace [Ger. *Hochofen;* Fr. *haut fourneau*]. In its primary signification the term blast furnace implies an elevated shaft lined with a refractory material, designed for the reduction of metals from their ores. The shaft is open at the top, where the ore, fuel, and fluxes are charged, and supplied with a blast of air near the bottom, where openings are provided for removing the metal and cinder. The term has, however, by custom become almost entirely restricted to furnaces for the reduction of iron. In its essential details a blast furnace consists of a stack, in whole or in part of masonry, surrounding a vertical chamber or shaft of circular section. The diameter of the shaft usually increases from the top downward and from the bottom upward. The lower part of the furnace is called the *hearth,* and has the smallest diameter. At its upper part are one or more openings through which the blast of air is introduced, and in the lower part, or *crucible,* the molten iron and cinder collect. The hearth is prolonged towards the front of the furnace, and is closed by the *dam,* and covered in on top by the *tymp-arch.* The dam is formed of firebrick or other refractory material. It slopes inward towards the interior of the furnace, and has its outer vertical face covered with a cast-iron plate, called the *dam-plate.* At the bottom of the dam is a channel communicating with the interior of the furnace, through which the molten iron is tapped off, and on its upper edge is a notch, called the *cinder-notch,* over which the cinder flows. The tymp-arch is covered by the *tymp,* a long, hollow casting, through which water constantly circulates. The blast is supplied through *tuyeres,* from one to eight in number, which are set into the masonry of the furnace. They are hollow truncated cones, supplied with a constant current of water to prevent the iron of which they are composed from melting. Into these *water-tuyeres* are fitted the *nozzles* of blast-pipes, which are connected with the *blast main* which encircles the furnace. The sloping walls connecting the hearth with the widest part of the furnace are called the *boshes.* This term is very generally, though incorrectly, used to express the greatest diameter of the furnace. In many cases there is no sharp line of demarcation between the hearth and the boshes, the former being simply a continuation of the curved walls of the boshes.

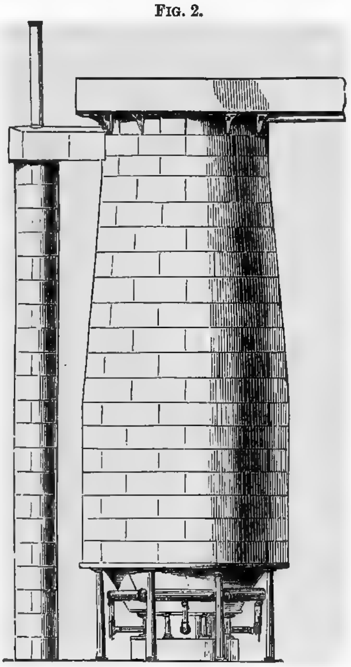
Fig. 1.



In constructing a blast furnace, the upper portion is built on pillars (of iron or masonry), and is entirely independent of the boshes and hearth, which can be removed and reconstructed without interfering with the body of the stack. The top or *mouth* of the furnace, where the materials are charged, may be either entirely and permanently open, or provided with an arrangement which closes the furnace except during charging, when it is opened by some simple mechanism. The *tunnel head* is a hood or chimney, either of sheet iron or brick, over the mouth of the furnace, provided with suitable openings to allow the charge to be dumped into the furnace. The gases of the furnace, which were formerly allowed to escape and burn at the mouth, are now almost universally utilized. This is effected by making openings in the walls of the furnace—some distance below the top in open-mouth furnaces, but as near the top as possible where the top is closed—and conducting the gases by suitable channels either to the boilers or hot-blast stoves, or both, where they are burned. With closed-top furnaces the utilization of the gases is complete; with open-top a considerable quantity escapes and burns at the mouth.

The essential accessories of a blast furnace are the blowing-engine, hot-blast stoves, and hoist. There are three varieties of blast-engines in use: the vertical-beam engine, the horizontal, and the upright. The latter have the steam cylinder either directly above or below the blast cylinder. They are rapidly gaining in favor, owing to their compactness and efficiency. The blast, on leaving the blowing cylinder, passes to the hot-blast stoves. These consist of a series of cast-iron pipes, through which the blast passes, heated on the outside by the combustion of the gases of the furnace. The gases are usually burnt in a combustion chamber under the chamber containing the pipes. In this way the heat is more uniformly distributed, and there is less danger of the pipes being injured by the heat. Recently Siemen's system of regenerative heating has been applied to hot-blast stoves with the best results. In this system the gases are burned in a chamber, and the products of combustion pass through a network of firebrick, which becomes intensely heated. The gases are then caused, by means of valves, to pass into a second stove like the first, and burned as before, while the blast is conducted through the first stove. The blast and gases are made to alternate in this way at regular intervals. The temperature of the blast as it enters the furnace varies within wide limits. There are but comparatively few furnaces at the present day driven with cold blast, the temperature employed varying from 300° to 1000° F. With the firebrick stove above mentioned a temperature of from 1500° to 1600° F. has been attained. The blast on leaving the stoves passes through the main to the furnace, and is there distributed to the tuyeres. The pressure employed varies with the kind of fuel used. Charcoal furnaces usually are blown with a half to one and a half pounds, though sometimes as high as four pounds are used. Coke furnaces are blown with three to four pounds, while anthracite furnaces require four to seven pounds.

Fig. 2.



Hoists or lifts serve to raise the ore, fuel, etc. from the ground to the level of the mouth of the furnace, where they are charged. There are many varieties, as the pneumatic, hydraulic, and steam hoist. Occasionally a furnace is favorably situated on a hill-side, and no hoist is needed.

Fig. 1 is a section of a modern blast-furnace in the Cleveland district of England. Its height is 75 feet; greatest diameter 24 feet at an elevation of 24 feet; diameter of hearth, 8 feet; height of hearth, 8 feet; diameter of mouth, 15 feet. There are three tuyeres, 4½ inches in diameter. Cubic capacity, 20,000 feet. Yield, 350 tons of iron per week.

Figs. 2 and 3 represent an elevation and vertical section of a modern American furnace at Chicago. Its height is 66 feet; greatest diameter, 17 feet; yield, 350 tons iron per week. The gases are taken off at the top of the furnace, and descend by a vertical flue, then by an underground channel to the boilers and hot-blast stoves. The contrivance for closing the mouth of the furnace, shown in the drawings, is known as the cup and cone, or bell and hopper. This arrangement is one of the simplest, and the one most generally adopted.

The blast furnace of the present day is an outgrowth of the small primitive furnaces still to be met with in Eastern countries for reducing iron ores. It differs from them, however, in three essential particulars. The low furnaces produce an unmelted mass of soft iron, and a cinder rich in oxide of iron, and the process is intermittent. A blast furnace produces a compound of iron and other substances, principally carbon, which is fluid at the temperature of the furnace; the cinder is composed of earthy ingredients, and is almost entirely free from iron, and the process is continuous. Intermediate between the two is the German Blauofen, or Blaseofen, ten to sixteen feet in height, which, according to the manner in which it is worked, can be made to yield either soft or cast iron. These furnaces have no fore-hearth, but are built with closed fronts—a construction which has lately been applied to large blast furnaces successfully, but the system has not been extensively adopted.

The history of the development of blast-furnace construction for the last half century is almost entirely a record of increasing dimensions, both in height and diameter, having for a consequence greater yield, and, within certain limits, greater economy of fuel. The flat boshes of the older furnaces and the rapid narrowing upward towards the mouth have been generally replaced by steeper boshes and wider mouths. There have been, however, no universally accepted principles of blast-furnace construction developed, as far as regards the interior outline. The Cleveland district of England affords a striking instance of the growth of furnaces in height and capacity. Furnaces were built

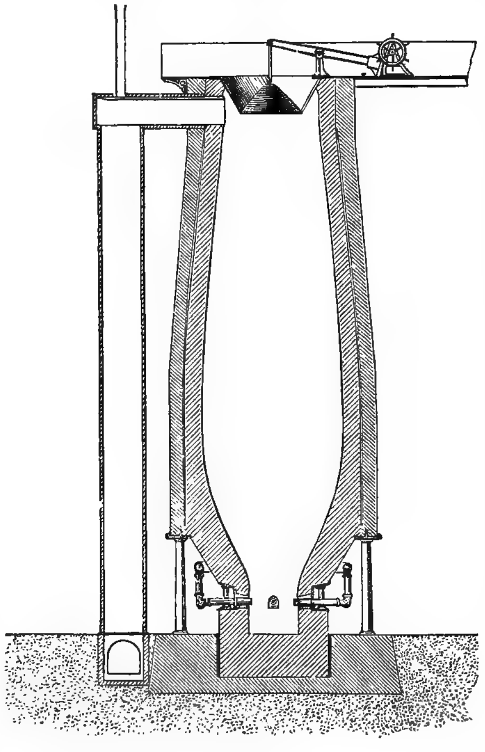
In 1851, 42 feet high, 15 feet diam., capacity 4,566 cubic feet.
" 1861, 62 " " 20 " " " 12,778 " "
" 1870, 90 " " 30 " " " 41,149 " "

The Blast-furnace Process.—The charge introduced into the mouth of a blast furnace consists of iron ore, which varies greatly in richness and purity in different regions; fuel, either raw coal, coke, or charcoal; and, ordinarily, limestone, the latter serving to unite with the earthy matters of the ore and form a fluid slag or cinder. The action of the furnace, expressed in its simplest form, is as follows: Air is blown through the tuyeres, and comes in contact with incandescent fuel. The oxygen of the air is speedily converted into carbonic oxide gas, which, together with the nitrogen of the air, rises through the descending charge. The reaction of the carbonic oxide and oxide of iron of the ore results in the formation of metallic iron and carbonic acid gas; the latter, ascending, escapes at the mouth of the furnace, while the former descends to the hottest part of the furnace, where it melts and drops into the hearth. The earthy matters of the charge fuse likewise, and collect in the hearth, floating on top of the molten iron. At regular intervals the slag and iron are tapped off: the former is thrown away, and the latter is cast in moulds of sand or iron, and forms "pigs." Although this simple statement of the blast-furnace process is correct as far as the end result is concerned, yet the reactions which occur in the furnace are, in reality, very complex and dependent on many conditions. The reducibility of different varieties of ore is very dissimilar: while some varieties require a high temperature and long exposure to an atmosphere rich in carbonic oxide gas, other varieties yield up their oxygen at a comparatively low temperature and short exposure to an atmosphere relatively poor in carbonic oxide. According to Bell, a gaseous mixture of 40 to 45 volumes of carbonic acid to 100 of carbonic oxide fails to exert any appreciable effect on Cleveland iron-stone at a temperature of melting zinc (782° F.), but the same mixture possesses decided reducing power at a red heat. Again, some ores are rapidly reduced with the above gaseous mixture at a temperature at which Cleveland iron-stone is unaffected.

The reduction of iron ores, or the removal of the oxygen of the oxide of iron, does not simply consist in the abstraction of oxygen by carbonic oxide. The investigations of Bell prove that reaction of carbonic oxide and oxide of iron is a very complex one. The first effect is the formation of some carbonic acid and some metallic iron. The further action of carbonic oxide on the metallic iron thus formed causes the carbonic oxide to break up into carbonic acid and carbon, the latter being deposited in the form of a black powder on the reduced metal. This combined process of reduction and carbon deposition continues until the iron is nearly all in the metallic state; but absolute reduction is never attained by the action of the carbonic oxide alone. As this product, composed of iron and carbon and some oxide of iron, descends into the hotter regions of the furnace, the carbon thus deposited is partially removed by the carbonic acid, but it is not until the point of fusion is reached that the last traces of oxygen are removed. It is probable that the carbon found in the pig iron is a part of the carbon deposited in the ore. The amount and rate of carbon deposition depends on the temperature and the relative amount of carbonic acid present in the gases. It may begin as low as 392° F., but decreases rapidly as soon as a red heat is reached. The most favorable temperature is between 752° F. and 842° F. The temperature of incipient reduction of sesquioxide of iron by carbonic oxide is variously given by different observers. Bell's determination is the lowest by far—viz. 284° F.—while the oxidation of metallic iron, according to the same observer, does not begin below 752° F.

It is evident that the economical production of iron in the blast furnace is mainly a matter of the amount of fuel used. A saving of the fuel in the process can be effected in two ways: first, by increasing the heat of the descending charge; and second, by increasing the heat of the ascending blast. The first of these conditions is realized by adding to the height or diameter of the furnace; in other words, increasing its capacity, so as more effectually to intercept the heat of the escaping gases; and the second condition is accomplished by direct heating of the air forced into the furnace. It was long considered that there was no limit to the saving that could be effected by increasing the capacity of the furnace and temperature of the blast, but Bell has shown that the profitable limit has probably been attained in both instances, at least in so far as the smelting of Cleveland ore is concerned. The practical limit of capacity in a blast furnace is reached when the gases which are given off at the mouth no longer have the power to abstract oxygen from the ore—a condition dependent on the temperature of the gases, and the relative amount of carbonic oxide they contain. But gases which are inactive on one ore at a given temperature may still have power to reduce another ore at the same temperature; consequently, the height and capacity of a blast furnace is dependent on the kind of ore smelted in it. In the case of Cleveland ore (containing in a calcined state 41 per cent. of iron), of difficult reducibility, Bell finds that the profitable limit is reached in furnaces of from 12,000 to 15,000 cubic feet capacity, with temperature of blast about 900° F. The escaping gases then have a temperature of 600 to 700° F., and contain 6.58 hundredweight of carbon, in the form of carbonic acid, for each ton of pig iron produced, and 40 to 45 volumes of carbonic acid to 100 volumes of carbonic oxide. The consumption of fuel under these circumstances is from 21½ to 22 hundredweight of coke for 1 ton of pig iron produced. Furnaces of 30,000 and 40,000 cubic feet capacity, driven with a blast of 1400 or 1500° F., do not exhibit any further economy of fuel. In smelting richer and more readily reducible ores a small cubic capacity suffices to attain the minimum expenditure of fuel. A notable instance is the Urbna furnace in Austria, working spathic ores. It is 36 feet high, and has a capacity of only 1200 cubic feet, but makes 140 tons of iron per week with 14 hundredweight of charcoal per ton of iron, the temperature of blast being 392° F.

FIG. 3.



The cause of the great economy of fuel effected by the hot blast—say, on an average, 10 to 11 hundredweight per ton of iron—has long puzzled metallurgists, and the subject cannot be said to be yet entirely removed from the sphere of speculation. The researches of Bell in England and Akerman in Sweden have, however, recently thrown great light on the subject. The following considerations show where the principal sources of economy lie; in other words, why the combustion of a given amount of fuel, outside of the furnace and conveyed through the blast, is more than equivalent to the same amount of fuel burnt in the furnace itself. The fuel burnt before the tuyeres is oxidized merely to carbonic oxide, and gives per unit of carbon only 2400 heat-units; while the fuel in the hot-blast stoves is burnt to carbonic acid, and gives, per unit of carbon, 8000 heat-units, or more than three times the amount in the first instance. Although not more than one-half of this heat is available, owing to loss by the chimney and by radiation, yet there is still a gain from this source. The principal source of saving, however, is to be found in the fact that the heat brought into the furnace by the blast is unaccompanied by any increase in the bulk of the gases in the furnace; whereas the same amount of heat produced by the combustion of the fuel before the tuyeres would have been accompanied by the amount of air necessary for its combustion. This decrease in the bulk of the gases, consequent upon the use of hot blast, acts, first, by diminishing the rapidity of the upward current, thus allowing longer contact of the gases with the ore; and, second, as there is less gas escaping from the furnace, less heat will be carried off in this way.

As the reduction of the ore is dependent upon the temperature and composition of the gases, it is evident that the amount of heat which we may supply by the blast has a limit, for this heat is unaccompanied by the production of carbonic oxide. When, therefore, the fuel used in the furnace has been so far reduced in amount as only to supply the minimum amount of carbonic oxide needed for reduction of any given ore, further increase of the temperature of the blast can be of no advantage, as the heat thus conveyed to the furnace will either escape at the mouth, or it will, by increasing the heat of the furnace, cause a loss of fuel by enabling the escaping carbonic acid to take off another equivalent of carbon.

The product of the blast furnace is *pig* or *cast iron*. Its composition is dependent on the ores and fuel used. It always contains 3 to 4 per cent. of carbon, and in some varieties as high as 5 per cent. The carbon exists in two forms in pig iron—chemically combined, and in the form of graphite. The darker and more highly graphitic varieties are formed at the highest temperatures. The higher the temperature and the more silica the charge contains, the more silicon will be reduced and unite with the iron. A high temperature has also the tendency, in very basic charges, to reduce some of the metals of the alkaline earths. Sulphur is more readily removed in the cinder at an elevated temperature, while the total phosphorus of the charge goes almost entirely into the pig iron, whatever the temperature may be.

The production of a blast furnace depends on its capacity, the richness and reducibility of its ores, the nature of the fuel, and the temperature of blast. While some small furnaces yield but three tons daily, the production of some of the mammoth furnaces of England is eighty tons daily. The composition and character of the cinder or slag from a blast furnace depends on the nature of the ore and the temperature of the furnace. It consists mainly of a double silicate of lime and alumina.

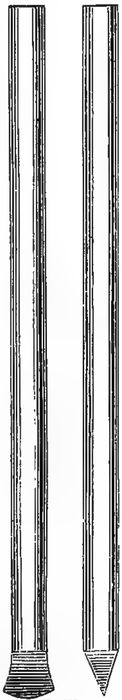
T. M. DROWN.

Blast'ing [from the Ang.-Sax. *blæsan*, to "blow"]. The use of gunpowder in quarrying stone probably dates back almost to the invention of that explosive. In ordinary practice the blocks of stone are separated from the mass in the quarry by means of one or more *blasts*, each blast being made by first drilling a hole into the rock by the use of a *drill*, operated either by hand, or—as is now the practice in large works, especially large tunnels or shafts—by machinery driven by steam or compressed air.

In removing very large masses of rock quickly, to make way for a railroad, to furnish stone in sufficient quantities for the rapid construction of an important breakwater, or to prepare the site for a fort, it has become the custom to run galleries into the rock, and to place in chambers prepared for the purpose very large charges of powder of sufficient power to bring down the whole face of a cliff or side of a mountain, as was the case at Dover and Holyhead in England, and at Lime Point, entrance to San Francisco Bay, Cal. Each of these methods for removing rock will be described in turn.

In hand-drilling the operation is performed by means of a *drill* or *jumper*, which is formed from a bar of steel, or of iron tipped with steel at one end, which is flattened out into a fan shape, with a sharp cutting edge extending on each side a little beyond the body of the drill, as seen in Fig. 1, so that the drill may have free play in working. The drills are of lengths suited to the depths of the holes to be drilled, it being customary to use a short drill in commencing a hole, and longer ones in succession as the hole is deepened. Their diameters also vary, generally with the depths of the hole, but are also much modified by the kind of explosive used, blasting powder requiring much more space for the charge than nitro-glycerine and its compounds.

FIG. 1.



Drill.

In drilling shallow holes of one inch or less diameter, the quarryman holds the drill in one hand (see Fig. 2), turning it a little with each blow, and with the other hand wields a hammer weighing from four to seven pounds. (See Fig. 3.) In this way he can drill in granite an average of eight feet in a day.

In drilling holes ranging from one to three and a half inches in diameter, and two to fifteen feet in depth, three men are usually required (Fig. 4), one to hold and turn the drill, and the other two to wield hammers (Fig. 5) weighing from fourteen to eighteen pounds, striking the drill alternately. The progress thus made in granite has been from two and a half to twelve feet per diem, in holes varying respectively from three and a half to one and a half inches in diameter.

To prevent the cutting edge of the drill becoming heated, and thereby softened, water is frequently poured into the hole, and a wisp of straw, hay, or a rag is laid around the drill at the mouth of the drill-hole to prevent the water spurting out when the drill is struck by the hammer.

From time to time the fragments and powdered stone have to be taken out of the drill-hole by means of a *spoon* or *scraper*. (Fig. 6.)

Another form of drill, called the *churn-drill* or *churn-jumper*, is frequently used, when the holes are vertical or nearly so. (Fig. 7.) It is usually seven or eight feet long, but may be as much longer as required for deeper holes. It is sharpened at each end into a cutting drill edge, and sometimes has an iron bulb in the middle to give additional weight in falling, and consequently greater effect in drilling. Two men are usually employed to operate it, raising it, turning it about one quarter round, and letting it fall, cutting the rock by the force of gravity. (Fig. 8.) Sometimes a spring rod and line are used to facilitate the operation, enabling one man to operate the drill. (Fig. 9.) The progress made is better than with the drill and hammer, being about sixteen feet per diem, but the cutting edges suffer greater injury, becoming oftener dulled or broken, rendering frequent sharpening necessary.

The next step, after finishing the drilling and removing the chips, powdered stone, etc. from the bottom of the drill-hole, is to determine the *strength of the charge*. In former times an inferior kind of gunpowder, called blasting powder, was generally used, and is still employed in many quarries in preference to the quicker and stronger explosives, apparently for the reason that its slower ignition, by allowing a gradual development of its expansive force, produces a greater, and, for their purposes, a better, effect upon the rock, breaking it into large masses, better suited for "dimension stone." In furtherance of this idea many quarrymen have mixed with the powder certain proportions of other materials, as fine dry sawdust, in the proportions of one-third sawdust for small charges, and one-half for large, and quicklime in the proportion of one-third lime; and have also in some cases managed to have an air-space over or around the charge. The results are stated to have been satisfactory. At Cherbourg, France, in blasting rock for the breakwater, sawdust, obtained from the softer kinds of wood, as elm or beech, was mixed with gunpowder in equal proportions, and the effect, as far as concerns the quantity of rock removed, is reported as having been equal to that of similar blasts in which the charge was wholly gunpowder. The masses were, however, larger, and therefore better suited for use upon the breakwater.

FIG. 2.

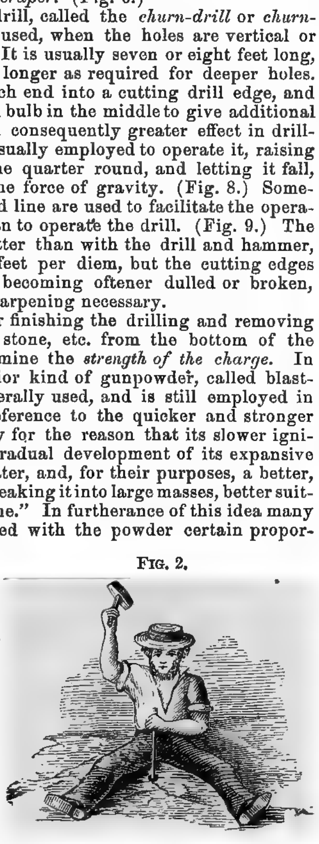
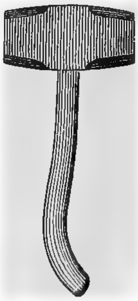


FIG. 3.



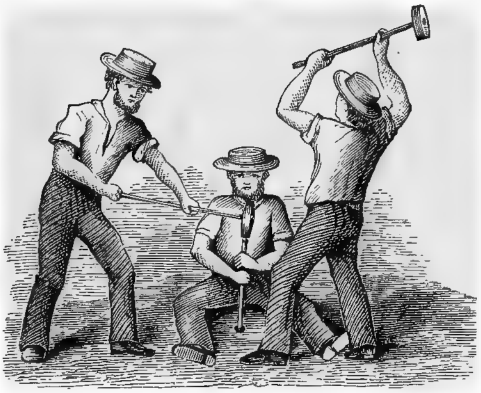
Hand Hammer.

Of late years the necessity for a more active agent for use in gold and silver mining, and in excavating railroad tunnels, and large cuttings in solid rock, has brought into use more powerful explosives. Nitro-glycerine, first invented and used in Europe, has been introduced to a considerable extent in this country. At the Hoosac Tunnel, where its qualities have been much improved by Prof. Mowbray, it has been manufactured and used exclusively since the summer of 1868. The result has been an improvement in the rate of monthly progress, which, including that resulting from the use of machine drills, has increased from 50 to 150 feet, and the quantity of rock removed in the same time, from $194\frac{7}{12}$ cubic yards to $1147\frac{5}{12}$ cubic yards.

Many combinations of nitro-glycerine are also in use, some of which are claimed to be safer than, and almost if not quite as effective as, nitro-glycerine. Of these *dualin*, invented by Dittmar, and manufactured at Neponset, Mass., is much used. This consists essentially of dried sawdust soaked with as much nitro-glycerine as it will contain. The nitro-glycerine, being thus fixed, is not apparently liable to the changes incident to a liquid state, nor to explosion by shocks. *Giant powder* or *dynamite*, made by soaking nitro-glycerine into a silicious sand, or infusorial earth consisting of millions of microscopic shells, which readily absorb and retain the nitro-glycerine, is claimed to be safe from shocks, and is much used in the mines of California, Nevada, and other Western States and Territories. *Gun-cotton* has been used in England, and the trials of the disks prepared by Prof. Abel have shown marked results of its great explosive power. In the demolition of one of the towers erected in London for the International Exhibition of 1862, some of the charges of gun-cotton were only one-sixteenth, by weight, of the powder used in similar charges in other parts of the same building.

To determine the quantity of powder or other explosive that must be placed in a mine of any kind, we should take into consideration the nature of the soil or rock, its tenacity, weight, and the quantity of the explosive necessary to throw up a cubic yard of it. After ascertaining this by actual experiment, the charge necessary for another mine or blast in the same material may be found by what is called the "miners' rule;" which is, that "the charges of two similar mines are to each other as the cubes of their lines of least resistance," or $c : c' :: l^3 : l'^3$.

FIG. 4.



The "line of least resistance" is the line along which the exploded charge finds the least resistance to its vent in the open air. Generally, it is the shortest line from the centre of the charge to the surface of the rock or ground. Quarrymen rarely understand the correct use of this line in determining the quantity of powder for a charge, usually confounding it with the depth of the drill-hole. In some cases this is not far from correct, as is seen in Fig. 10, where the line AB is the line of least resistance for the charge BC. But were the hole drilled to the depth G, FG being the position of the charge, the line HE becomes the line of least resistance.

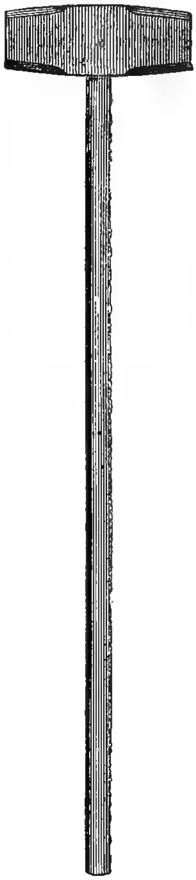
A simple rule, very generally followed, is to "fill the hole one-third full." This for holes of medium diameter may not be far wrong, but where the diameter is larger than usual an excessive charge will be the result of its application. This is readily seen from the fact that one-third of the length of a 2-inch hole will contain nearly *twice* as much powder as the same length of a 1½-inch hole, and a 2½-inch hole will contain nearly *three times* as much.

The true line of least resistance is measured from the *centre of the charge,* and not from the bottom of the drill-hole. This distinction is important, as will be seen by observing in the following table—taken from Gen. Pasley's "Memorandum on Mining"—the different spaces occupied by the same charge in holes of various diameters:

Diameter of the hole.	Powder contained in one inch of hole.		Powder contained in one foot of hole.		Depth of hole to contain one pound of powder.
inches.	lbs.	oz.	lbs.	oz.	inches.
1	0	0.419	0	5.028	38.197
1½	0	0.942	0	11.304	16.976
2	0	1.676	1	4.112	9.549
2½	0	2.618	1	15.416	6.112
3	0	3.77	2	13.24	4.244
3½	0	5.131	3	13.572	3.118
4	0	6.702	5	0.424	2.387
4½	0	8.482	6	5.784	1.886
5	0	10.472	7	13.664	1.528
5½	0	12.671	9	8.052	1.263
6	0	15.08	11	4.96	1.061

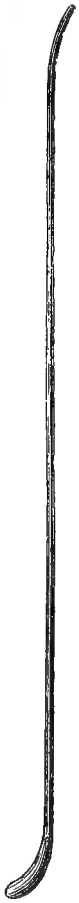
Thus, if we have a 1-inch hole, 42 inches deep, charged, according to the common rule, with 14 inches of powder, the centre of the charge, being seven inches from the bottom of the hole, will lessen, by that distance, the commonly understood line of least resistance (the depth of the hole), giving 35 inches, which is the true line. As the diameter of the hole increases the two lines approximate more nearly, until with a 6-inch hole they differ only by about half an inch.

FIG. 5.



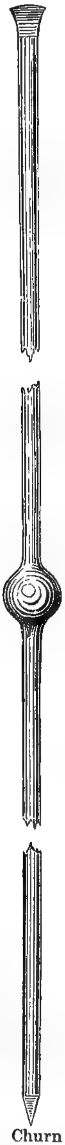
Large Hammer.

FIG. 6.



Spoon.

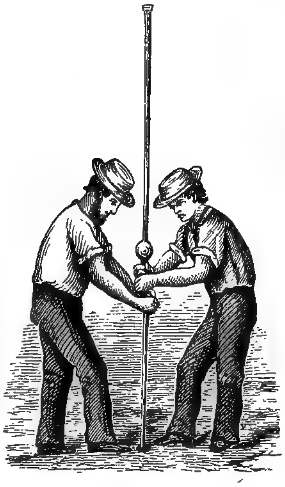
FIG. 7.



Churn Drill.

Aware of the unequal results from following the common rule, many quarrymen are accustomed to determine the charge by *appearances,* including in that term the nature of the rock, position of planes of stratification, diameter of drill-hole, and a mental comparison with similar mines with which they have had experience. In those quarries and mines, however, which are worked with the best system and economy the charges are almost always determined by the "miners' rule," the charge in pounds being obtained by multiplying the cube of the line of least resistance, expressed in feet, by a certain fractional number, the value of which depends upon the nature of the rock to be blasted.

FIG. 8.



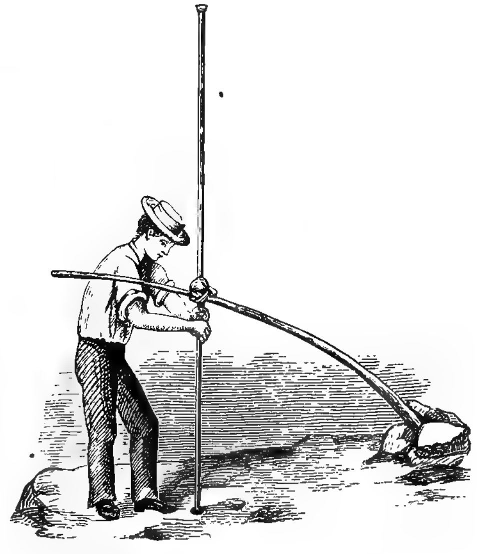
The following table, taken from Lieut.-Gen. Sir John Burgoyne's "Notes on Blasting Rock," gives the charges of "Merchant's blasting powder" used in the granite quarries of Kingstown, near Dublin, Ireland, which were generally found to be sufficient to fracture the rock:

Lines of least resistance, in feet.	Charges of Merchant's blasting powder.		Remarks.
	lbs.	oz.	
1	0	0½	To make sure, ¼ or ½ oz. should be added to so small a charge.
2	0	4	
3	0	13½	
4	2	0	
5	3	14½	
6	6	12	
7	10	11½	
8	16	0	

The above charges, according to the "miners' rule," are all proportional to the cubes of the lines of least resistance in feet.

In the demolition of the walls of the building erected for the International Exhibition of 1862 the charges, when arranged in the wall in three-lined intervals, were equal to $\frac{5}{8}$ $(l.\ l.\ r.)^3$ (five-eighths of the cube of the line of least resistance, in feet); for two-lined intervals the charges were $\frac{1}{3}$ $(l.\ l.\ r.)^3$; and for one-lined intervals, from $\frac{1}{4}$ $(l.\ l.\ r.)^3$ to $\frac{3}{10}$ $(l.\ l.\ r.)^3$.*

FIG. 9.



In blasting rock, a hard quartzose schist, for the construction of a pier to form the new harbor of Holyhead, England, in 1850–51, the charges of Merchant's blasting powder ranged from $\frac{2}{7}$ $(l.\ l.\ r.)^3$ to $\frac{1}{26}$ $(l.\ l.\ r.)^3$, depending upon the positions of the charges in relation to the planes of stratification.*

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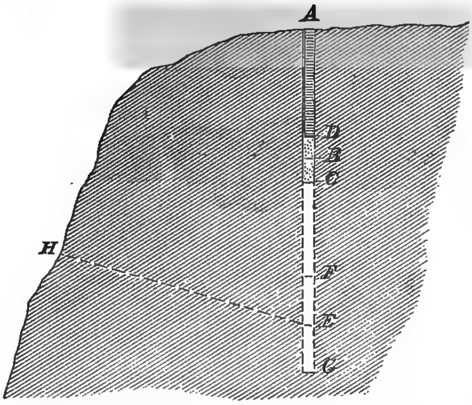
* "Professional Papers of the Corps of Royal Engineers," vol. xiv., p. 148.

In the three large charges used to blast down Round Down Cliff (composed of chalk) near Dover, England, in 1843, their strength was calculated at $\frac{1}{32}$ $(l.\,l.\,r.)^3$.†

At Delhi, India, in blasting hard quartzose rock the charges for lines of least resistances of 1, 2, 3, 4, 5, and 6 feet were, respectively, 4, 8, 14, 20, 26, and 36 ounces.‡

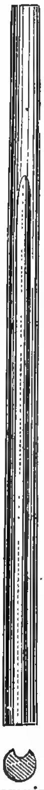
FIG. 10.



In the large blast in sandstone at Lime Point, entrance to San Francisco Bay, Cal., in 1868, the lines of least resistance being between 45 and 50 feet, the charges were 4000 pounds and 3500 pounds, or about $\frac{1}{28}$ $(l.\,l.\,r.)^3$.

Charging the Drill-hole.—After the strength of the charge has been determined by any of the above rules, and all moisture removed from the bottom of the drill-hole by means of wisps of straw, hay, or bits of rags, the charge is introduced. If the hole be vertical, the powder is poured in by means of an ordinary funnel of tin, or, preferably, copper; but if the hole is inclined, the funnel is lengthened out by attachable sections, so as to reach nearly to the bottom of the hole, in order that the powder may be lodged at the bottom, without allowing any particles to adhere to the sides, as they would do if poured in loosely. The danger of premature explosion from the tamping-bar striking fire against the sides of the hole is thereby avoided. For this purpose, also, the tamping-bar (Fig. 11) should be shod with copper.

FIG. 11.



Tamping Bar.

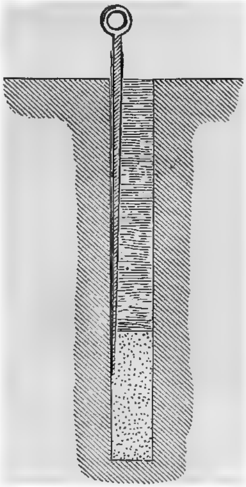
A wooden rod is used to press down the powder and to dislodge any grains that may have attached themselves to the sides of the hole. If the hole be horizontal or nearly so, the charge is placed at the bottom of the hole by using a semi-cylindrical scoop with a long handle. The charge is placed in the scoop, which is then carried to the bottom of the hole, and being turned over is then withdrawn, leaving the powder at the bottom.

If the hole is inclined upward, a cartridge to contain the powder must be used; this is pressed home by the wooden rod, and if the inclination of the hole be great, a wad of straw or hay is pressed up against it to hold it in place until the tamping can be introduced.

Tamping.—The *priming-needle* is next used. This is a long wire tapering towards the point, so as to be easily withdrawn after the tamping is rammed around it, and enlarged at the other end to form an eye for the introduction of an iron bar in withdrawing it. (Fig. 12.) It should be tipped with copper, and would be better if made entirely of that material. The needle is introduced so that its tip shall penetrate well into the charge. It is usually wrapped with paper, so that when withdrawn the paper may remain as a wall to the fuse-hole, preventing any loose particles of tamping from falling into and choking it. The needle being held firmly against one side of the drill-hole (Fig. 12), the tamping is introduced. First, a wadding consisting of some loose elastic material, as a wisp of straw, hay, or piece of dry sod, is inserted over the powder; then an inch or two of broken brick, or dry clay, or soft stone chips without any flinty substances in them, are thrown in and lightly rammed with the tamping-iron and hammer; then a few more inches of brick or stone chips are put in and well rammed, and so on successively to the top of the hole, when the last one or two inches are filled with damp clay and rammed; after which the needle is withdrawn.

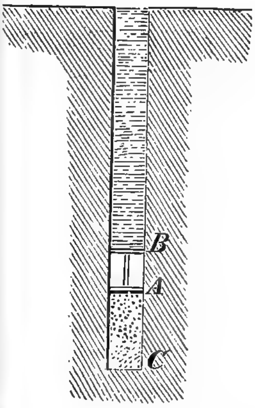
It is stated that if an *air-space* (as AB, Fig. 13) be kept open between the charge and the tamping, leaving the charge AC to fill one-half or two-thirds of the space BC, the effect will be the same as for a full charge filling the entire space. The expedient, however, is not often used in practice.

FIG. 12.



Priming-Needle.

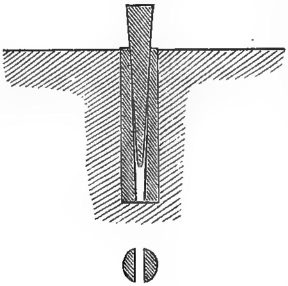
FIG. 13.



Air-Space.

Materials for Tamping.—Broken brick slightly moistened, rotten stone, quarry chips not containing any flinty substances liable to strike fire, well-dried clay, and sharp pit-sand, are good tamping materials. Opinions have been much divided in this country and in Europe upon the comparative merits of sand and clay for tamping. Elaborate experiments were made at Fort Adams, under the direction of Colonel (afterwards Brigadier-General) Totten, U. S. Engineers, to determine the value of sand for blasting purposes. Sand was forced upward through brass and iron tubes by means of a piston to which great power was applied. The resistance of the sand to this force was so great as to reduce to powder the sand in contact with the inside of the tube before the mass could be forced out of it. Trials were also made with gunpowder as the expelling force. "A musket barrel of ¾-inch bore was charged with two inches of powder and thirteen inches of packed sand. On firing, the barrel was burst, but the sand was not driven out." "A piece of musket barrel taken from near the muzzle, and open at both ends, was charged at one end with five and a half inches of brick-dust, hard rammed, and at the other with five and a half inches of sand, well packed, with one inch of powder between them, a priming-hole being bored to communicate the fire. The explosion of the powder burst the barrel, but neither the sand nor the brick-dust was driven out." In conclusion, the report of Lieut. Brown says: "The experience at Fort Adams proves that the resistance offered by sand is quite sufficient for blasting rocks, and the advantages attending its use are, that it is much less troublesome than the usual mode, and that it is perfectly safe. To ensure success, the space left above the charge should have a length of ten or twelve times as great as the diameter of the hole." §

FIG. 14.



Plug and Feather.

Experiments made at the works carried on at Kingstown, near Dublin, Ireland, to test the relative values of sand and clay for tamping, exhibited in their results a marked superiority in the latter over the former, which was very often blown out without cracking the rock, while the clay tamping in another hole of the same dimensions held firmly, the rock being cracked. Sand well packed gave better results than when poured loosely into the drill-hole, but not equal to those given by clay. The sand was from the sea-shore, and of course water-worn. Sharp pit-sand would probably have given better results. Of the three varieties, coarse, fine, and medium sand, the medium proved to be the best.

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* "Professional Papers of the Corps of Royal Engineers," vol. ii., p. 1.

† Ibid., vol. vi., p. 188.

‡ Lieut.-Gen. Sir John Burgoyne, "Blasting and Quarrying Stone," p. 76.

§ "Journal of the Franklin Institute," July and Aug., 1836.

In blasting rock at Cherbourg, France, the experience was in favor of sand-tamping, which was used with great success and exclusively of all others.[*]

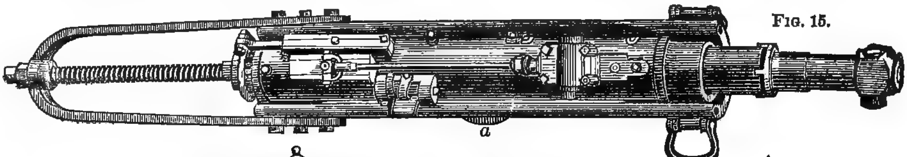


FIG. 15.

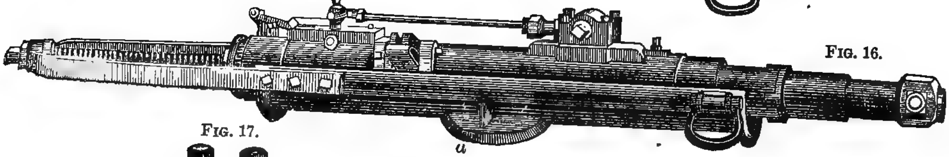


FIG. 16.

FIG. 17.

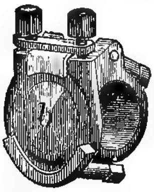
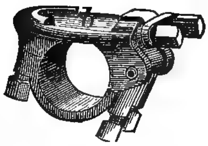


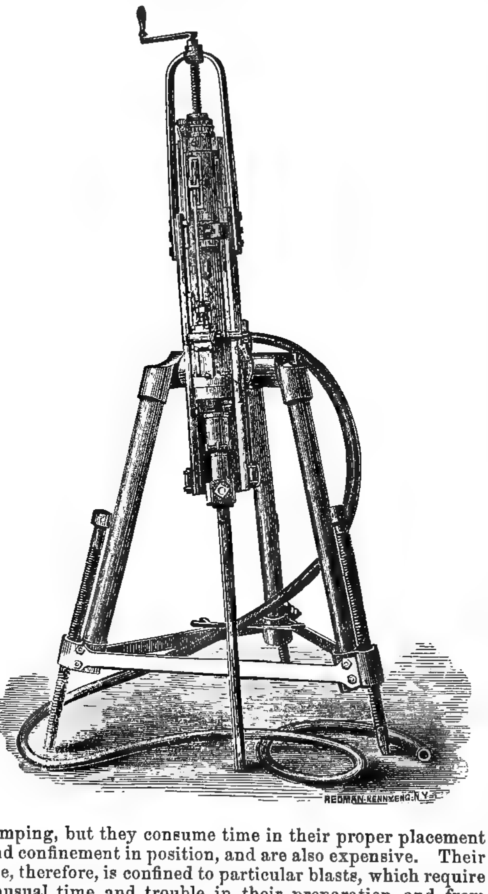
FIG. 18.



In using nitro-glycerine, sand-tamping is much preferable, as the shocks from ramming any other kind of tamping are liable to explode the charge.

Many contrivances, such as cones, plugs, and wedges, have been employed to place over the charge in the drill-hole for the purpose of increasing the resistance of the tamping, but they consume time in their proper placement and confinement in position, and are also expensive. Their use, therefore, is confined to particular blasts, which require unusual time and trouble in their preparation, and from which compensating results are expected.

FIG. 19.



To obtain greater effect from a given drill-hole, the bottom of the hole has sometimes been enlarged by the use of acids to form a sort of chamber for the reception of the charge. At Marseilles, France, in blasting a calcareous rock, dilute nitric acid was poured to the bottom of the drill-hole through a small leaden tube. The effervescence produced by the decomposition of the rock, escaping to the surface through an outer tube, carried with it the substances of the dissolved rock.

Priming the Charge.—The usual way is to fill the needle-hole with fine powder, then place in connection with the powder at its mouth a slow match, made by soaking coarse paper in saltpetre or a solution of powder. The slow match is made long enough to allow the quarryman, after lighting one end of it, to seek a place of safety before the explosion takes place. Sometimes the priming is contained in straws, joined together end to end so as to make a tube sufficiently long to reach the charge. This is inserted in the needle-hole, and fire is communicated, as above, by a slow match or portfire.

Bickford's safety fuse and others of similar character are frequently used, especially in wet localities. The fuse is cut so that when one end is inserted into the charge the other will project about an inch above the mouth of the hole. The wadding is then put in, and after it the tamping is rammed around it in the same way as around the needle. This fuse possesses great advantages over the common priming when the drill-hole is horizontal or inclined upward, or much water is present. In the latter case the charge should be contained in a waterproof cartridge, and the junction of the fuse with it be made watertight by means of a wrapping of twine covered with wax.

At Cherbourg the use of the needle and the usual tamping was dispensed with. A straw tube, such as has been described, filled with priming composition, was placed in the drill-hole, the lower end being inserted into the charge. Fine and thoroughly dried sand was then poured in until the drill-hole was full. The upper end of the straw was then opened and the composition ignited, the slowness of burning affording time for the miner to seek shelter.

At Delhi, India, a reed filled with powder was used to fire the charge. The reed was inserted into the needle-hole, and the top being split, a piece of rock was laid upon one of the splits to prevent it falling into the hole. The powder being ignited by a piece of touch-paper and a train, the reed flew to the bottom of the needle-hole like a rocket, and ignited the charge.

Of late years the use of electricity in blasting has much increased, especially since the introduction of nitro-glycerine and its compounds, and gun-cotton, which can best be fired by the shock of a minor explosion. If ignited, they burn without any explosive effect. In firing a charge of powder all that is necessary is to make a short interruption of the conducting wires in connection with the charge. In passing the electric current a spark is produced at the point of interruption sufficient to ignite the powder. In firing nitro-glycerine or gun-cotton an "exploder" containing a sensitive priming composition is necessary. Those used at the Hoosac Tunnel are made there by Prof. Mowbray, by first inserting the ends of two insulated wires into a small wooden cylinder, where they are accurately fixed in position, so as to give a spark upon the passage of the electric current. The wooden cylinder is then filled with the priming composition (composed of sulphide and phosphide of copper and chlorate of potash), and this is then connected with a copper cap containing fulminate of mercury, and the whole enclosed in a wooden cylindrical case made watertight. The resistance of the copper cap adds much to the force of the exploder, and ensures the effective explosion of the nitro-glycerine.

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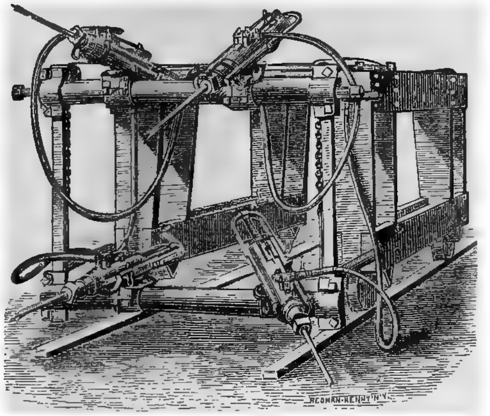
[*] "Mémoire sur la digue de Cherbourg," par J. M. F. Cachin, page 51, note.

Fig. 20.


REDMAN-KENNY N.Y.

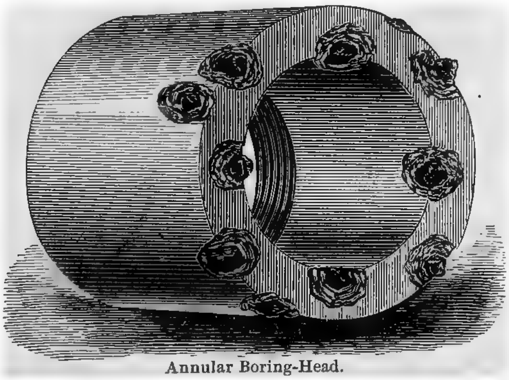
A frictional electric machine made by Mr. H. Julius Smith of Boston is very portable, and has been found useful for firing mines. The ebonite disk for exciting electricity is turned by a small crank between two rubbers covered with sulphuret of tin, and all is enclosed in a compact case of vulcanite. By simply turning the crank backward the connection of the poles of the battery with the conducting wires is made, and the charge is fired.

A magneto-electric machine made by Ritchie & Sons of Boston was used at the Hoosac Tunnel, and possessed the power of firing 150 charges simultaneously. The conducting wires used were of copper encased in a watertight covering of gutta-percha.

Cutting up Large Blocks.—In reducing the masses thrown out by a blast to the sizes of "dimension stone" required for use, lines of small holes are usually cut in the direction required, selecting, if possible, the natural lines of cleavage. These small holes are wedge-shaped, about three inches long, two inches deep, and three inches apart. Into these iron wedges are inserted, and struck with a heavy iron hammer, in succession, from one end of the row to the other.

Splitting with the "plug and feather" is more generally used where it is desired to obtain a uniform split surface to a considerable depth. A row of circular holes, about one inch in diameter, five or six inches in depth, and the same distance apart, are drilled along the line to be split. Two feathers are then placed on opposite sides of each hole. The *feather* (Fig. 14), when in position, is like an inverted iron wedge having a smooth surface to receive the *plug*, and a circular back to fit the sides of the drill-hole. Between these feathers the plug (a long narrow wedge) is inserted, the faces of the plug and feathers being parallel to the desired line of cleavage. The plugs are then driven in succession as above, until the rock splits.

Fig. 21.



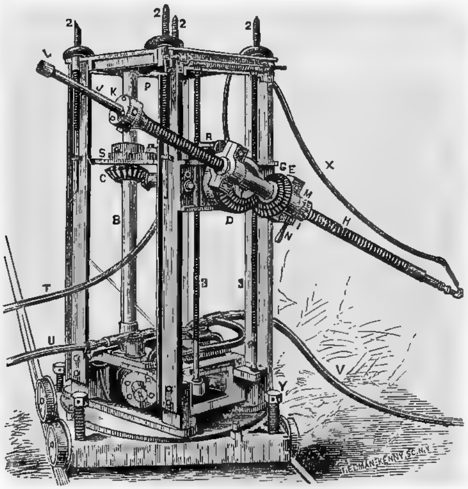
Annular Boring-Head.

In the large quarries at Aberdeen and Peterhead in the north of Scotland the charges used are merely sufficient to break the rock into large masses. A process called "bulling" is then had recourse to. This consists in filling the vertical cracks and fissures opened by the blast with powder, and firing it. The explosion throws the blocks forward in their beds some inches, if not several yards, into positions convenient for splitting up.

Quarry Shields.—In a populous locality, or one where it is difficult for the quarrymen to reach a place of shelter from the small fragments of rock that are sent by the blast flying through the air, it is usual to cover the rock around the hole with brush or loose plank or timbers weighted with stone. These prevent the fragments from flying so far. Shields of boiler iron and of plank strongly nailed together are used in very confined localities, as in drifts and shafts of mines. The iron shields used in the quarries near Glasgow, Scotland, were two and a half feet square by one-fourth of an inch thick.

Steam Drilling-Machines.—The length of time required, as well as the great labor and expense of drilling by hand, has led to the introduction, in large private and public works, of drilling-machines driven by steam or compressed air. Sommeiller invented a machine which was used with success at the Mont Cenis Tunnel. This was driven by compressed air conveyed into the headings in pipes, the compressors being situated near the E. and W. entrances to the tunnel. Subsequently the Burleigh drill, similar to the above, was patented in this country, and manufactured largely by the Burleigh Drill Manufacturing Company at Fitchburg, Mass. This machine was used in the Hoosac Tunnel after the summer of 1866, and gave great satisfaction, the progress by its use and that of nitro-glycerine having been increased from 50 to 150 feet per month, notwithstanding the size of the heading had been more than doubled in the mean time. The value of this machine warrants a brief description.

Fig. 22.



No. 1. Tunneling Drill.

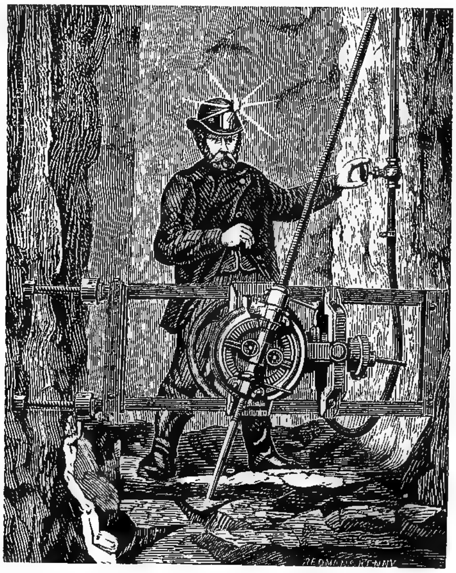
Figs. 15 and 16 show a top and side view of the Burleigh drill, as now made. It consists of three parts—the cylinder, the cage, and the piston. "The cage is merely a trough with ways on either side, in which the cylinder, by means of a feed-screw and an automatic feed-lever, is moved forward as the drill cuts away the rock. The piston moves back and forth in the cylinder, propelled and operated substantially like the piston of an ordinary steam-engine. The drill-point is attached to the end of the piston, which is a solid bar of steel. The piston is rotated as it moves back and forth by ingenious and simple mechanism. The forward movement of the cylinder in the trough is regulated by an automatic feed as the rock is cut away, the advance being more or less rapid as by the variation in the nature of the rock the cutting is fast or slow." When the drill is in operation a small jet of water is kept playing into the drill-hole to cool the drill-point and to soften the rock. "When the cylinder has been fed forward the entire length of the feed-screw, it may be run back, and a longer drill-point inserted in the end of the piston." The drilling-machine is attached to the clamp (see Figs. 17 and 18) by means of a circular plate (*aa*, Figs. 15 and 16) with a bevelled edge cast upon the bottom of the cage near its centre. This plate fits a corresponding cavity (*bb*, Figs. 17 and 18) in one side of the clamp, and is held there firmly in any required position by the tightening of a screw. By the motions upon one plane of the plate in its cavity, and upon another, at a right angle to the first, of the clamp upon the bar, and the sliding endwise of the clamp upon the bar, it will be seen at once that any position and direction of the drill is attainable. It only remains to attach the bar, of any reasonable length, to a convenient carriage or frame."*

These frames are of various forms, made to suit the different circumstances under which the drill is usually used. Of these various forms, the one shown in Fig. 19 is adapted to quarry work, open-cut, surface, or shafting work. The adjustable legs admit of its being placed upon uneven surfaces of the rock. Fig. 20 shows a frame adapted for use in a tunnel. It mounts four drills upon two bars, the lower of which may be raised or lowered by means of chains, pulleys, and a windlass.

In the Hoosac Tunnel the motive-power was compressed air, and this is much better than steam for all tunnel and shaft work. By its escape, upon being worked off, it cools the headings, refreshes the air, and creates a current out of the drift or shaft, which carries off the vitiated air caused by blasting, respiration, and burning candles. The results of its use upon other works have also been very satisfactory. The progress made in deepening the Illinois and Michigan Canal was reported as being from twelve to fifteen holes drilled daily, each hole being from 7 to 8 feet deep and 4½ inches in diameter, or from 90 to 110 feet per diem, equal to the labor of thirty to thirty-five men. At Poughquag, N. Y., in very hard, seamy rock, it drilled 40 holes, 4 inches in diameter, per day, equal to the work of twenty men. At the works of improvement at Hallet's Point, carried on by the government, it was reported for 1868 and 1869 that the drill performed twice the amount of work in the same time as, and at one-third the expense of, hand-labor.

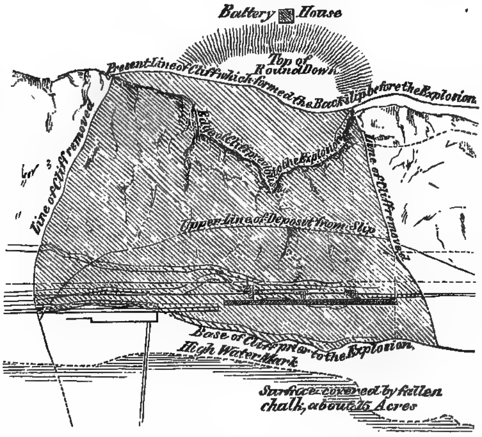
Diamond Drill.—The first application of the diamond to drilling rock was made by Prof. Rodolphe Laschot, a civil engineer of Paris, who found that a rotating drill armed with diamond points could be made to bore holes in rock rapidly to great depths by forcibly injecting a stream of water into the hole through the drill. He also arranged the diamond teeth upon the end of a cylinder or boring-head, so that a hole with an annular cross section could be bored, leaving a cylindrical core in the middle. Fig. 21† shows the arrangement of the black diamonds upon this bit or boring-head, which is a steel cylinder about four inches in length. They are placed in three rows—one on the end, one upon the inner, and one upon the outer edge. The diamonds in the row on the end cut the forward path of the drill, while those in the two other rows enlarge this path to admit the free ingress and egress of water to cool the diamond point and moisten and soften the rock. Fig. 22 exhibits one of the numerous forms of the machine adapted to tunnelling purposes.

FIG. 23.



The motive-power is furnished by two oscillating engines AA, both attached to the same crank-shaft B. This upright shaft by the gear C communicates its motion, with double velocity, to the bevelled gears D and F, and from thence to G and E. E is keyed to the screw-shaft H at the clutch M. G has a tubular axis which has a female screw cut inside to receive the male screw on the shaft H, thus forming a long nut in which the shaft revolves. The velocities being different, the effect of the two screws, like that of a differential screw, is to feed forward the drill to its work. By changing the diameters of the bevelled gears G and F any desired feed may be obtained. In extremely hard rock the feed of one inch for 400 revolutions is used, allowing the diamonds to cut only $\frac{1}{400}$ of an inch in each revolution. The drill-rod being rotated at the rate of 600 revolutions per minute, the above feed will give a progress of 1½ inches per minute or 7½ feet per hour. In rock of ordinary hardness the drill is fed forward at the rate of 1 inch to 300 revolutions, boring 2 inches per minute or 10 feet per hour.

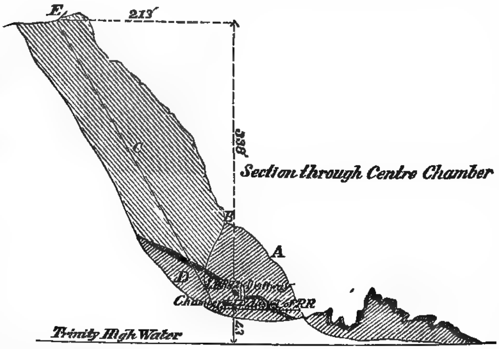
FIG. 24.


Battery House
Top of Round Down
Present Line of Cliff which formed the Back slip before the Explosion
Line of Cliff removed
Edge of Cliff previous to the Explosion
Line of Cliff removed
Upper Line of Deposit from Slip
Base of Cliff prior to the Explosion
High Water Mark
Surface covered by fallen chalk, about 15 Acres

By throwing the clutch M out of gear, the revolution of the drill-shaft is suspended, and by the action of the nut-gear G is run rapidly back, thus withdrawing the drill-rod from the hole bored. The drill-rod J consists of a tubular boring shaft made of lapwelded tube, with the bit or boring-head described above screwed on to one end. As the drill cuts an annular channel into the rock, the cylindrical core left by the cutters passes up into the hollow drill-rod, and is drawn out with the drill-rod in sections of from eight to ten feet. The drill-rod may be extended so as to bore any depth required. It may also, by convenient arrangements provided, be turned in any direction, or raised or lowered, as desired. Water is injected into the drill-hole through the hollow drill-rod by means of a double-acting plunger pump situated at R.

Fig. 23 represents a more portable form of the machine, adapted to use in a shaft. It is mounted upon a movable frame, which is fixed in position by jack-screws pressing against the sides of the shaft. The motive-power (steam or compressed air) is admitted through a pipe leading to the surface above, the quantity being regulated by a stop-cock near the hand of the attendant. The advantages

FIG. 25.



A, centre of mine.
B, top of crater.
C, superincumbent mass whose fall followed the removal of the base.
D, débris remaining after the explosion, denoting proposed escarpment previous to blast.

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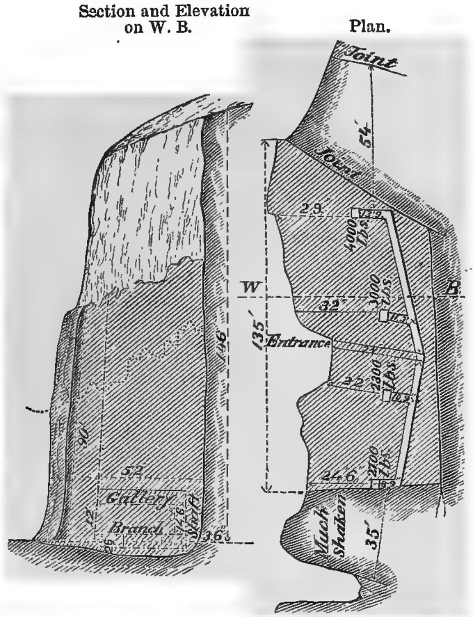
* Circular pamphlet of the Burleigh Rock-Drill Company, Fitchburg, Mass.

† Circular pamphlet of Severance & Holt, manufacturers of diamond-pointed rock-drills, 16 Wall street, N. Y.

claimed for this drill are—that holes may be bored to any required depth, thus permitting the charge to be placed at the point where its effect is desired, and enabling prospecting holes, or drain-holes for water, to be run in galleries or sunk in the bottom of shafts of mines; that the holes are perfectly cylindrical and of uniform diameter, thus permitting the use of cartridges of very nearly the diameter of the holes.

FIG. 26.



N. B. The section of the cliff at the entrance of the galleries is shown by thick dotted lines, and the outline of the débris is shown by thin dotted lines. The part removed by the explosion is shown by light shading.

At Hallet's Point, where both drills were used by Gen. Newton, the Burleigh drill gave the best results in tunnel-work, but for prospecting or drilling long holes for other purposes, it is stated that the diamond drill cannot be dispensed with.

Blasting by Galleries.—In cutting the way for the South-eastern Railway it became necessary to blast down a portion of Round Down Cliff, near Dover, England, composed of compact chalk.* It was decided to run a gallery into the cliff, and to place three large charges five feet in rear of the centre line of the railway, and three feet above its level. The gallery, 4′ wide and 5′ 6″ high, was run 20 feet above the level of the railway. (Fig. 24.) Three shafts, made in the form of a truncated cone, 3′ in diameter at top and 5′ at bottom, to offer greater resistance to the tamping being blown out, were then sunk 17 feet. (Fig. 25.) Branches were then run at right angles to the drift-way, made of a wedge-shaped form, 2 feet wide at the shafts and 4½ feet at the chambers, for the reason stated above. Chambers of oblong form were excavated at right angles to the branch drifts.

The charges were calculated at $\frac{1}{32}$ of the cubes of the lines of least resistance, which for the middle charge was 72 feet, and for the two end ones 56 feet each, giving respectively 7500 pounds and 5500 pounds, or a total charge of 18,500 pounds. The powder for the charges, in bags, was placed in deal boxes put together in the chambers, a vacant air-space being left around the boxes. The galvanic wires for exploding were connected with two branches within each chamber, each branch attached to a primer filled with finest rifle powder, and having the ends of the galvanic wires connected therein by fine platinum wires. The tamping consisted of blocks of chalk laid dry and compactly. It filled the branches, the shafts, and was extended in the drift ten feet on each side of the shafts. The charges were fired by means of three separate batteries, each consisting of a Daniell battery of 18 cells, and two Grove's batteries of 20 plates each. These were connected with the charges by three separate sets of wires. The circuit was completed and the mines fired simultaneously by three attendants acting by words of command. The ignition was followed by a deep hollow sound. "The bottom of the cliff yielded very gently to the force of the powder, assuming a curved form beyond the general face; then the upper part began to give way, and finally the whole slid out into the sea, carrying everything before it in the most magnificent manner."† Four hundred thousand cubic yards of the chalk cliff were removed. This blast is remarkable as being the first large one, on land, at which the galvanic wire was used to fire several charges simultaneously.

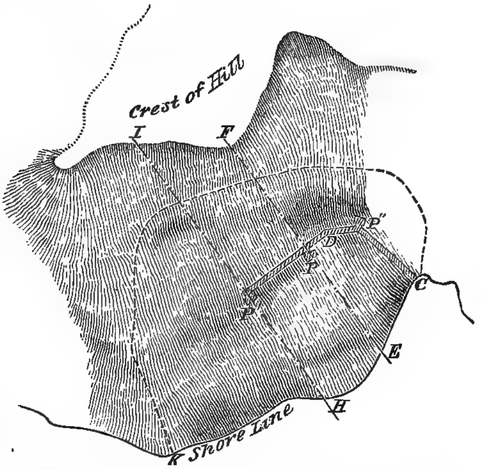
In the construction of the large pier to form the new harbor of Holyhead, England, it was found that the ordinary process of blasting, even on the largest scale, could not supply the quantity of stone required—2500 to 3000 tons per day. It was therefore decided to operate by sinking shafts and running galleries, whichever would soonest reach the seat of the charge, and to use large quantities of powder, properly distributed in several chambers.‡ The rock consisted of an extremely hard quartzose schist.

The first large blast was made on the 1st of Nov., 1850, and by the 2d of Aug., 1851, the number had reached 58, with a total result of 293,890 tons of rock removed by the explosion of 103,092 pounds of Merchant's blasting powder, or an average of $2\frac{85}{100}$ tons to a pound, at a mean cost of $4\frac{3}{4}$*d.* per ton. The charges of powder averaged one-fourteenth of the cube of the line of least resistance, in feet. They were so placed that this line should, if possible, be perpendicular to the planes of stratification. The results were so satisfactory that the method was continued.

The galleries were from 3 to 4 feet wide and 5 to 5½ feet high. In excavating them, holes were drilled from 1½ to 2 feet deep, 1½ inches diameter, which were charged with from 4 to 6 ounces of powder, well tamped. Two parties of two men each relieved each other day and night, excavating 1⅜ feet per day. In the shafts, 6 feet by 4 feet, the progress was not so great. In loading, the powder in sacks was passed from hand to hand to the chamber, where it was usually poured into a deal box prepared to receive it. The tamping was formed of red clay, well rammed, every 6 inches for the first 10 feet, every 12 inches for the next 10 feet, and every 18 inches for the remaining distance. The charges were fired by a Grove's voltaic battery.

Fig. 26 represents the arrangement of galleries and chambers for a large blast of 12,000 pounds of fine-grained powder, which was fired on the 22d of Nov., 1860.§ A gallery was run in 34 feet from the face of the cliff; then a shaft was sunk 14½ feet, from the bottom of which level galleries were driven right and left, and four returns were made, at the extremities of which the chambers were formed, about 3 feet below the level of the ground-line of the quarry. The powder for the charge, in 50-pound bags, was passed in by hand to the chamber, where the loader emptied them into larger canvas bags coated with tar. These were closely piled in the chamber. The tamping was composed of red clay, and was extended out to the entrance.

FIG. 27.



Sketch of a Drift at Lime Point, Cal., May 20, 1868.

In estimating the quantity of powder for the charges no specific rule founded on the lengths of the lines of least resistance was followed, but the cubical contents of the rock to be removed was divided by the number of cubic feet in a ton, and this result divided by the number of tons of rock that had been found, in previous blasting, could be thrown up by one pound of powder. In this case it was 1 pound to 3 tons. The total charge (12,000 pounds) was then divided into four charges, according to their lines of least resistance, the tenacity of the rock near each one, and the proximity of joints. The resulting charges averaged one-fourth of the cubes of the lines of least resistance.

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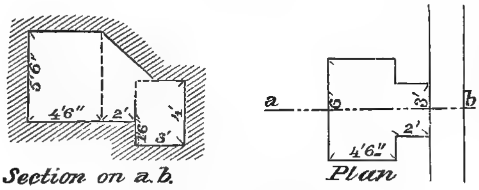
* "Professional Papers of the Corps of Royal Engineers," vols. vi. and viii.

† "Professional Papers of the Corps of Royal Engineers," vol. vi., p. 188.

‡ Ibid., vols. ii. and vii.

§ Ibid., vol. x.

FIG. 28.



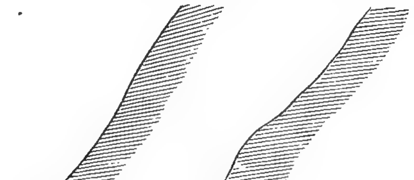
Sketch of Powder-Chamber.

The charges were fired by one of Grove's batteries. The blast threw out 40,000 tons of rock, thus averaging 3⅓ tons to the pound of powder used.

In May, 1868, a large blast was made in the face of the bluff at Lime Point, entrance to San Francisco Bay, Cal., by Major Mendell, Corps of Engineers, to prepare the site for a fort at that point. The rock is described as "a metamorphosed or changed portion of the sandstone formation." Its stratification was very much bent and contorted, "resembling the compressed and crumpled leaves of a book." An entrance gallery was run into the cliff 45 feet (Fig. 27), starting twenty feet above low water, and ascending 1 inch in 10 feet to drain off the water; then the main gallery made two turns to the left to gain a direction parallel to the face of the cliff, extending 80 feet farther with the same grade, at the end of which a chamber was formed for one charge. Another chamber was formed 60 feet from the first. The gallery was commenced with dimensions of 6′ height by 4′ width, giving space enough for two men to work and to swing the striking hammer. It was then decided to use dualin and giant powder. This permitted a reduction of the size of the drill-holes to diameters of ⅞ inch, and depths of 18 inches, and a consequent reduction of the drilling force and size of the drift, one man being able to perform the drilling in a drift 4 feet high by 3 feet wide. The cartridges were 5 to 8 inches long, and were tamped. The priming, consisting of fulminate of mercury contained in a copper cap, was fired by a fuse. The floor of the chambers P and P′ were 1½ feet above the floor of the gallery. (Fig. 27.) Two wooden boxes were put together in them, into which the gunpowder for the charges was emptied as it was brought in in sacks which had been filled from casks opened at the entrance to the gallery: 3500 pounds were placed in the first and 4000 in the second chamber. Two priming caps, connected with two sets of branch wires from the main wires, were placed in each charge. The two main wires connecting with the battery were contained in a small wooden box, which also contained two lines of water fuse to be used if the wires failed.

In tamping, the vacant space about the box was filled with sand and sods, without ramming. A wall of sods was then placed in front of the box; a little way in rear of this a second wall of sods, with the space between the two well rammed with clay. This was continued, sods and clay alternating, to the mouth of the gallery. The face of the cliff in front had been cut away (Fig. 29), to increase the effect of the blast.

FIG. 29.



The charges were exploded simultaneously by means of Beardsley's magneto-electric machine. "The report was dull, and scarcely noticeable. The base of the hill was upheaved, and moved slowly outward. The rock and earth above, left unsupported, slid in large masses, a considerable portion falling into the sea." The portion of the hill near the entrance gallery was not displaced; the tamping of this portion was therefore removed, and a charge of 2650 pounds of powder was placed in a third chamber at P″. It was exploded in the same manner as the others, and brought down that part of the cliff.

The dotted line (Fig. 27) shows the extent of the breach made by the three charges. About 5500 cubic yards of rock were blown down.

The above three examples sufficiently illustrate the course that has been pursued in blasting by galleries since the first blast of the kind in 1843, and afford an excellent indication of the proper method to be followed in similar operations.
J. G. FOSTER.

Blatch'ford (RICHARD M.). See APPENDIX.

Blatchford (SAMUEL), LL.D., born in New York City Mar. 9, 1820; graduated at Columbia College, New York City, in 1837; in 1839 became private secretary of Gov. William H. Seward of New York; in 1845 practised law in Auburn, N. Y.; in 1854 removed to New York City, practised law, and continued the publication of reports of cases in the circuit courts of the U. S. in the second circuit, which he had commenced publishing in 1852; in May, 1867, became judge of the district court of the U. S. for the southern district of New York; in April, 1878, became circuit judge of the second judicial circuit; and on Mar. 27, 1882, was appointed by President Arthur an associate justice of the supreme court of the U. S.

Blat'ta, a genus of insects which includes the cockroaches, belonging to the order Orthoptera. Several species of this insect are disgusting household pests, of which the most offensive is *Blatta orientalis.* (See COCKROACH.)

Blauw-Boc [Dutch for "blue buck," so named from its blue-black color], the *Antilope leucophæa*, an exceedingly swift antelope whose habitat extends from Cape Colony to Senegambia. It is six feet long and three and a half feet high. It fights when at bay, and is then dangerous. Its flesh is poor. The name is also given to the pygmy antelope (*Cephalophus pygmæa*), which is only a foot high. It is found in South Africa. It is of a bluish-slate color.

The Blauw-Boc.

Bla'zonry, the art of deciphering coats-of-arms; also that of expressing or describing a coat-of-arms in appropriate language. The word is supposed to be derived from the German *blasen,* to "blow," and to have originated in the ceremonial of tournaments, from which so many other terms and usages in heraldry are derived, it having been customary on these solemn occasions for the herald to blow a trumpet when he called out the arms of a knight on ushering him into the lists. Blazonry requires a knowledge of—1. The points of the shield, which are nine in number; 2. The field—that is, the tincture or tinctures forming the ground of the coat; 3. The charges or devices borne on the field; 4. The ordinaries.

Bleach'ing [from the Ger. *blei'chen,* to "whiten" (from *bleich,* "white" or "pale"); Fr. *blanchir*], a process by which the natural colors of various substances are discharged, so as to whiten them. Bleaching is extensively applied to the textile fibres; linen, cotton, wool, and silk; and to straw, paper-stock, ivory, wax, animal and vegetable oils, etc. Until the close of the last century the agents employed were air, light, and moisture, aided by weak alkalies and acids. More recently the process has been wonderfully hastened by the use of such powerful agents as chlorine and sulphurous acid. Numerous other agents possessing bleaching properties have been from time to time recommended, but they have not as yet been used to any extent. Such are bromine, ozone, permanganates, chromates, etc. The selection of the bleaching agent depends as much upon the properties of the article to be bleached as upon the coloring-matters to be removed. Cotton, flax, and many other vegetable fibres, being composed of cellulose, one of the most permanent of all organic bodies, are capable of withstanding the action of acids, alkalies, and chlorine, while the animal fibres, silk and wool, being of very different composition, are destroyed by these agents, and must be bleached by the milder sulphurous acid.

Modern bleaching includes much more than the mere appilcation of chlorine or sulphurous acid. The goods are subjected to certain preliminary cleansing processes, such as washing in cold or hot water, boiling with alkaline lyes or soaps, and treatment with acids. By these operations many resinous, fatty, and other impurities, either natural or introduced during the preparation of the yarn, cloth, etc., are removed from the fibre. The more powerful agents are then used for removing the last traces of coloring-matter.

Special Methods.

Bleaching Linen.—This is a very ancient art. We read in the Scriptures of "fine linen, white and clean." The old method, still practised in some localities, consisted in the alternate treatment of the cloth with alkaline and acid liquids, and exposure on the grass to air, light, and moisture. Holland long enjoyed the reputation of possessing the best bleacheries. The brown linen of Scotland was sent over early every spring to be bleached, and on its return in the late autumn was sold under the name of "Hollands," a name still retained in the trade for certain kinds of bleached linen. The word "lawn" is another name of similar origin, having been applied to a finer quality of linen cloth bleached on better grass-plots, or lawns. The Dutch process lasted from March till September, and consisted of the following distinct operations, often repeated: (1) steeping in water four or five days, or in an alkaline lye forty-eight hours. (2) Bucking or bawking, boiling in an alkaline lye. (3) Crofting, or exposing on the grass for several weeks, and sprinkling from time to time with water. (4) Souring with buttermilk. After every dipping the cloth was washed with soap, then with water. The process was necessarily very expensive and laborious. In 1749 the Dutch method was introduced into Scotland, where it was considerably shortened by the employment of dilute solutions of sulphuric acid in place of buttermilk. In 1784, Berthollet investigated chlorine, publishing his results in 1787, and announcing the bleaching properties of this element. Prof. Copeland introduced this agent at Aberdeen. Chlorine was first used in aqueous solution, then in alkaline solution, and finally, in 1798, Charles Tennant of Glasgow introduced chloride of lime, which has been almost exclusively used ever since. Bleaching linen is still a tedious operation, as the fibres are heavily incrusted with impurities; the actual loss during the operations of bleaching being one-third the original weight, while cotton loses only one-twentieth. Steeping, washing, bawking, and crofting are still found necessary, and are several times repeated. Souring is effected with hydrochloric or sulphuric acid. The goods are then chlorinated with hypochlorite of potash, made by mixing chloride of lime with carbonate of potash. Washing, souring, soaping, scalding in soapsuds and weak lye, and crofting, complete the operation. A fortnight is the shortest time in which the bleaching can be effected, and often a much longer time is necessary.

Bleaching Cotton.—Cotton is either bleached in the yarn or in the cloth. The following description of the process employed in American print-works will sufficiently illustrate the methods in common use: The cloth is (1) "singed" by a shearing-machine or by passing over a red-hot roll or over a series of gas flames; (2) it is "limed," boiled for a night with milk of lime; (3) washed; (4) soured with dilute sulphuric acid; (5) washed; (6) bawked, boiled for a night with soda-ash and rosin; (7) washed; (8) bawked with a weak soda-ash lye for seven or eight hours; (9) washed; (10) chemicked with a weak solution of chloride of lime; (11) washed; (12) soured with dilute sulphuric acid; (13) washed—the entire series of operations being completed in three or four days.

Bleaching Wool.—Wool is (1) washed on the sheep, to remove sweat and much of the dirt, including a peculiar substance called suint, which is a neutral salt of potash with a peculiar organic acid. Owing to the high price of potash, this suint has recently attracted considerable attention, and a special industry has been established in the French wool districts for its preservation and utilization. The wool contains from 15 to 33 per cent. of suint, a nine-pound fleece containing twenty ounces of suint, or six to seven ounces of potash. This can be recovered from the water in which the sheep are washed. It is estimated that 3,000,000 pounds of potash can be manufactured annually in the French districts alone. (2) The wool is steeped in soap and water, weak alkaline lye, or putrid urine to remove a peculiar lime-soap which it contains, and other impurities. It is then oiled for spinning, and finally cleansed and bleached, either in the yarn or in the cloth. The operations consist in passing it (3) through a weak warm solution of carbonate of soda and soap; (4) washing with lukewarm water; (5) exposing to sulphurous acid gas. Operations 3, 4, and 5 are sometimes repeated once or twice. The goods may then be blued with carmine of indigo in a weak solution of soap containing a little hydrate of alumina.

Silk Bleaching.—Raw silk contains about 40 per cent. of gummy matter, consisting of albumen, gelatinous substances, wax, fat, resin, and yellow coloring-matter. This is removed by boiling the silk in a solution of soap, and washing with pure water. Bran is sometimes added to the soap to neutralize by the lactic acid it yields any free alkali present. When the silk is to be left white, or dyed or printed with very light colors, it is exposed for a few hours to sulphurous acid gas.

Bleaching Paper-stock.—Cotton and linen rags are bleached in the same manner as cotton yarn and cloth. Old paper is treated with caustic soda to loosen the ink, then with soapsuds, and finally with chloride of lime. Tow and straw are treated with caustic soda and lime, and finally bleached with chloride of lime.

Bleaching Straw.—For the manufacture of hats, bonnets, etc., straw is bleached by (1) exposing it on a meadow to air, sunlight, and dew, with occasional turning; (2) steaming; (3) fumigating with sulphurous acid gas.

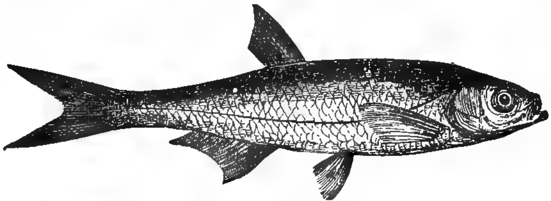
Jute is bleached by caustic soda and a chlorine bath made by mixing chloride of lime and sulphate of magnesia in equivalent proportions, and dissolving them in cold water. *Human hair* is said to be bleached on the head to a blonde by the action of aqua regia or of peroxide of hydrogen. *Feathers* are bleached by immersion (1) in a dilute solution of bichromate of potassa containing a little nitric acid, and (2) in a weak solution of sulphurous acid. *Sponges* are bleached by immersion in a warm solution of caustic soda, followed by washing in water and treatment with a hyposulphite of soda solution, to which a little hydrochloric acid has been added. *Ivory* is bleached by rubbing it with pumice-stone and water, and placing it under a glass shade in the sun. It may also be bleached by immersion (1) in a solution of carbonate of soda, (2) in pure water, (3) in a solution of sulphite of soda; (4) to the sulphite of soda is added dilute hydrochloric acid, (5) in pure water. *Beeswax* is bleached by exposure to air, sunlight, and moisture in thin ribbons. *Animal and vegetable oils* are often bleached by heating them with a little caustic alkali, by which a small quantity of soap is formed, which settles to the bottom, carrying with it some of the coloring-matter. They are also bleached by exposure in shallow vessels to the sun under glass. *Old engravings* which have turned yellow may be cleansed or bleached by exposure to ozone, generated in a capacious vessel, by a stick of phosphorus partly immersed in water. Immersion for a minute in Javelle water, hypochlorite of soda, is said to answer equally well, though, to prevent injury to the paper, it must be subsequently dipped in water containing hyposulphite of soda.

The Chemistry of Bleaching.—The exact chemical character of the changes which occur in bleaching is not fully established. When the coloring-matter is absolutely destroyed, it is probable that it is generally due to the action of active oxygen, ozone, formed by the agents employed. In some cases, however, sulphurous acid unites with the coloring-matter, forming a colorless compound, the color of which can be restored again. A red rose bleached by this agent returns to its original color when placed in dilute sulphuric acid.

Antichlore.—If free chlorine is allowed to remain in the articles bleached, it is liable to injure their strength and damage the metallic parts of machinery. To prevent this, substances such as hyposulphite or sulphite of soda, protochloride of tin, coal-gas, etc. are employed, but the first mentioned is generally used. These are called ANTICHLORE (which see).

C. F. CHANDLER.

Bleak (*Alburnus lucidus*), a small and beautiful fresh-water fish of the family Cyprinidæ, belongs to the same genus as the minnow and dace. It is about six inches long, is found in many European rivers, and is esteemed as a delicate article of food. The inner surface of its scales is lined with a silvery substance which is used for making artificial pearls and white beads to adorn ladies' dresses.


The Bleak.

Bleb, or **Bulla** [Lat. *bulla*, a "bubble"], a blister-like elevation of the cuticle containing a watery fluid. Blebs are characteristic of some skin diseases, such as pemphigus, and are occasionally seen in fevers and disordered conditions of the digestion.

Blech'num [Gr. βλῆχνον], a widespread genus of ferns which has representatives in Europe and North America.

Bledsoe (Albert Taylor), LL.D., an American officer and teacher, born Nov. 9, 1809, in Kentucky, graduated at West Point in 1830. He served as lieut. of infantry at Fort Gibson till he resigned Aug. 31, 1832. He was adjunct professor of mathematics and teacher of French in Kenyon College, O., 1833–34, professor of mathematics in Miami University, O., 1835–36, counsellor-at-law in Springfield, Ill., 1840–48, professor of mathematics and astronomy in University of Mississippi, 1848–53, professor of mathematics in the University of Virginia, 1853–61, and during the civil war assistant secretary of war of the Southern Confederacy. He was author of an "Examination of Edwards on the Will," 1845, and "A Theodicy, or Vindication of the Divine Glory," 1856, and other works; contributor to the principal literary, scientific, and theological reviews of the U. S., principal of a female academy at Baltimore, Md., and editor of the "Southern Review" (Methodist). Died Dec. 1, 1877. George W. Cullum.

Bledsoe (Jesse), a noted jurist and advocate of Kentucky, was U. S. Senator 1813–15, professor of law in University of Transylvania, and chief-justice of supreme court of Kentucky. Died at Nacogdoches, Tex., June 30, 1837.

Bleed'ing, or **Hæm'orrhage** [from the Gr. αἷμα, "blood," and ῥέω, to "flow"], in surgery, denotes the escape of blood from the vessels which normally contain it. When the escape takes place into the tissues it is called "extravasation." Hæmorrhage into an internal cavity is said to be "concealed." A slight cut through the integument is usually followed by loss of blood, chiefly from the capillaries. Capillary bleeding will in many cases cease spontaneously, or it may require compression or the application of medicines, such as persulphate of iron or tannic acid. These medicines are called hæmostatics or styptics. Arterial bleeding is recognized by the fact that the blood escapes in jets and is of a bright-red color. Arterial bleeding tends spontaneously to grow less, both from the feebleness of the heart's action which naturally follows, and from the retraction and contraction of the arterial walls, and the consequent formation of a clot of blood, which plugs the wound; but it may be necessary to resort to ligation or tying, to acupressure or compression of the artery by needles, or to pressure, mechanical or by hand, upon the course of the artery between the heart and the wound. A handkerchief may be tied around and then twisted with a stick. The wounded part should be elevated if possible. Venous bleeding is not generally very formidable. It may be recognized by the steady flow of dark blood. A great source of danger when large veins are cut is that air may enter the circulation; in which case death may immediately follow.

Hæmorrhage from an internal and inaccessible surface may be treated by astringents, as gallic acid, or by ergot, which is especially important in puerperal hæmorrhage. Some individuals have what is known as the hæmorrhagic diathesis—a disposition to bleed excessively even after a slight injury. A tendency to hæmorrhage from the mucous surfaces is characteristic of some diseases, such as typhoid fever.

Bleeding, or **Blood-letting,** the abstraction of blood from the circulation as a means of curing or preventing disease. This operation is performed either by opening a vein (venesection or phlebotomy), by abstraction from the capillaries by means of leeches or cups, or more rarely by opening an artery (arteriotomy). Bleeding was formerly in extensive use in the treatment of many diseases, generally of an acute or active character; and though it has to a great extent been superseded by other measures, of late years it has been attracting the attention of the medical profession as a valuable therapeutic measure in a certain limited class of diseases. While it is liable to abuse, and while, like many other active measures in the treatment of disease, it may become a source of mischief, it is nevertheless, when used with judgment, a valuable help in the treatment of some disorders.

Bleek (Wilhelm Heinrich Immanuel), born in Berlin Mar. 8, 1827, settled in Cape Town in 1856, where he became librarian of Sir George Grey's valuable library. He wrote, among other works, a vocabulary of the Mozambique languages (1856), a "Handbook of African, Australian, and Polynesian Philology" (London, 1858), "Comparative Grammar of the South African Languages" (vol. i., 1862), "Reynard the Fox in South Africa, or Hottentot Fables and Tales" (1864), and "Ursprung der Sprache" (1868). Bleek was probably the first to suggest a rational explanation of grammatical gender. Died 1875.

Blende [from the Ger. *blenden*, to "dazzle"], a name given to the native sulphide of zinc, which British miners call black jack. It abounds in primary and in secondary rocks, and occurs both massive and crystallized in octahedrons and rhomboidal dodecahedrons. Pure blende is composed of 67 per cent. of zinc and 33 of sulphur. It is a valuable ore, but is more difficult to reduce than calamine. This is the chief ore employed in the important zinc industry at Friedensville and Bethlehem, Pa. The term is sometimes applied to sulphides of antimony and of manganese, the former of which is a rare mineral called red antimony.

Bleneau, a village in the department of Yonne, France, about 29 miles W. S. W. of Auxerre, is famous as the place where Turenne defeated the prince De Condé in 1652. Pop. in 1881, 2143.

Blenheim, blĕn'im, or **Blind'heim,** the name of a celebrated village of Bavaria, near the Danube, 23 miles N. N. W. of Augsburg. From it the English have named the famous battle which occurred at the neighboring village of Hochstädt, Aug. 13, 1704. Here the allied armies, commanded by the duke of Marlborough and Prince Eugène (who had about 52,000 men), attacked the French and Bavarians (about 56,000 men), who were commanded by Tallard and the elector of Bavaria. The duke of Marlborough and Prince Eugène gained a decisive victory, and took about 13,000 prisoners, including Tallard. The French and Bavarians also lost nearly 10,000 killed and wounded, besides many that were drowned in the Danube. The French and Germans call this the battle of Hochstädt. Pop. of Blenheim, 751.

Blenheim, a thriving village of Harwich township, Kent co., Ontario (Canada), 12 miles from Chatham, has several large factories, and a large trade in grain and fruit. Pop. in 1881, 1212.

Blenheim Dog, or **Marlborough Dog,** a small and beautiful variety of spaniel, much resembling the cocker in form and appearance, but generally of a black color, with flame-colored spots above the eyes and on the breast and feet. The muzzle is also fuller. The Blenheim spaniel is the *Pyrame* of Buffon. It derives its English name from Blenheim Palace, in Oxfordshire, where the breed has been preserved since the beginning of the eighteenth century. These dogs are sometimes sold at an enormous price.

Blenheim House, a magnificent palace in England, near Oxford, was erected at the public expense for the duke of Marlborough as a testimony of gratitude for his services at the battle of Blenheim (which see). The nation at the same time gave him the royal estate of Woodstock, now called Blenheim Park, which is adjacent to Blenheim House. This edifice was designed by Vanbrugh, and cost more than £500,000. It occupies three sides of a square, and the principal front extends 348 feet from wing to wing. The collection of paintings which adorns the interior is one of the largest and most valuable in England.

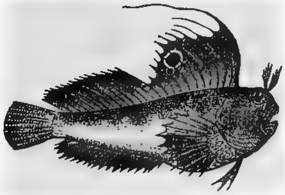
Blenk'er (Louis), a German patriot and soldier, born at Worms in 1812. After the defeat of the revolutionary movement of 1849, of which he had been one of the leaders, he took refuge in the U. S. In 1861 he became a brigadier-general in the Union army. Died Oct. 31, 1863.

Blen'nerhas'sett (Harman), a rich Englishman, born in Hampshire Oct. 8, 1767, who was ruined by his connection with Aaron Burr. He was educated at Trinity College, Dublin. In 1798 he purchased an island in the Ohio River, 2 miles below Parkersburg, and erected on it an expensive mansion. He advanced money to aid Burr in his enterprises, and was indicted for treason in 1807 as an accomplice of Burr, but was released without a trial. Died Feb. 1, 1831, in Guernsey.

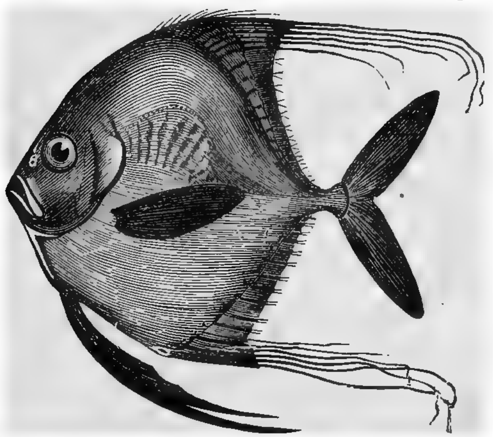
Blennorrhœ'a [Gr. *βλέννα*, "mucous," and *ῥέω*, to "flow"], an abnormally copious discharge from any mucous membrane. In discharges termed blennorrhœal there is a mixture of epithelial scales in large quantities from the mucous membrane, with numerous pus-cells. After inflammation of the urinary mucous membrane a gleety discharge frequently continues for a long period. The treatment consists in establishing health by tonics, fresh air, and careful regimen, with astringent lotions to lessen the secretion, and occasional local stimulants to alter the depraved condition of the mucous membrane.

Blen'ny (*Blen'nius*), a genus of fishes of the order Teleostea and family Blenniidæ. To this family the wolf-fish and the gunnel or butter-fish are referred. They are generally remarkable for the abundance of slimy matter with which their skin is covered. Many are destitute of scales. The body is generally of an elongated form. They have only one dorsal fin, which, however, seems in many of them as if composed of two parts. They are found in the seas of many parts of the world. The blennies are small fishes, living in shoals, and often found in pools left dry by the tide. They possess the power of using their ventral fins to aid them in moving about among rocks and sea-weeds. They are seldom used as an article of food, but are in request for the aquarium, on account of their tenacity of life and their activity. They feed chiefly on small crustaceans. The *Blennius ocellaris* (eyed blenny), called also the butterfly-fish, has a large and prominent dorsal fin, in which is a spot resembling an eye. This beautiful fish is common in the Mediterranean, and is sometimes found on the coast of England.

Many of the blenny family retain their eggs within the oviduct until they are hatched, so that the young are produced alive, and capable of seeking food for themselves. An example of this is found in the viviparous blennies (*Zoarces vivipara*) of the British seas. Several blennies are found on the American coasts.


Eyed Blenny.

Bleph'aris [Gr. *βλεφαρίς*, an "eyelash," referring to the long filaments attached to the fins], a genus of fishes allied to the mackerel and the dory, includes the hair-finned dory, *Blepharis crinitus*, a fish which is from five to six inches in length, bluish-white above and shiny beneath. It is found, though rarely, on the North American Atlantic coast.


The Blepharis.

Bléré [Lat. *Bliriacum*], a town of France, department of Indre-et-Loire, on the river Cher, 16 miles E. S. E. of Tours. It has a bridge built about 1150. Pop. in 1881, 3688. Near it is the château of Chenonceaux, which Henry II. of France gave in 1535 to Diana of Poitiers, who, having sumptuously embellished it, was compelled to transfer it to Catherine de Médicis. In 1733 it was purchased by M. Dupin, the wit and beauty of whose widow caused it to be frequented by Fontenelle, Voltaire, Buffon, Rousseau, and others. The castle is in good preservation.

Bles-Bok (*Damalis albifrons*), an antelope of South Africa. Its name is derived from the *blaze* (Dutch, *bles*) of white in its face.

Bles'sed This'tle (*Cnicus benedictus*), a plant of the order Compositæ, a native of Europe, sparingly naturalized in the U. S. It was formerly regarded with great veneration on account of its supposed medicinal virtues, which are celebrated by Burton in his "Anatomy of Melancholy," and by Shakspeare, under the name of *Carduus benedictus*. It is tonic and diaphoretic.

Bles'sington (Margaret Gardiner), Countess of, an accomplished and beautiful Irish lady, born near Clonmel, in Tipperary county, Sept. 1, 1789. Her maiden name was Power. She was married in 1818 to the earl of Blessington, who was her second husband. She travelled with him extensively on the Continent, and after he died in 1829 she lived in Gore House, London, where her soirées were attended by many literati and other eminent persons. She published "Conversations with Lord Byron" (1834), "The Idler in France," and other works. Died in Paris June 4, 1849. (See R. R. Madden, "The Literary Life and Correspondence of Lady Blessington," 3 vols., 1855.)

Bli'dah, or **Blida,** a town of Algeria, in the province of Algeria, about 30 miles S. W. of Algiers. It is pleasantly situated on the border of the Metidjah, is a station on a railway, and is said to be very flourishing. It has been occupied by the French since 1838. Pop. 8113.

Bligh (William), an English naval officer, born in 1753. He commanded the ship "Bounty," with which he was sent to Tahiti in Dec., 1787, to procure plants of the bread-fruit tree, in order to plant them in the West Indies. During his voyage for Jamaica with a cargo of these plants a part of his crew mutinied, April 28, 1789, on account of his harsh treatment. The captain and eighteen of his men were sent adrift in the launch, and after much suffering arrived at the island of Timor in June, having traversed 3600 nautical miles in an open boat. The mutineers settled on Pitcairn's Island. Bligh was appointed governor of New South Wales in 1806, but his conduct was so tyrannical that he was expelled in 1808. Died Dec. 7, 1817.

Blight [probably from the Anglo-Saxon *be* and *lihtan*, "to fall upon"], a term in common use for supposed atmospherical injuries received by plants. Before effects were traced to their causes with the same care that they are at present, the sudden discoloration of the leaves of plants, their death, or their being covered with minute insects or small excrescences, was called by the general name of blight; and this blight was attributed to some mysterious influence in the air, to the east wind, or to thunder, because these states of the atmosphere commonly accompanied those phenomena. It is now found that what is called blight is in some cases the effect of insects, to the progress of which a peculiar state of the atmosphere often contributes; while in other cases it is caused by parasitical fungi. These fungi on grain crops are called fireblast, bunt, smut, brand, and rust. The ergot or spurred rye used in medicine is a somewhat similar fungus. Ergot in grain used as food may lead to gangrenous diseases. A fungus upon the grape constitutes *mildew*, a most destructive disease.

The sudden death of plants without apparent cause, and also the withering and drying up of part of their leaves and branches, to which appearance the term blight should perhaps be restricted, are produced by the transpiration of water from the leaves taking place with greater rapidity than it can be supplied by the absorption of the roots, and also by the roots becoming attacked by fungus spawn. In very hot weather in summer branches of fruit trees trained against walls, or of gooseberry bushes on espaliers, are sometimes withered up in a few minutes from this cause. Blight on standard apple or other fruit trees in orchards is often nothing more than the injuries done to the leaves and buds by the caterpillars of certain moths; that on thorn hedges by the caterpillar of the saw-fly or of the ermine, or of some other moths; and that on roses, by the aphides or green-fly.

Blind (Karl), a German liberal politician, born at Mannheim Sept. 4, 1820, had a prominent part in the revolutions of 1848 and 1849, and in 1852 took refuge in London. Having been pardoned by the government of Baden in 1867, he returned to Germany, where he has since distinguished himself as a zealous opponent of the policy of Bismarck.

Blind'age, in fortification, a term applied to a screen made of timber and earth, or any fixture designed to shelter the garrison or conceal their operations from the enemy. The blindage is sometimes formed of fascines, placed on the inner crest of a battery and continued over the top of the embrasures. Other blindages, used to protect the gunners of a battery from a vertical fire, consist of plain and strong timbers, one end of which is placed on the inner crest of the parapet and the other end on the ground.

Blind-fish. See Amblyopsis.

Blind'ness [Lat. *cæcitas*], the absence of the sense of sight, is caused by disease, defect, or injury of the eye, of the optic nerve, or of that part of the brain connected with it. Blindness may be complete or incomplete; it may exist from birth or may accompany extreme age. It may be transient or permanent. Permanent blindness may follow the various eruptive fevers, especially those of childhood, such as scarlet fever and smallpox. Congenital blindness is generally from deficient development of the nervous apparatus, and is detected by the child being indifferent to light and throwing its head from side to side. Very rarely the power of vision is subsequently developed, except when congenital cataract is removed.

Opacity of the vitreous humor or of the crystalline lens —the latter known as cataract—causes blindness, which comes on gradually. The blindness from cataract is seldom so complete as to prevent the person from distinguishing day from night, or from being aware of opaque bodies passing between him and the light. Opacities of the cornea, if extensive or in the axis of vision, produce some degree of blindness. Advances in knowledge of anatomy have enabled surgeons to restore sight in cases which years ago would have been hopeless.

Night blindness (*hemeralopia*) is a condition in which a person finds, towards evening, that objects are becoming less and less distinct, and at last that he is totally or nearly blind. This affection has attacked bodies of troops exposed to great fatigues and the glare of the sun. If there is no disease within the brain, recovery generally results from protecting the eyes from the light, entire repose, and the use of such remedies as may correct any constitutional defect in the individual attacked.

Day blindness (*nyctalopia*) is characterized by inability to see in a bright light; the subjects of it see more than usually well at night. Captives long immured in dark cells are often affected with it. Among nocturnal animals, as owls, bats, etc., it is the normal condition. It accompanies albinism in some instances.

"The world of the blind," says Prescott, "is circumscribed by the little circle which they can span with their own arms. All beyond this has no real existence." Some subjects of knowledge will always be beyond the blind man's reach. Light, color, and space he cannot fully realize. Cheselden once successfully operated on a boy for blindness. It was two months before he discovered that pictures represented solid bodies; he thought them planes differently colored, and when he began to have some notion of the truth, in touching the canvas of a picture he expected to find something solid upon it. The words sea and sky do not convey the same image to the blind which they convey to us, and there must be a large class of words in the same category. But though the circle of which Prescott speaks is narrow, yet within it the perceptions of the blind are remarkably active and accurate. The fact of their isolation renders their mental operations more concentrated.

As a class, we find the blind to be thoughtful and quiet, with peculiar sensitiveness of mind and feeling; grateful for every kindness; equally tenacious in remembering the least affront, and often self-willed and opinionative. These are but the natural results of scanty information, and a narrow field of observation and acquirement. Not a few blind persons, however, are possessed of peculiar sweetness of disposition, and it is obvious that different conditions may produce great differences of character in such sensitive natures. The loss of the sense of sight, as is well known, is partly compensated for by a wonderfully increased sensitiveness of hearing and touch.

The making of baskets, mats, rugs, list shoes, brushes, knitting, netting, wood-turning, and hair-work are among the trades which the blind practise with success. The study of music is often the blind man's delight. Some blind men have even become famous as musicians—two of them so remarkable that even Handel expressed great delight at their skill. But a pleasing mediocrity is the average attainment of blind players.

Modern civilization is distinguished for its efforts to provide for the mental wants of this unfortunate class. The first school devoted to the instruction of the blind was established in Paris in 1784 by Valentine Haüy, a generous and enthusiastic but impractical man. Asylums, without systematic instruction, had been established at various places in Europe during the Middle Ages, and some of these still exist. The first school for the blind in the U. S. was the New England Asylum (now the Perkins Institution) at Boston, Mass., founded in 1829. Among those who have been distinguished for their zeal and success in this work we may mention Dr. John G. Fisher, the founder of the above school, Dr. S. G. Howe of Boston, Dr. Akerley of New York, Dr. Dunglison and Robert Vaux of Philadelphia. Books for the blind are at present generally printed with raised Roman letters, though various other alphabets, some of them stenographic, have been devised. Some blind persons, however, acquire such a nice sense of touch as to be able to read ordinary printed matter, taken directly from the type, or the "first proof."

The census of 1880 reports 48,928 blind persons in the U. S., but there is no doubt that many cases of partial and some of total blindness were not reported to the census-takers. The following is a list of institutions for the blind in the U. S.:

Name.	Location.	Year of Found.
Institution for Deaf, Dumb, and Blind	Talladega, Ala.	1858
Institution for the Blind	Little Rock, Ark.	1859
Institution for Deaf, Dumb, and Blind	Berkeley, Cal.	1866
Institution for Mutes and the Blind	Col. Springs, Col.	1874
Academy for the Blind	Macon, Ga.	1853
Institution for the Blind	Jacksonville, Ill.	1849
Institution for the Blind	Indianapolis, Ind.	1847
Institution for the Blind	Vinton, Ia.	1853
Institution for the Blind	Wyandotte, Kan.	1868
Institution for the Blind	Louisville, Ky.	1842
Institution for the Blind	Baton Rouge, La.	1870
Institution for the Blind	Baltimore, Md.	1853
Institution for Colored Blind and Deaf-Mutes	Baltimore, Md.	1872
Perkins Institute and Massachusetts Asylum for the Blind	Boston, Mass.	1829
Institution for Deaf, Dumb, and Blind	Lansing, Mich.	1854
Institution for Deaf, Dumb, and Blind	Faribault, Minn.	1863
Institution for the Blind	Jackson, Miss.	1853
Institution for the Blind	St. Louis, Mo.	1851
Blind Girls' Industrial Home	St. Louis, Mo.	
Institution for the Blind	Nebraska City	1876
New York State Inst. for the Blind	Batavia, N. Y.	1867
New York Institution for the Blind	New York City, N.Y.	1831
Home for the Blind	New York, N. Y.	
Indigent Blind Asy., Blackwell's Isl.	New York, N. Y.	*
Institution for Deaf, Dumb, and Blind	Raleigh, N. C.	1846
Institution for the Blind	Columbus, O.	1837
Institution for the Blind	Philadelphia, Pa.	1833
Pa. Working Home for Blind Men	Philadelphia, Pa.	1874
Pa. Indus. Home for Blind Women	Philadelphia, Pa.	1868
Institution for Deaf, Dumb, and Blind	Cedar Springs, S. C.	1869
Institution for the Blind	Nashville, Tenn.	1844
Institution for the Blind	Austin, Tex.	1856
Institution for Deaf, Dumb, and Blind	Staunton, Va.	1839
Institution for Deaf, Dumb, and Blind	Romney, W. Va.	1870
Institution for the Blind	Janesville, Wis.	1850

* Is a part of the almshouse.

The following list gives the names of some of the chief schools for the blind in Europe:

	Founded		Founded
Paris	1784	Breslau	1819
Liverpool	1791	Barcelona	1820
Edinburgh	1791	Naples	1822
London	1800	Gmünd	1823
St. Petersburg	1806	Lintz	1824
Berlin	1806	Perth	1825
Vienna	1804	Manchester	1827
Prague	1804	Glasgow	1827
Amsterdam	1808	Freisingen	1828
Zurich	1809	Bruchal	1828
Dresden	1809	Hamburg	1830
Dublin	1810	York	1838
Copenhagen	1811	Cork	1840
Stockholm	1817	Munich	1844
Koenigsberg	1818	Lausanne	1844

Besides the above, there is a very great number of local schools for the blind in Europe, some of them of the highest excellence. Revised by Chas. W. Greene.

Blind'story, or **Trifo'rium,** the second arcade in the wall which separates the body from the aisles of a church. It is so called as opposed to the clearstory, the uppermost arcade, the apertures of which admit light into the church, while the apertures of the triforium are dark. The blindstory serves to give access to the various parts of the building, and to suspend banners on holidays. The gloom of the blindstory contrasts well with the brightness of the clearstory.

Blind'worm, a popular name of the *Anguis fragilis*, which, however, is not blind nor a worm. It has been usually regarded as a serpent by naturalists, or a link between serpents and saurians (lizards). Mr. Gray has arranged the *Anguis* and several other genera in the order Saurophidia ("lizard serpents"). The blindworm has a cylindrical body, destitute of external limbs, but the bones of the shoulder and pelvis exist in a rudimentary state. It is found in nearly all parts of Europe, is inoffensive and timid, and moves very slowly; hence it is sometimes called slowworm. Its length varies from ten to fifteen inches or more. When alarmed it contracts itself forcibly and becomes very brittle, so that it is easily broken in two by bending it. (See Glass Snake.)

Bliss (Philip Paul). See Appendix.

Bliss (Porter Cornelius). See Appendix.

Bliss (William W. S.), A. M., an American officer, born Aug., 1815, at Whitehall, N. Y., graduated at West Point in 1833, and assistant adjutant-general (rank of major) July 7, 1846. He served in the Cherokee Nation 1833–34, as assistant professor at the Military Academy 1834–40, in the Florida war 1840–41, being chief of staff to commanding general, as assistant adjutant-general at head-quarters of Western military departments 1842–45, as chief of staff of Maj.-Gen. Taylor in the military occupation of Texas 1845–46, in the war with Mexico 1846–48, in command of the Western division 1848–49, engineer at Palo Alto, Resaca de la Palma (brevet major), Monterey, and Buena Vista (brevet lieutenant-colonel), as private secretary of President Taylor Mar. 4 to July 9, 1850, and as assistant adjutant-general of the Western division, head-quarters at New Orleans, La., 1850–53. He was presented in 1849, by the State of New York, in "appreciation of him as a soldier and a man," with a gold medal, with suitable devices, for his gallant services in Mexico, and honored with membership of learned associations at home and abroad. He was highly distinguished for his acquirements in science, literature, and languages, was a most graceful and forcible writer, as shown by the celebrated despatches of Gen. Taylor from his pen, and his great wealth of learning and humor made him a most entertaining companion. Died Aug. 5, 1853, at East Pascagoula, Miss., aged thirty-eight.

Blistered Steel. See Steel, by A. L. Holley.

Blis'ters are plasters which, when applied to the skin, raise the cuticle into vesicles filled with serous fluid. They have for their object a counter-irritation or diversion of inflammatory action from an internal part to the surface of the body. The common blister is made of cantharides or Spanish fly (*Cantharis* or *Lytta vesicatoria*), mixed with a convenient proportion of lard and wax. If applied too long it produces distressing affections of the urinary bladder. In children and sensitive persons a layer of thin gauze may be placed between the blister and the skin. Under no circumstances should a blister be left long upon children, as it may produce sores which are difficult to heal. When the blister has raised, the vesicles should be pricked and their fluid contents allowed to trickle away, the vesicated surface being then dressed with simple cerate or lard.

Blitt'ersdorf, von (Friedrich Landolin Karl), Baron, minister to the grand duke of Baden, a zealous supporter of the Metternich policy, born Feb. 3, 1792, wrote "Einiges aus der Mappe des Freiherrn von Blittersdorf." Died April 16, 1861.

Bli'tum [Gr. βλίτον], a genus of plants belonging to the order Chenipodiaceæ. The common "strawberry blite" (*Blitum capitatum*) of North America is a plant perhaps introduced from the south of Europe, but probably native of both continents. There are several other species likewise common on both sides of the Atlantic.

Block [Fr. *bloc*], a heavy piece of timber; a massy body, solid and heavy; the piece of wood on which criminals are beheaded; the wooden mould on which a hat is formed; any obstacle or obstruction; also a continuous row of buildings. The term is applied in New York and other cities to the space and buildings between each street and the next street.

Block, in architecture, is used to denote large, unworked masses of marble or stone; also a modillion in a cornice, or the small projections left on the stones of some ancient buildings, which are supposed to be indications of the unfinished state of the work, though they are found in elaborately constructed buildings.

Block, in the rigging of a ship, is the part of the apparatus for raising sails and yards, tightening ropes, etc. The uses of blocks are very numerous on shipboard, and to subserve these uses they are distributed about the masts and yards. The block comprises a *shell* or exterior, a *sheave* or pulley on which the rope runs, a *pin* on which the sheave turns, and a *strap* to fasten the block in its place. A single block contains only one sheave; a double block, two; and so on. Besides the designation of blocks according to the number of sheaves they contain (as single, double), they receive other names—such as cheek block, clew-garnet block, clew-line block, etc. Elm is used for blocks, and lignumvitæ for sheaves.

Until 1781 ships' blocks were made by hand. But it required unusual skill and practice to fashion the pieces and put them together so as to possess the requisite strength and facility in working. More than 1400 blocks were required for one of the old seventy-fours, and a proportionate number for other vessels. In 1781 a Mr. Taylor began to make the sheaves and shells of blocks by machinery for the British navy. Sir M. I. Brunel, in 1801, invented machinery for making blocks, which was put into successful operation in 1808. Thomas Blanchard, the American mechanician, invented most ingenious machines for block-making. For his invention and superintending the work, Brunel received from the British government £20,000.

Block (Moritz), a French writer on statistics and political economy, born at Berlin Feb. 18, 1816. Among his works are "Statistics of France" (2 vols., 1860), "Europe, Political and Social" (1869, both in French), "Die Bevölkerung des Französischen Kaiserreichs" (1861), and "Die Bevölkerung Spanien's und Portugals" (1861). Since 1856 he has published the "Annuaire de l' économie politique et de la statistique."

Blockade, in international law, is the means in time of war of prohibiting neutrals from all intercourse with an enemy's port; and it is carried into effect by an armed force (ships of war or forts), which blocks up and bars export or import to or from the place blockaded. This right is sanctioned by all civilized nations. Blockades may begin in the simple fact of obstructing entrance into a port, or in official notice. According to French doctrine, a vessel may approach the entrance of a port with impunity, and must be warned off by a blockading vessel; but according to English and American practice, due notice given to the public authority of a state makes its vessels liable to penalty for attempting to enter the port. Blockades without notification are chiefly resorted to in an emergency, and are temporary: they require notification at the mouth of the harbor. To constitute a valid blockade, declared intention and actual force are necessary. A blockade ends when a blockading force is withdrawn voluntarily, or is driven off, not by storm, but by a superior hostile force; and to renew it new notification is necessary. The Declaration of Paris in 1856 defines valid blockade to be such as prevents ingress into a harbor. This is somewhat vague, but cuts off all paper blockades, such as those laid by the Orders in Council and the Berlin and Milan Decrees. Only harbors or forts and mouths of rivers can be blockaded, and the latter only so as not to prevent vessels from access to a port of a neutral up the stream. The breach of blockade may be either by coming out of the blockaded port or going in. The breach of blockade subjects the property so employed to confiscation; there is no rule of the law of nations more established than this, and it is universally acknowledged by all civilized governments. The violation of blockade by the master, however, affects the ship, but not the cargo, unless the cargo is the property of the same owner, or unless the owner of the cargo is cognizant of the intended violation.

On the proclamation of peace, or from any political or belligerent cause, the continuance of the investment may cease to be necessary, and the blockade is then said to be *raised*. The blockading force then retires, and the port is open as before to all other nations.

Theo. D. Woolsey.

Blockade, in military art, signifies an operation and effort to reduce and capture a fort or town without a bombardment or regular siege, relying solely upon the stoppage of supplies. The attacking party throws up redoubts or other works on the neighboring heights and roads. A part of the investing army sometimes remains in a temporary camp, ready to repel a sortie of the garrison. Forts built on steep and rocky eminences may be reduced more easily by blockade, because the roads or paths by which supplies can be received are few, and can be guarded by a small force.

Block Books. Previous to the invention of printing, besides the calligraphists and illuminators who prepared and adorned the books of scholars and clerics, there existed a separate guild for the fabrication of school-books and books of devotion, as well as calendars and popular medical books for the lay public. These were ornamented with rude paintings. The card-painters were identical with this craft until the beginning of the fifteenth century. As the demand for the products of their art increased, they invented the process of block-printing, cutting into blocks of wood, and sometimes plates of metal, so as to leave the letters and pictures standing out, and applying colors to these and taking impressions. In these xylographic books, sometimes one, sometimes both sides of the sheet were printed.

Block-House, a wooden redoubt or temporary fort, is always covered. It is usually rectangular, is built of logs, and has two stories, one of which is sunk several feet below the surface of the ground. The upper story projects a few feet beyond the lower on all sides. It is loopholed for the use of muskets. Block-houses have been much employed in the U. S. as a defence against Indians. If exposed to the fire of artillery, they should be formed of double rows of logs three feet apart, with well-rammed earth between them.

Block Island, an island belonging to the State of Rhode Island, situated between Montauk Point, the E. extremity of Long Island, and Point Judith. It constitutes the township of New Shoreham in Newport county. It is 8 miles long and from 2 to 5 miles wide. Block Island light, at the N. extremity, is in lat. 41° 13′ 46″ N., lon. 71° 34′ 17″ W. Pop. in 1870, 1113; in 1880, 1203; in 1885, 1267.

Block′ley, a former township of Philadelphia co., Pa., on the W. side of the Schuylkill River, is now included in the city of Philadelphia. It is the site of the Blockley Insane Asylum, and of a large almshouse occupied by the paupers of the city.

Block-Printing. See PRINTING.

Block-ship, a ship-of-war that is too old or slow for efficient service at sea, but useful for defence of great ports and naval arsenals.

Block Tin, a name of a variety of tin which is inferior in quality to grain tin. During the process of melting or reduction in a reverberatory furnace the purest tin first fuses, and is withdrawn. The residue, being melted at a higher temperature, is poured into moulds, and is called block tin.

Blod′get (LORIN), an American scientist and writer, born in Chautauqua co., N. Y., May 23, 1823. He received a thorough common-school and academical education. In 1851 he became assistant professor at the Smithsonian Institution at Washington. He sent, in 1852, the results of his researches in climatology to the British Association for the Advancement of Science, and the following year presented a series of papers on the same subject at the meeting of the American Association at Cleveland, which may be said to have laid the foundation of American climatology. In 1853–54, Mr. Blodget had direction of the observations and calculations of the Pacific R. R. survey. Near the close of 1854 he was transferred to the war department, but continued to have charge of the surveys. In 1855 he published a quarto volume of climatological observations, and in 1857, "Climatology in the U. S.," a work extensively circulated and very favorably received in Europe. From 1859 to 1864 he was editor of the "North American," published in Philadelphia, and secretary of the Philadelphia Board of Trade from 1858 to 1864. From 1863 to 1865 he had charge of the commercial bureau of the treasury department at Washington, and published several volumes of official reports. In 1865 he was made U. S. appraiser at large. He contributed articles on finance to the "North American Review," in 1866 and 1867, besides making contributions to various other publications. Mr. Blodget's reputation is perhaps even greater in Europe than in the U. S. Some of his writings on climatology were warmly commended by Alexander von Humboldt.

Blodget (SAMUEL), born at Woburn, Mass., April 1, 1724, became a judge of common pleas in Hillsboro′ co., N. H., and served in the Louisburg expedition of 1745. In 1783 he raised a sunken ship with a valuable cargo near Plymouth, and went to Europe to prosecute similar enterprises, but met with small encouragement. He commenced the duck manufacture in New Hampshire in 1781. He afterwards undertook the construction of a canal around Amoskeag Falls. Died at Haverhill, N. H., Sept. 1, 1807.

Bloem′fontein, the capital of the Orange River Free State, in South Africa, on a tributary of the Modder, in about lat. 29° 10′ S., lon. 26° 40′ E. Pop. 2567.

Blois (anc. *Ble′sæ*), a town of France, capital of the department of Loire-et-Cher, is finely situated on high ground on both sides of the Loire, and on the railway from Orleans to Tours, 36 miles by rail S. W. of Orleans, and 112 miles by rail S. W. of Paris. It has a fine cathedral, a college, a public library, a botanic garden, an episcopal palace, and a hôtel de ville. Here is the celebrated castle of Blois, the scene of many interesting historical events, and once the favorite residence of the kings of France. Francis I., Henry II., and Charles IX. held their courts in this castle, which has been inhabited by many princes. Blois is a place of great antiquity, and was once more important than it is now. It has manufactures of gloves and porcelain, and a trade in brandy, wine, and timber. Here is an aqueduct cut in the rock by the ancient Romans. Pop. 21,077.

Blom′field (CHARLES JAMES), D. D., a learned English prelate, born at Bury St. Edmund's, in Suffolk, May 29, 1786, graduated at Trinity College, Cambridge. He edited several dramas of Æschylus and the works of Callimachus (1824). He became bishop of Chester in 1824, and bishop of London in 1828. He was an efficient promoter of the erection of new churches in London. His principles were "High Church." Died Aug. 5, 1857. (See DR. BIBER, "Bishop Blomfield and his Times," 1857; A. BLOMFIELD, "Life of C. J. Blomfield," 1863.)

Blom′maert (PHILIPPUS), an eminent Belgian author and philologist, born Aug. 27, 1808. He published editions of old Flemish poems, and translated the Niebelungen into Dutch or Flemish iambics. His most important work is a "History of the Belgians" (1849). D. Aug. 14, 1871.

Blood [Ger. *Blut*], the principal nutritive fluid of animals, and the most abundant and complex fluid in the animal economy. It consists of a clear, transparent plasma, the "liquor sanguinis," and a great number of floating corpuscles, which are also nearly transparent; while the two together constitute in all the higher animals an opaque red fluid. In most of the invertebrates and in the *Amphioxus,* a fish of a low type, the blood is clear and transparent. In vertebrates only are the corpuscles found. The red color of the blood is brightest in the arteries, while in the veins it assumes a dark, almost blue-black tint. It has a faint odor, often characteristic of the animal from which it is taken. The temperature of human blood in health is probably about 100° F. in the deep-seated vessels. Its specific gravity is about 1060, but is not uniform. The blood-plasma or liquor sanguinis consists of water holding in solution a large proportion of albumen, a much smaller amount of fibrin, a variable amount of the carbonates, phosphates, sulphates, chlorides, and certain organic salts of potash and soda, and of the sulphates and phosphates of lime and magnesia, with a little iron, and certain undetermined organic "extractives." Sugar exists in the venous blood, and so does a fatty emulsion. Urea, the urates, cholesterine, creatine, carbonic acid, and other excrementitious matters are borne along by the blood until excreted by the proper organ. The liquor sanguinis, when its fibrin is removed by coagulation, is called serum—a term which is sometimes applied to the liquid before defibrination. When blood is withdrawn from the circulation, it rapidly separates into a rather firm clot (*coagulum* or *crassamentum*), consisting of fibrin, which when alone is white and clear, but unless washed it is usually colored red by the red corpuscles which it entangles.

If the plasma of blood be defibrinated and then heated, or nitric acid be added, a large white coagulum of albumen will be observed. Albumen is the most abundant, and in nutrition is probably the most important, of the principles of the blood.

The corpuscles already alluded to are of two kinds: (1) the red corpuscles, which constitute nearly half the mass of the blood, to which they give its color. They are flat, biconcave disks, circular in all mammals, except the camels and llamas, in which they are oval, as in the inferior vertebrates. In man they are $\frac{1}{3200}$ of an inch in diameter. (2) The white corpuscles or leucocytes, which are very much less abundant than the others. They are identical with the pus-cells, the colostrum-corpuscles, and with the tissue-cells generally. Their function in the blood is not well known. The white corpuscle is a true cell, while the red corpuscle is not. It is believed by many that the red corpuscles are bearers of oxygen from the lungs to the tissues. The greater part of the iron of the blood is contained in them. Their coloring-matter, hæmoglobine or cruorine, is believed by some theorists to owe its red color to this iron. The composition and physical properties of blood are quite variable, changing with changes of food, of health, or of habits. The circulating fluid of the invertebrates differs widely from true blood, though analogous in origin and uses.

CHAS. W. GREENE.

Blood-bird (*Myzomela sanguinolenta*), a beautiful little species of honeysucker, which receives its name from the rich scarlet color of the head, breast, and back of the male. It inhabits the thickets of New South Wales.

Blood-flower (*Hæmanthus*), a genus of bulbous plants of the natural order Amaryllidaceæ, mostly natives of South Africa, derive their name from the red color of the flowers. They are cultivated in greenhouses for the beauty of their flowers, which grow in heads or clusters. The leaves of some species are linear, and those of others nearly round. The inspissated juice of *Hæmanthus toxicarius* is used by the natives of South America to poison their arrows.

Blood-hound [so called because formerly employed to track wounded game by their blood], a name applied to several varieties of the dog, distinguished for the keenness of their scent and the persistency with which they will follow the track of game. They have been employed in many petty wars to track small forces of partisans, to follow escaped prisoners, etc., as in time of peace they have been trained to hunt felons, poachers, and fugitive slaves. When kept for these purposes they acquire a peculiarly ferocious and bloodthirsty character, but when employed for the chase they are sagacious and trusty. The Cuban and Russian hounds are celebrated for their ferocity. They differ much from the English hounds, but like them have pendulous ears and lips and a compact and muscular build.

Blood-root (*Sanguinaria Canadensis*), a plant of the natural order Papaveraceæ, growing wild in many parts of North America. It is one of our most beautiful early spring flowers. It takes its name from the orange-colored sap of the root, which contains the alkaloid sanguinaria, remarkable for the fine red color of its salts. The root of this plant is a valuable stimulant expectorant, but its use requires caution, for its administration has been followed by the symptoms of acro-narcotic poisoning.

Bloodstone. See Heliotrope.

Bloom'ary, or **Blo'mary** [from *bloom*, a mass of iron], a furnace for converting pig or cast iron into malleable or "wrought" iron, or for producing malleable iron from iron ore directly. In the latter case it differs from the Blast Furnace (which see), in reducing the ore and producing the iron in a mass or "bloom" without melting it, while the blast furnace produces an impure molten iron, which is tapped off and cast into pigs; the blast furnace working continuously, the bloomary (in many cases) interruptedly. The change of cast into malleable iron by the bloomary process is generally superseded by Puddling (which see), but the former is used to some extent in the U. S. and Sweden in the production of the better kinds of metal. Bloomaries for the direct production of iron are of various forms. The process is one of the oldest known in metallurgy, and rude forms of it are at present used in many barbarous countries. The two best known modern forms of the bloomary (the Catalan furnace and the German bloomary) are at present used in Spain, Southern France, Sweden, Russia, and parts of the U. S. for the reduction of ores, chiefly by means of charcoal. Only the richest ores can be profitably used, and the loss of iron is much greater than by the blast furnace. In the true Catalan forge the charcoal, with a great part of the charge of iron ore, is heaped on the small square hearth opposite to the tuyere, fine ore and charcoal being thrown in from time to time. A moderate blast is maintained, and the whole is stirred at proper times; and in about six hours the iron is removed, and forged at once into a bloom. In the ordinary or German bloomary the ore is first made fine, and then thrown in small quantities upon a charcoal fire with a blast.

Bloomer (Amelia). See Appendix.

Bloomfield, city, R. R. junction, and capital of Davis co., Ia. (see map of Iowa, ref. 7–I, for location of county), has manufactures of ploughs, wagons, and furniture. It has a high-school building costing $30,000, and is the centre of a rich farming district; has a public library and a large trade. Pop. in 1880, 1531; in 1885, 1527.

Bloomfield, capital of Greene co., Ind. (see map of Indiana, ref. 9–C, for location of county), on R. R. and the Wabash and Erie Canal, 80 miles S. W. of Indianapolis. It has a steam flouring mill and an active trade. Pop. in 1870, 656; in 1880, 988.

Bloomfield, capital of Stoddart co., Mo. (see map of Missouri, ref. 8–K, for location of county), about 125 miles S. of St. Louis. Pop. in 1870, 379; in 1880, 389.

Bloomfield, R. R. junction, Essex co., N. J. (see map of New Jersey, ref. 2–D, for location of county), 4 miles N. N. W. of Newark. It has woollen and paper mills, an iron foundry, and a cabinet-organ factory. Pop. of township in 1870, 4580; in 1880, 5748.

Bloomfield (Joseph), born at Woodbridge, N. J., studied law, entered the Revolutionary army in the third regiment of New Jersey troops as captain, serving bravely throughout the war; became attorney-general of New Jersey, governor of New Jersey (1801–12), brigadier-general in the war with Great Britain (1812–15), and an influential Jeffersonian member of Congress (1817–21). Died Oct. 3, 1823.

Bloomfield (Robert), an English pastoral poet, born at Honington, in Suffolk, Dec. 3, 1766, was apprenticed to a shoemaker. He worked at that trade in London, and wrote in a garret "The Farmer's Boy" (1798), a rural poem which obtained great popularity, and was translated into French, Latin, and Italian. Among his other works are "Wild Flowers" and "Ballads and Songs." Died Aug. 19, 1823. (See "Pursuit of Knowledge under Difficulties," vol. ii.; "Blackwood's Magazine" for June, 1822.)

Bloomington, a city and R. R. centre, capital of McLean co., Ill. (see map of Illinois, ref. 5–E, for location of county), 60 miles N. N. E. of Springfield. It has manufactures of boots, shoes, paper bags, and ploughs, car-works and repair-shops, employing some 1200 hands, a coal-mine, and several furnaces. It is connected by a street railroad with Normal, two miles distant, which is the seat of the State Normal University and the Soldiers' Orphans' Home. Bloomington is the seat of Major Female College, the Illinois Wesleyan University, a Roman Catholic college, and a business college. Pop. in 1870, 14,590; in 1880, 17,180.

Bloomington, city, R. R. junction, and capital of Monroe co., Ind. (see map of Indiana, ref. 8–D, for location of county), 51 miles S. W. of Indianapolis. It is the seat of the State University, organized in 1829, has important lime-stone quarries and manufactures of hard wood, and contains large tanneries. Pop. in 1870, 1032; in 1880, 2756.

Bloomington, on R. R. and Republican River, capital of Franklin co., Neb. (see map of Nebraska, ref. 11–E, for location of county). Pop. in 1880, 524; in 1885, 560.

Blooms'burg, on R. R., capital of Columbia co., Pa. (see map of Pennsylvania, ref. 4–H, for location of county), 56 miles S. W. of Scranton. Iron and limestone abound in the vicinity. The town has a normal school, also iron furnaces and foundries. Pop. in 1870, 3341; in 1880, 3702.

Blossburgh, Pa. See Appendix.

Blount (James H.). See Appendix.

Blount (William), an American Senator, born in North Carolina in 1744, was a member of the Continental Congress, and became governor of Ohio Territory in 1790. In 1796 he was elected a U. S. Senator for Tennessee, and in 1797 was expelled from the Senate on a charge that he was implicated in a plot to surrender a part of Louisiana to the British. Died Mar. 21, 1800.

Blounts'ville, capital of Blount co., Ala. (see map of Alabama, ref. 2–D, for location of county). Pop. in 1880, 222.

Blountsville, capital of Sullivan co., Tenn. (see map of Tennessee, ref. 5–K, for location of county). Pop. in 1870, 180; in 1880, 317.

Blow (Henry T.), born in Southampton co., Va., July 15, 1817, graduated at the University of St. Louis, Mo., was a prominent Unionist and anti-slavery man before the civil war, was U. S. minister to Venezuela (1861–62), member of Congress (1863–67), and minister to Brazil (1869–71). Died at Saratoga, N. Y., Sept. 11, 1875.

Blow'pipe [Fr. *chalumeau;* Ger. *Löthrohr*], a tube bent at right angles and terminating in a fine nozzle, for directing a current of air from the mouth across the flame of a lamp, candle, or gas-jet. It produces a conical-pointed flame, intensely hot, which can be readily directed upon small objects by the operator. It is constantly used by the jeweller in soldering, but in the hands of the chemist and mineralogist it is the basis of a distinct and comprehensive system of analysis, both qualitative and quantitative. By using a gentle current of air, and not permitting the nozzle to enter the flame, the entire flame is brought into a horizontal position, but its chemical character is not changed; it is still composed of combustible gases rich in carbon; and as these, when directed upon many metallic oxides, reduce or liberate the metals, this flame is called the *reducing* flame. If, on the other hand, a more powerful current of air is blown into the interior of the flame, a sharp-pointed jet of a blue tint is the result. Many metals, placed just beyond the point of this flame, are rapidly oxidized; hence it is called the *oxidizing* flame. The chemist is thus enabled by the aid of the blowpipe to expose small quantities of minerals or other substances either to a reducing or an oxidizing influence. By holding the substance in platinum-pointed forceps its fusibility can be determined, or it may communicate to the flame some characteristic color. By placing it upon charcoal many important facts can be learned with regard to it; *i. e.* it may produce white or colored deposits upon the coal, or evolve a characteristic odor, etc. By subjecting it at the same time to the action of carbonate of soda it may yield metallic globules or powder, with or without a coating. By the aid of a loop of platinum wire the body under examination may be exposed to the action of borax or salt of phosphorus, when glassy beads of characteristic colors may result. Thus with the aid of the blowpipe the analyst subjects the substance to a series of tests, by which its exact character is revealed. By the use of the balance, clay crucibles, cupels of bone-ash, and a great variety of reagents, the percentages of certain metals can be determined, such as copper, cobalt, nickel, gold, and especially silver. The art of keeping up an uninterrupted current of air through the blowpipe is easily acquired. (See Eldeshorst's "Manual of Blowpipe Analysis," and Plattner's "Manual of Qualitative and Quantitative Analysis with the Blowpipe.") (See Oxy-hydrogen Blowpipe.) C. F. Chandler.

Blow'pipe-and-Ar'row, called also **Gravata'na** and **Pocu'na,** a weapon used by some of the Indians of South America, both in war and for killing game. It is a straight tube, in which a poisoned arrow is placed and forcibly expelled by the breath. The tube, etc. is from two to twelve feet long, the bore not large enough to admit the little finger. It is made of reed or of the stem of a palm. The arrows are from one or two to eighteen inches long, made of the spines of a palm, sharp, notched so as to break off in the wound, and their points covered with curare or other poison. A little down is twisted round each arrow, to fit the tube. In the hand of a practised Indian it is a very deadly weapon. As his weapon makes no noise, the hunter often does wonderful execution.

Blub'ber, the cellular membrane in which the oil or fat of the whale is enclosed; the layer of fat which lies just beneath the skin of the whale. A single whale often contains thirty tons of blubber, from which about twenty tons of oil are extracted. The blubber serves to protect the whale from cold and to diminish his specific gravity. It is an important article of food to the Esquimaux.

Blü'cher, von (Gebhard Leberecht), prince of Wahlstadt, a celebrated Prussian general, born at Rostock Dec. 16, 1742. He entered the service of Prussia in 1760, became a captain in 1771, and a colonel in 1790. In 1794 he distinguished himself as a cavalry officer in the war against the French, and was raised to the rank of major-general. He led the vanguard at the battle of Auerstadt (1806), from which he retreated to Lübeck. He was defeated and taken prisoner near Lübeck in Nov., 1806. When the war between the allies and Napoleon was renewed in Mar., 1813, Blücher was appointed commander-in-chief of the Prussian army, which he led at Lützen and Bautzen. He defeated Macdonald at the Katzbach in August, and took many prisoners. On Oct. 16 he gained a victory over Marshal Marmont at Möckern, and then formed a junction with the allied armies, which, with his co-operation, defeated Napoleon at the battle of Leipsic, Oct. 17–19, 1813. He was raised to the rank of field-marshal in 1813, and led the Prussian army, about 60,000 strong, which invaded France early in 1814. Between Feb. 10 and 15 he was defeated by Napoleon at Champaubert, Montmirail, Veauchamps, etc., and lost about 15,000 men, but he defeated the same enemy at Laon, Mar. 9, entered Paris at the end of that month, and here received from his king the title of prince of Wahlstadt. On the renewal of the war in 1815 he took command of the Prussian army, and was defeated at Ligny, June 16, but he reached Waterloo in time to decide the victory, June 18, 1815. Died Sept. 12, 1819. He was noted for his energy and rapid movements, and was surnamed Marshal Vorwärts ("Forward"). In 1826 a large bronze statue by Rauch was erected to him in Berlin, and another in Breslau in 1827. (See Foerster, "Blücher und sein Umgebung," 1821; Pischon, "Blüchers Leben, Thaten, und Ende," 1842; Varnhagen von Ense, "Blüchers Lebensbeschreibung," 1827; "Life and Campaigns of Blücher," London, 1815; Scherr, "Blücher, seine Zeit und sein Leben," 2 vols., 1862; Bieske, "G. L. Blücher von Wahlstadt," 1862; and Chesney, "Waterloo Lectures," 1874.)

Blue [Lat. *cæru'leus;* Fr. *bleu;* Ger. *blau*], one of the three primary colors, and one of the seven prismatic colors, of which the complementary is orange. The *blue coloring matter of flowers* has been called anthokyan or cyanine; little is known of its chemical constitution. *The blue pigments* are (1) ultramarine, obtained originally from lapis-lazuli, now manufactured artificially; (2) Prussian or Berlin blue, the sesquiferrocyanide of iron; (3) smalt, glass colored blue by oxide of cobalt; modifications of this pigment are called azure blue, cerulean blue, indigo blue, deep blue, king's blue, etc.; (4) Thenard's or cobalt blue, a compound of alumina and oxide of cobalt; (5) verditer or Bremen blue, mountain blue, etc., a basic carbonate of copper; (6) blue ochre or iron blue, native Prussian blue, is a phosphate of protoxide of iron found in many places.

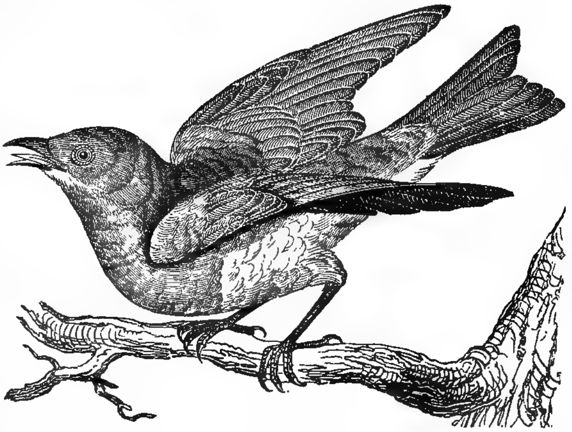
The blue dyes are (1) Indigo. This is applied as Saxon blue, or indigo extract, a solution of indigo in fuming sulphuric acid. Chemic, or chemic blue, is the very acid solution; indigo carmine is the extract neutralized by an alkali, as the indigo vat, indigo reduced to a colorless solution by protoxide of iron or grape-sugar, which becomes blue again in the air. (2) Prussian blue, already mentioned as a pigment. (3) Logwood blue, produced by logwood extract on goods mordanted with alum and cream of tartar. (4) Azuline, or phenol blue, prepared from phenol or carbolic acid. (5) Aniline blues, (*a*) bleu de Lyons, triphenyl-rosaniline; (*b*) Nicholson's, or alkali blue, etc. (6) Toluidine blue. (7) Diphenylamine blue. (8) Chinoline blue, etc. (For details consult the above under their respective names.)

C. F. Chandler.

Blue'beard [Fr. *Barbe-bleu;* Ger. *Blau'bart*], the central character of a celebrated fiction, according to which the chevalier Raoul, who has a blue beard, tests his wife's curiosity by entrusting her, during his absence, with the key of a chamber which she is forbidden to enter. She cannot resist the temptation to explore the chamber; her fault is discovered, and he puts her to death. Six wives share this fate, but the seventh is rescued by her brothers, and Bluebeard is slain. The tale appears in innumerable forms. Tieck, in his "Phantasus," has worked up this material into a drama, with romantic and satirical additions; Grétry has made use of it in his opera of "Raoul," and Offenbach has written an opéra bouffe called "Barbe Bleu" (1866).

The historic original of Bluebeard is supposed to be Retz, de (Gilles de Laval) (which see), made marshal of France in 1429, and who fought bravely against the English; but he is remembered chiefly for crimes which tradition has painted in the blackest colors. He is said to have taken a pleasure in corrupting young persons of both sexes, and in murdering them for their blood, which he used in magical incantations. Out of this fact, itself half mythical, the tale of Bluebeard has probably grown. Laval was burnt alive near Nantes in 1440. According to another theory, Laval, by his fate, became the object for the floating mass of traditions which had existed from the earliest times, and to which, no doubt, his known wickedness gave some reason for belief.

Blue'bell, a name applied in Great Britain to two widely different wild flowers: (1) the *Hyacinthus non-scriptus,* a hyacinth with beautiful blue flowers, and a root which was formerly gathered for the starch it contains; (2) the *Campanula rotundifolia,* the harebell, very common throughout Europe, and having a wide range in Asia and North America. This and other blue-flowered species of *Campanula* are sometimes called "bluebell" in the U. S., where the name is also in some places very incorrectly given to the blue fringed-gentian.



The Blue-bird.

Blue-bird, or **Blue Warbler** (*Sylvia sialis, Erythaca sialis,* or *Sialia sialis*], a bird of the family Sylviadæ, is a general favorite in the U. S., which it visits as a summer bird of passage, and is welcomed as a harbinger of spring. It prefers the vicinity of human habitations, and often builds in orchards and gardens. It is nearly equal to an English robin in size. The upper part of it is a rich sky-blue color; the breast and throat are a reddish chestnut. Its song is a mellow, sweet-toned, and agreeable warble. This bird lays about five pale blue eggs. The male and female both defend their nest and young with remarkable courage when attacked by serpents or other animals. They generally build their nest in the hollow limb of a tree or in a box about the house or garden kindly provided by the farmer, whom they repay partly by the cheerfulness of their song, partly by the multitude of injurious insects which they daily destroy. In the summer their food consists of insects and spiders; in the winter, of berries. Toward fall—that is, in the month of October—their song changes, and the pleasant warble shrinks into one single plaintive note. Even after the trees are stripped of their leaves, they still linger for a short time over their native fields. But after the middle or end of November few or none of them are seen.

Blue Books, the name applied to the reports and papers printed by the British Parliament, because they are usually covered with blue paper. The term is also applied to the reports sent annually by the governors of colonies to the colonial secretary. The practice of printing the proceedings of the House of Commons began in 1681, when disputes ran high on the question of excluding the duke of York from the succession. The documents printed by the House of Commons accumulated gradually in bulk and variety, until they reached their present extent. In 1836 the House adopted the practice of selling their papers at a cheap rate. The chief contents of these papers at present are the votes and proceedings of the House; the bills; the estimates for the public services; the accounts of expenditures; any documents which the ministry may voluntarily or at the demand of the House produce; reports of committees or commissions appointed by the Crown and the government. The blue books of a session often fill fifty or sixty thick folio volumes. Their contents are heterogeneous, and to a great extent cumbersome and valueless. They are not prepared on any uniform system or subjected to general revision or editing. There is an official list of the *personnel* of the U. S. government published annually at Washington, which is entitled "The U. S. Blue Book."

Blue Earth City, capital of Faribault co., Minn. (see map of Minnesota, ref. 11–E, for location of county), is on R. R. and the Mankato or Blue Earth River, 100 miles in a direct line S. S. W. of St. Paul. Pop. in 1885, 1112.

Blue Eye (*Entomiza cyanotis*), sometimes called **Blue-Cheeked Honey-Eater,** a beautiful bird abundant in New South Wales. It is a species of honey-sucker, and feeds on insects and honey, which it obtains chiefly from the blossoms of the *Eucalyptus*. It is gregarious and remarkable for its graceful movements.

Blue′fields, or **Blewfields,** a river of Central America, in the Mosquito Territory, flows eastward, and enters the Caribbean Sea at the town of Bluefields, which has a good harbor, and is in lat. 12° N., lon. 83° W.

Blue′fish (*Temnodon saltator*), an acanthopterygian fish of the family Scomberidæ, is sometimes called "horse mackerel." The upper part of it is of a bluish color. It derives its specific name from a habit of leaping out of the water. It frequents the coasts of the U. S. in spring and summer, is very swift and voracious, and preys on the mackerel and other fishes. The weight of it varies from five to ten pounds. It is a fine fish for the table.

Blue Gowns, or **King's Beadsmen,** a former class of privileged mendicants in Scotland. There was long a custom of appointing beadsmen with a small royal bounty, who ultimately degenerated into a class of authorized mendicants. In theory their duty was to pray for the king. Each of the beadsmen on the king's birthday received a gown of blue, a loaf of bread, a bottle of ale, and a leathern purse containing a penny for every year of the king's life. Every birthday another beadsman was added to the number. A large pewter badge was attached to the breast of the gown, which, besides the name of the bearer, had the inscription, "Pass and Repass." The practice of appointing beadsmen was discontinued in 1833, at which time there were sixty on the roll.

Blue Grass, called also **Green Meadow Grass** and **June Grass** (*Poa pratensis*), a species of grass which is a native both of Europe and America, distinguished from other species of its genus by its flat panicles, smooth culms and sheaths, and short, blunt ligules. Though common in many regions, this grass attains its chief value in that part of Central Kentucky which is called the "blue-grass region," where it is considered to afford the most important crop that can be raised by farmers. It is chiefly cultivated for pasturage, though on certain soils it makes excellent hay. To this grass Kentucky owes her great reputation as a stock-raising State.

Blue Laws, a name applied to certain enactments said to have been made by the legislature of the colony of New Haven, now a part of Connecticut. These laws are said to have interfered seriously with the private life, religious conduct, and even the dress of citizens; but while it is true that not only in New Haven, but in other parts of New England, there was undue interference in these affairs, it is equally certain that many of the "blue laws" of which certain writers have told us never had an existence in any statute-book.

Blue Lead, a name given by miners to galena.

Blue Lick Springs, a village of Nicholas co., Ky., where there are saline mineral springs, the waters of which are sold for medicinal purposes in various of the U. S. The waters closely resemble those of Harrowgate, in England.

Blue Light. See Bengal Light.

Blue Monday is said to have been so named from an ancient custom in some parts of Europe of decorating churches with blue on the Monday before Lent, this particular Monday, and afterwards all Mondays, being considered holidays for men whose business obliged them to work on Sundays. This practice led to riotous excesses still traditionally remembered, and it was generally suppressed by legal enactments; but the blue Monday is still observed to some extent in certain places.

Blue Mountain (Pennsylvania). See Kittatinny.

Blue Mountains, a range in the E. part of New South Wales, and N. of the Australian Alps. It is nearly parallel with the sea-coast, from which it is about 100 miles distant. The highest peaks of this range rise over 4000 feet above the level of the sea. The range long formed a barrier between the settlements on the coast and the interior. In 1815 a road was opened through these mountains to the rich pastures of Bathurst Plains; and now a railroad connects Sidney and Bathurst, crossing the Blue Mountains at an elevation of over 3000 feet.

Blue Nile, or **Blue River.** See Bahr-el-Azrek.

Blue Pill (*Pilula hydrargyri*), or **Blue Mass,** consists of two parts of mercury rubbed with three parts of conserve of roses till globules of mercury can be no longer detected; to this is added powdered liquorice-root, so that a pill of three grains contains one grain of mercury. In cases of recent and mild disorder or torpor of the liver blue pill is much used, either alone or combined with some other drug, such as rhubarb. The dose is from one to three grains twice a day. The doses given by physicians are smaller now than formerly. (See Mercury, Medicinal Uses of.)

Blue Rapids, city, on R. R. and the Big Blue River, Marshall co., Kan. (see map of Kansas, ref. 4–H, for location of county, 95 miles W. of Atchison. It has a developed water-power of 1700 horse-power, large flouring and woollen mills, beds of gypsum and water-lime, and Holly waterworks. Pop. in 1880, 829; in 1885, 851.

Blue Ridge, the range of the Alleghanies which is nearest to the Atlantic Ocean. It extends in a N. E. and S. W. direction through Pennsylvania, Maryland, Virginia, North Carolina, and Georgia. The part of this ridge in Pennsylvania is called the South Mountain. In Virginia it forms the S. E. boundary of the Great Valley, and is remarkable for beautiful scenery. The Peaks of Otter, which are the highest points of this ridge in Virginia, rise about 4000 feet above the level of the sea. From North Carolina southward, the name of Blue Ridge is invariably applied to the watershed which divides the waters flowing into the Atlantic from those of the Gulf of Mexico.

Blue River, Col. See Bunkara River.

Blue River of Indiana rises in Henry county, in the E. part of the State, and flows south-westward. After it has united with several streams it receives the name of Driftwood or East Fork of White River.

Blue Springs, Neb. See Appendix.

Blue Stocking [Fr. *bas bleu*], a term applied to literary ladies, and generally with the imputation of pedantry. It originated in England in Dr. Johnson's time, when there existed blue-stocking clubs, at which literary ladies met to converse with distinguished literati. According to Boswell, they were so called because Mr. Stillingfleet, one of the prominent members, always wore blue hose.

Blue Sulphur Springs is a post-village of Greenbrier co., W. Va., 22 miles W. of the famous White Sulphur Springs. The springs afford a copious supply of valuable saline chalybeate waters, useful in the treatment of many diseases.

Blue Throat, sometimes called **Blue Breast,** or **Blue-Throated Robin** (*Phœnicura Sueçica* or *Sylvia Sueçica*), a beautiful bird of the family Sylviadæ, is common on the continent of Europe as a summer bird of passage, and is supposed to pass the winter in Africa. It resembles a redbreast in form, but is rather larger, and has a brilliant sky-blue plumage on its throat, below which is a black bar. It sings sweetly, and imitates the notes of many other birds. This is one of the birds which the Italians call Beccafico (which see). It is esteemed as a delicacy, and many are caught in Alsace and Lorraine.

Blue Vitriol, the sulphate of copper. (See Copper.)

Blue′wing Duck, or **Bluewing Teal,** a species of duck (*Anas discors*), an abundant game-bird of America. Vast numbers spend the winter in the marshes near the mouths of the Mississippi, to which they congregate both from the North and the East; the summer migrations of the species extend as far N. as the 57th parallel, and it is plentiful on the Saskatchewan in the breeding-season. It breeds also in the marshes of the South, and is common in Jamaica, where it is a permanent resident. No duck is in higher esteem for the table, and it has been suggested that the bluewing is particularly worthy of domestication. In the summer plumage of the male the upper part of the head is black; the other parts of the head are of a deep purplish blue, except a patch of pure white before each eye; the plumage on the upper parts is brown mixed and glossed with green, except that the wings exhibit various shades of blue, the lesser wing-covers being of a rich ultramarine, with an almost metallic lustre; the lower parts are reddish orange spotted with black; the tail feathers are short and pointed. It is a bird of extremely rapid and well-sustained flight.

Bluff, a high bank or cliff presenting a steep or abrupt front towards a river, lake, or sea. The term is often applied to the high banks of the Mississippi and other Western rivers. Between the bluff and the river sometimes occurs a flat tract of considerable width called a bottom. On the Mississippi below Lake Pepin the bluffs of magnesian limestone rise about 350 feet above the river, and present picturesque scenery.

Bluff, Utah. See Appendix.

Bluffton, R. R. junction, capital of Wells co., Ind. (see map of Indiana, ref. 4–G, for location of county), on the Wabash River, has fine church and high-school buildings, planing-mills, corn-planter manufactory (steam), barrel manufactories, foundries and machine-shops, stave and heading factories, flouring-mills, woollen-mills, and a large grain, lumber, and stock trade. Pop. in 1870, 1131; in 1880, 2354.

Bluh'me (Friedrich), a German jurisconsult, born in Hamburg June 29, 1797, died at Bonn Nov. 5, 1874. He studied law at Halle, Göttingen, and Jena, and made in 1821 an extensive tour in Italy, the results of which are found in his essay "Die Ordnung der Fragmente in den Pandektentitlen," in the "Zeitschrift für geschichtliche Rechtswissenschaft," vol. iv., in his edition of Gaius, his "Iter Italicum" (Berlin, 1824–37, 4 vols.), etc. He successively filled the chairs of jurisprudence at Halle, Göttingen, and Bonn, and published "Das Kirchenrecht der Juden und Christen" (Halle, 1826; second edition, 1851), "Grundriss der Pandektenrechts" (Halle, 1829; second edition, 1843), and "Encyclopadie und System der in Deutschland geltende Rechte" (Bonn, 1847–58, 3 vols.), his chief work.

Blum (Robert), a German democrat and popular orator, born of poor parents at Cologne Nov. 10, 1807. He founded the "Schiller-Verein" ("Schiller Society") at Leipsic in 1840, and the German Catholic Church at Leipsic in 1845. In 1848 he was the master-spirit of the Saxon liberals or democrats, and a member of the Frankfort parliament, in which he was the leader of the Left or moderate opposition. Having been sent by this party to Vienna, he joined the insurgents of that city, which was soon captured by the Austrian army. Blum was arrested and shot at Vienna Nov. 9, 1848. (See Eduard Duller, "R. Blums Leben und Tod," 1848; E. Franke, "Leben des R. Blum," 1848.)

Blu'menbach' (Johann Friedrich), M. D., an eminent German naturalist, born at Gotha May 11, 1752. He graduated as M. D. at Göttingen in 1775, and wrote for that occasion a remarkable thesis "On the Varieties of the Human Race." In 1778 he became professor of medicine and anatomy in the University of Göttingen, where he lectured for fifty years. He published a "Manual of Natural History" (1780), often reprinted. He may be said to have first placed natural history on the scientific basis of comparative anatomy. Among his works is a "Manual of Comparative Anatomy" (1805), which was translated into many languages. He advocated the doctrine of the unity of the human species, which he divided into five races—the Caucasian, Mongolian, Malay, American, and Ethiopian. Died Jan. 22, 1840. (See C. F. H. Marx, "Zum Andenken an J. F. Blumenbach," 1840.)

Blumenthal, von (Leonard), born in 1810, educated at the military academies of Culm and Berlin; entered the Prussian army as second lieutenant at seventeen; became first lieutenant in 1846; captain in the general staff in 1849, and in the same year captain in the general staff of the Schleswig-Holstein army; was made colonel in 1860; was distinguished in the war against Denmark; became major-general in 1864, serving with distinction in the war with Austria, and was appointed chief of the general staff of the crown prince at the beginning of the war with France.

Blumhardt (Christian Gottlieb), born at Stuttgart Apr. 29, 1779, died at Basel Dec. 19, 1838. He studied theology at Tübingen, and was appointed secretary of the German Missionary Society in Basel in 1801, pastor of Bürgin 1809, and director of the missionary school in Basel in 1819. Since 1816 he edited the "Missionsmagazin," from 1828 also the "Heidenbote," and published "Versuch einer allgemeinen Missionsgeschichte der Kirche Christi" (1828–37, 5 vols.).

Blun'derbuss [supposed to be a corruption of the Dutch *donderbus*, from *donder*, "thunder," and *bus*, a "tube;" literally, a "thunder-tube"], a short musket or gun with a large calibre or bore, which has sufficient capacity for several bullets. It has a limited range, but is destructive at close quarters, and was formerly used against burglars. In the army it has been superseded by the carbine.

Blunt, Dak. See Appendix.

Blunt (Edmund), an American hydrographer, born at Newburyport, Mass., Nov. 23, 1799, became in 1833 first assistant in the U. S. Coast Survey. Died Sept. 2, 1866.

Blunt (Edmund March), the father of the preceding, was born at Portsmouth, N. H., June 20, 1770. He published, besides other valuable nautical works, "The American Coast Pilot" (1796). Died Jan. 2, 1862.

Blunt (George William), born in Newburyport, Mass., Mar. 11, 1802, educated in New York City. He was the author of various charts, "Atlantic Memoir," "Sheet Anchor," "Harbor Laws of New York," "Plan to Avoid the Centre of Violent Gales," and compiler of the "American Coast Pilot." He was a commissioner of emigration (1852–54), pilot commissioner since 1845, and harbor commissioner since 1867. He was a man of great public spirit in the various positions he held, and was instrumental in correcting many abuses and effecting reforms; and to the interests of New York, as depending upon the preservation of its magnificent harbor and port, he particularly devoted himself. D. Apr. 19, 1878.

Blunt (James G.), M. D., an American general, born at Trenton, Me., July 20, 1826, removed in 1856 to Kansas, and was appointed in 1861 brigadier-general and commander of the department of Kansas. He was made a major-general in 1862. In 1863 he commanded the army of the frontier.

Blunt (John Henry), M. A., D. D., F. S. A., born in 1823 at Chelsea, England, was educated at University College, Durham, filled various curacies in the diocese of Durham, Oxford, Exeter, and Ely, and was appointed rector of Beversham, Gloucestershire, in 1873. He was a very prolific writer, especially of books of an encyclopædic character. Most widely known, perhaps, are "A Dictionary of Doctrinal and Historical Theology" and "A Dictionary of Sects, Heresies, Ecclesiastical Parties, and Schools of Religious Thought," two large volumes published in 1874. Among his other works are "Directorium Pastorale," a volume on the principles and practice of pastoral work in the Church of England; "Household Theology," a handbook of religious information; "The Annotated Book of Common Prayer," an historical, ritual, and theological commentary on the devotional system of the Church of England. D. Apr. 18, 1884.

Blunt (John James), born at Newcastle-under-Lyme, Staffordshire, England, in 1794, died at Cambridge June 17, 1855. He studied at Cambridge, visited Italy and Sicily, was appointed curate of Hadnet, Shropshire, in 1821, rector of Great Oakley, Essex, in 1834, and professor of divinity at Cambridge in 1839, and published "Sketch of the Reformation in England" and "Undesigned Coincidences in the Writings of the Old and New Testament," which latter work has been often reprinted, and has exercised a considerable influence.

Blunt'schli (Johann Kaspar), born at Zurich Mar. 7, 1808, died at Heidelberg Oct. 21, 1881. He studied jurisprudence in his native city, and in Berlin under Savigny, and was appointed professor of law at Zurich in 1833 and at Heidelberg in 1859. He took a very active part in the politics of both Switzerland and Baden, but always as a conservative. His writings are partly historical: "The History of Zürich" (1838, 2 vols.), "The History of Uri, Schwytz, and Unterwald" (1847), etc., partly juridical, "Geschichte des algemeinen Rechts" (1864), "Das moderne Kriegsrecht (1866), "Das moderne Völkerrecht" (1868), "Die Lehre vom Staat" (1875), etc. He presided over the congress of jurists in Dresden in 1861, and enjoyed a great reputation in the juridical world.

Blyth (Samuel), a British naval officer, born in 1784, commanded the brig Boxer in an engagement off Portland, Me., with the U. S. brig Enterprise, Sept. 5, 1813, during which he was killed by a cannon-ball. His remains were interred in Portland with the honors of war by the side of Lieut. Burrows, who commanded the Enterprise, and was also killed.

Bo'a, the name of a genus of large non-venomous serpents, which, devoid of poison-fangs, kill their prey by constriction. They are all natives of the warm parts of America, the similar large serpents of Asia and Africa forming the genus *Python*, though formerly the name was applied without any distinction to both generas. The family Boïdæ (containing the *Pythons*, etc. of the Old World, as well as the true *Boas*, anacondas, etc. of the New) is almost exclusively tropical, and nearly all the species are of great size and strength. It is related by Livy that a serpent 120 feet in length devoured several soldiers and caused alarm to a Roman army in Africa; the skin is said to have been long preserved at Rome. The mouth of the boas is destitute of poison fangs. Captain J. H. Speke killed a serpent in Africa 51½ feet long. Their teeth are long and directed backward, to prevent the escape of the prey, which is first seized by the mouth, and then the serpent, with a rapidity of motion which the eye of the observer fails to follow, coils itself around it; the muscles of the body afterwards compress it, so that in a few minutes life is extinct. Deglutition then takes place, accompanied with a flow of saliva, not only for lubrication, but to hasten the process of digestion. The food is always swallowed entire, and the process seems to require no small effort. The neck is distended to an enormous degree as the prey passes through. After a repast these serpents spend a considerable time in a state of torpidity—several weeks elapsing before they require a new supply—and in this state they are easily killed.

Boa Constrictors attacking a Deer.

The lungs consist of two lobes, one much larger than the other, and at the extremity of the larger is a capacious air-bag, supposed to serve for the aëration of the blood during deglutition. The tail has great prehensile power, and its grasp of a tree round which it may be coiled is aided by the opposing action of two claws, one on each side of the anus, which are the representatives of the hinder limbs of the superior vertebrate animals, and which, on dissection, are found to be connected not only with strong muscles, but with bones entirely concealed within the serpent. The head is thick and somewhat elongated; the eyes small; the tail blunt; the scales numerous and rather small; the colors in many species bright and elegantly disposed. The true boas have the plates under the tail single, while in the pythons they are double. They are of four species. The *Boa constrictor* is far from being one of the largest, seldom attaining a length of more than twelve feet. It is common in parts of South America, where its skin is used for making boots and saddles. Uric acid is prepared in Europe from the excrement of the boa. The name boa constrictor is, however, popularly extended to any very large non-venomous serpent. The only known serpent of the boa family in the U. S. is a small species of *Wenona*, found in the Pacific States. REVISED BY C. W. GREENE.

Boadice'a, written also **Voadica,** a warlike British queen, was the wife of Prasutagus, king of the Iceni, who died about 60 A. D. Soon after this date she and her subjects, exasperated by the rapacity and outrages of the Roman soldiers, took arms against them. The Britons took the Roman colonies of Camalodunum and Londinium (London), and killed about 70,000 Romans. She was defeated in 62 A. D. by Suetonius Paulinus, and then killed herself. (See TACITUS, "Annales.")

Boar, the male of the *Sus scrofa,* or swine. When applied to the wild stock of swine found in various countries, the term is used without particular reference to the sex of the animals. The native country of this species is in the Old World, where the wild stock abounds in parts of Europe, in Asia, and in Africa. The wild boars found in the Southern States (especially in Florida) are descended from the domestic swine, but have reverted quite to the wild type in respect to the form of the body, ears, and tusks, the bristly crest on the back, the black or red color, and the striped young. Most writers make all the domestic breeds of swine descendants of the wild stock. Others think the small native pig of the Pacific Islands is of a separate species; but it is asserted by some that no swine were known on these islands till after they were visited by European ships, which certainly left swine and other domestic animals in many parts of Polynesia. A few writers regard the East Indian boar as of a distinct species. Swine with solid hoofs are known in Poland and Hungary. No true swine are native to America or Australia. Boar-hunting has long been regarded as one of the most exciting sports of the chase. It is practised in Europe, India, and Syria—in some places with toils or nets, in others with dogs, which bring the boar to bay, when he is despatched with a spear or long knife. In India he is hunted on horseback and killed with a boar-spear. It is held unsportsmanlike to shoot the boar. When at bay the wild boar is a very dangerous animal.

Board, a form of lumber; a piece of timber sawed thin; if more than one and a half inches thick, it is called a plank; a table; entertainment or food; the deck of a ship or vessel; a table at which a council or court is held; a body of public men constituting a quorum in session. Board is a general term applied to persons in a collective capacity who have the management of some public office or department, bank, etc.; thus the directors of a bank or railroad are called the board of directors; the British lords of the treasury, the board of treasury. In nautical language, board is a space or portion of sea over which a ship passes in tacking.

To "go aboard" or "on board" is to enter a vessel, to embark in it. The mast is said to "go by the board" when it breaks and falls into the water.

To "board," in naval warfare, signifies to enter a ship by force in order to capture it. The assailants sometimes throw on the enemy's deck combustibles, etc., in order to confuse the crew, and then board the ship armed with boarding-pikes, pistols, and cutlasses. Between two men-of-war, however, this kind of warfare is hardly ever employed; it would be too hazardous an attempt. But it is used by privateers against merchantmen.

Board'man (GEORGE DANA), an American Baptist missionary, born in Livermore, Me., Feb. 1, 1801, graduated at Waterville College (now Colby University) in 1822, and at Andover Theological Seminary in 1825. He sailed for Burmah July 16, 1825, and distinguished himself by his zeal and devotion to the work among the Karens, being, practically, the founder of the Karen mission. Died near Tavoy Feb. 11, 1831.—His son (Rev. GEORGE D. BOARDMAN, D. D., of Philadelphia) is one of the most brilliant and scholarly clergymen of the Baptist denomination. He was born at Tavoy, in British Burmah, Aug. 18, 1828, and graduated at Brown University in 1852.

Boardman (HENRY AUGUSTUS), D. D., an able and eloquent American divine, was born at Troy, N. Y., Jan. 9, 1808. He graduated at Yale College in 1829, taking the highest honors of his class, and afterwards studied theology at Princeton. Since 1833 he has been pastor of the Tenth Presbyterian church in Philadelphia. Chosen in 1853 by the General Assembly to fill the chair of pastoral theology at Princeton, he declined this position. He published "The Scriptural Doctrine of Original Sin" (1839) and "The Bible in the Counting-house" (1853). D. June 15, 1880.

Boardman (RICHARD), one of Wesley's first missionaries to America, born in England in 1738, joined Wesley's conference in 1763, volunteered for America in 1769, preached in New York, and generally through the Middle States, till 1774, when he returned to England, and continued his itinerant ministry till his death at Cork, Ireland, Oct. 4, 1782. He is justly esteemed as one of the chief founders of American Methodism.

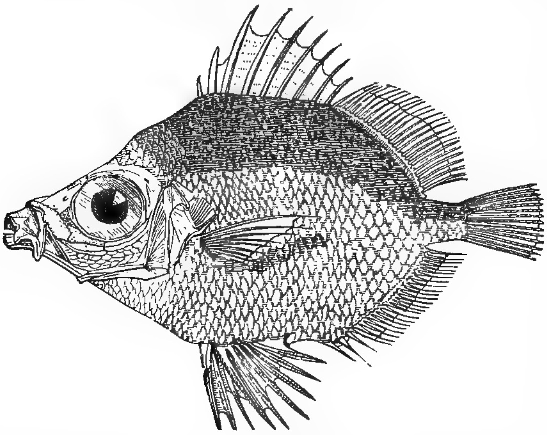
Board of Admiralty, a governmental department which has the management of all the affairs of the British navy. (See ADMIRALTY.) It comprises six lords commissioners, who decide collectively on all important questions. Besides this collective action, each has special duties. There are two civil and four naval lords. The first civil lord (always a cabinet minister), besides a general control has the management of naval estimates, finance, appointments, and promotions. The first naval lord manages the distribution of the fleet, discipline, appointment of inferior officers, commissioning ships, sailing orders, and the naval reserve. The second naval lord attends to armaments, manning the navy, the coast-guard, the marines, marine artillery, dockyard brigades, and naval apprentices. The third naval lord attends to naval architecture, machinery, and new inventions. The fourth naval lord has control over the stores, victualling ships, medical affairs, transports, and pensioners. The junior civil lord attends to accounts, mail-packets, Greenwich Hospital, chaplains, and schools. Under these six lords are two secretaries-in-chief, who manage the office-work. The lords all resign when the prime minister resigns.

Board of Ordnance. See ORDNANCE DEPARTMENT, by GEN. JOHN C. TIDBALL.

Board of Trade, in Great Britain, a permanent committee of the privy council, comprising many of the high functionaries of the government, who have the supervision of marine affairs, railways, joint-stock companies, etc., and who also collect and publish statistics and information of all kinds which have a bearing upon the commerce, revenues, and economic conditions of the nation, the colonies, and foreign countries. The results are published in monthly and annual reports.

In the U. S. and Canada boards of trade are voluntary associations of business-men, which in most large towns are organized to promote the financial and commercial interests of the place, and to consider such questions with regard to railway and water communication, foreign commerce, banking, insurance, exchange, supply and demand, etc. as may from time to time demand their attention.

Boar′fish (*Capros*), a genus of fishes of the dory family, or Zeïdæ, differing from the genus *Zeus* in the still more protractile mouth (the resemblance of which to the snout of a hog is supposed to have given origin to the name), in the want of spines at the base of the dorsal and anal fins, and of long filaments to the dorsal spines. The body has the usual oval, much-compressed form of the family. The common boarfish (*Capros aper*) is a well-known inhabitant of the Mediterranean, rarely caught on the coasts of England. The flesh is little esteemed.


The Boarfish.

Boat [Anglo-Saxon, *bat;* Fr. *bateau;* Ger. *Boot;* Danish, *baad;* Sw. *bat*], a small open vessel moved by oars, sails, or horse-power. The name is also applied to a decked vessel moved by steam and called a steamboat. Boats differ greatly in form and dimensions according to the purposes they are intended to serve, and receive various names, as barge, cutter, gig, pinnace, skiff, gondola, yawl, jolly-boat, wherry, canal-boat, ferry-boat, scow, etc. The principal boats attached to a ship of war are the long-boat, launch, barge, pinnace, cutter, jolly-boat, yawl, and gig. The long-boat has a mast and sails, and is employed to fetch wood, water, and heavy stores from the shore to the ship. The launch is more flat-bottomed than the long-boat, and is adapted for service in shallow waters or for ascending rivers. Large vessels sometimes have steam launches armed with guns, for fighting in shallow waters. The barge is a long, narrow boat used to carry the principal officers to and from the ship. The name is also applied to quite a number of other kinds of craft, large and small. The pinnace has usually eight oars, and is intended for the inferior officers. The cutter is broader, deeper, and shorter than the pinnace, is rowed with six oars, and is chiefly employed in carrying light stores and the crew. The jolly-boat is similar in form to the cutter, but smaller, and has only four oars. The yawl is a small boat used for nearly the same purposes as the cutter and jolly-boat. The gig is a long narrow boat of six or eight oars, and is used to convey the chief officers of the ship on expeditions requiring great speed. It is only the larger ships of war that carry boats of all these varieties. Life-boats are kept at dangerous points upon the coasts, and are carried on board many ships. They are designed to be so built that they cannot be capsized or sunk. They were first patented in 1785, and have been much improved since. (See Lifeboats.)

The coracle, the most ancient form of boat known in the British Islands, still used in Wales, is a large wickerwork basket, covered with skins or some thin waterproof substance, strengthened by a cross-seat. The birch-bark canoe and skin boats of some of the Indian tribes are essentially identical with the coracle. The wherry is stoutly built, and is designed to carry about eight passengers. It is managed by one sculler or two oarsmen, and it is for the conveyance of passengers or pleasure-parties. The boats used for rowing as a sport are of a much lighter and sharper build.

Boat-Bill (*Cancroma cochlearia*), a bird of the order Grallatores and of the heron family. It differs from the heron chiefly in the form of its bill, which is very broad, and somewhat similar in shape to a boat. The mandibles have been compared to the bowls of two spoons placed one upon the other. It is found in the tropical parts of South America, and feeds on fish. In size it is nearly equal to a domestic fowl.

Boat-fly (*Notonecta*), a genus of aquatic insects of the order Hemipetra and sub-order Heteroptera, derives its name from the form of the body, which resembles a boat, and is well adapted to movement in the water. The insects of this genus have a remarkable habit of always swimming on their backs. The *Notonecta glauca*, called water boatman, is common in England, and is about half an inch long. It can fly well, but seldom uses its wings. Many species are found in this country.

Boating. See Regatta.

Boat-Lowering Apparatus is an arrangement of ropes and pulleys for lowering boats from ships quickly and safely. Every passenger-ship is compelled by law to carry a certain number of boats, and every ship of war carries boats for minor services. Many inventors have directed their ingenuity to this subject, with a hope of devising some method of rapidly lowering boats in a storm, without the danger of accident. The apparatus now most approved is Clifford's, in which the lowering and disengaging are effected by one man seated in the boat.

Boat′swain (commonly pronounced by sailors bō′sn), an officer on a ship of war who has charge of the boats, sails, rigging, cables, anchors, and cordage. He must frequently examine the masts, yards, sails, and ropes, and report their condition. It is also his duty to summon the crew to their work, and to assist in the necessary business of the ship and in relieving the watch. In the performance of his duties he is assisted by a boatswain's mate.

Bobadi′lla, de (Francisco), a governor of Hispaniola and knight of Calatrava, sent in 1500 by Ferdinand and Isabella with plenary powers to investigate the affairs of that colony. He immediately put Columbus, who was then governor, in irons, and sent him to Spain. Columbus was, however, well received at court and by the nation, and was sent back on his fourth voyage, arriving there on the day when Bobadilla started to return to Spain, for he had been recalled. Bobadilla's government had been very disorderly and unfortunate, and hardly had he left the port when his ship was lost in a hurricane, and he was drowned June 29, 1502.

Bob′bin, a cylindrical piece of wood, or a wooden roller, flanged at each end, used to hold yarn, which is wound on it, preparatory to warping, in the weaving of cloth. In throstle-spinning bobbins are an essential part of the machinery, as they receive the thread from the rollers. The number of bobbins used in the various branches of business is enormous. In the thread manufacture alone in Great Britain it is stated that 2,000,000 gross are used annually. Thread-bobbins are turned by a self-acting lathe, which turns out one hundred gross in ten hours, a saving of sixteen-fold as compared with hand-turning; the attendant has to feed the machine by dropping blocks into a hopper, from which they pass into the lathe, where they are finished.

Bob′binet (*i. e. bobbin-net*), a sort of lace or net-fabric woven by machinery, and usually made of cotton. It is a fine and elegant textile fabric of a peculiar texture, which consists in the interlacing of a set of long threads, representing the warp in common weaving with a set of cross ones, in such a manner as to form a mesh texture. Bobbinet is made at Nottingham, England, and in France.

Bobcay′geon, a post-village of Verulam township, Victoria co., Ontario, on an island in Sturgeon and Pigeon lakes, 18 miles from Lindsay. The town is divided by a canal which, with its locks, cost $150,000. It has a large trade in lumber, and has daily lines of steamboats, except in winter. Pop. in 1881, 750.

Bobolink′, Bob′link, Reed-bird, or **Rice-bird** (*Dolichonyx oryzivorus*), a beautiful American migratory bird of the order Insessores, passes the winter in the West Indies or in tropical regions. It comes northward early in spring, and arrives in May in the latitude of New York State, in which latitude it breeds. It builds its nest in meadows among the grass, and renders service to farmers by the destruction of insects and worms. In May and June the male is very musical, singing in the air with great volubility and hilarity, and rising and falling as if by a series of jerks. "He chants out," says Wilson, "such a jingling medley of short variable notes, uttered with such seeming confusion and rapidity, that it appears as if half a dozen birds of different kinds were singing all together." The summer plumage of the male is mostly black, variegated with white on the scapularies and tail-coverts, and yellow, which it exchanges in July or August for a plumage like that of the female. This is marked with several shades of brown or dull yellow. Its length is seven or eight inches. About the end of June the birds cease to sing, become gregarious, and move in large flocks to the Middle States. They are called reed-birds in Pennsylvania, where many of them are shot for the table in autumn. In the latter part of autumn immense flocks of them attack the rice-crops of South Carolina, where they receive the name of rice-bird, rice bunting, or rice troopial. Many of them are kept in cages for their song, but they do not sing in autumn or winter.

REDMAN-KENNY.

The Bobolink.

Bobrinez′, a town of Russia, in the government of Cherson, 135 miles N. E. of Odessa. Pop. 7137.

Bobruisk′, a town of Russia, on the Berezina, in the government of Minsk, and 92 miles S. E. of Minsk, was formerly fortified. It is connected by steamboat with the towns on the river. Pop. 26,872.

Bo′ca Ti′gris (Chinese, *Hu-mên* or *Fumên*, *i. e.* "mouth of the tiger"), the entrance of the Canton River into the Outer Waters, or Lintin Bay. It is bounded on the E. by the islands of Anunghoi and Chuenpee, and on the W. by the island of Ty-cock-tow. A number of forts and batteries called "Bogue forts," which guard the entrance to the river, were stormed by the British in 1841 and 1857.

Bocca′ccio (GIOVANNI), or **Boccaccio di Certaldo,** a celebrated Italian novelist and poet, born in Paris or Florence in 1313, was the son of a Florentine merchant and a French woman. He collected many books, and copied rare ancient manuscripts which he was not able to purchase, and was one of the most learned men of that age. At Naples he fell in love, about 1342, with a natural daughter of King Robert of Naples, and to please her he wrote poems entitled "Il Filostrato," "L'Amorosa Visione," and others. He became about 1350 an intimate friend of Petrarch, and returned to Florence, the government of which employed him in several diplomatic missions. His principal work is the "Decamerone, or Hundred Tales" (1353), in prose. These tales have extraordinary literary merit, and are esteemed models of style, but some of them are extremely obscene. From the "Decamerone" Shakspeare derived the subjects of several of his dramas. In 1373, Boccaccio was appointed to lecture at Florence on Dante's "Divina Commedia." He wrote a "Life of Dante." He died Dec. 21, 1375. "There is," says Hazlitt, in Boccaccio's serious pieces, "a truth, a pathos, and an exquisite refinement of sentiment which is hardly to be met with in any other prose-writer whatever." (*Characters of Shakspeare's Plays.*) (See BALDELLI, "Vita de Giovanni Boccaccio," 1806; MAZZUCHELLI, "Scrittori d'Italia;" LONGFELLOW, "Poets and Poetry of Europe.")

Bochart (SAMUEL), a learned French Protestant Orientalist and theologian, born at Rouen May 30, 1599, studied Arabic, Chaldee, and Syriac under Erpenius at Leyden, and excelled in philology. He became in 1625 pastor of the Protestant church at Caen, where he remained forty-two years, and gained a high reputation as a preacher and writer. His most important works are a "Sacred Geography," in Latin (1646), and "Hierozoicon," or an account of the animals mentioned in the Bible (1663). Died at Caen May 11, 1667. His Geographia Sacra displays great learning and sagacity. (See MORIN, "De Vita et Scriptis S. Bocharti," 1692; EDWARD H. SMITH, "S. Bochart: Recherches sur la Vie de cet Auteur illustre," 1833.)

Boch′nia, a town of Austria, in Galicia, 23 miles by rail E. S. E. of Cracow. It has several churches. Here are mines of salt which yield about 15,000 tons annually. Pop. in 1880, 8561.

Boch′old, or **Bocholt,** a town of Prussia, in Westphalia, on the Aa, 42 miles W. S. W. of Münster. It has a castle, and manufactures of silk fabrics, hosiery, and cotton stuffs. Pop. in 1880, 8534.

Boch′um, a Prussian town in Westphalia, 31 miles by rail N. E. of Düsseldorf, has manufactures of woollens, paper-hangings, hardware, iron, and tobacco, and important mines of coal. Pop. in 1880, 33,440.

Bock (KARL ERNST), a German pathologist and anatomist, born Feb. 21, 1809, became professor of pathological anatomy in Leipsic in 1839. His "Buch vom Gesunden und Kranken Menschen" (9th ed. 1872) has had a wide circulation.

Bock′enheim′, a town in Prussia, in the province of Hesse-Nassau, 3 miles N. W. of Frankfort-on-the-Main. It has manufactures of iron-ware, jewelry, and pianos, and a large cattle-market. Pop. in 1880, 15,369.

Böckh, or **Boeckh** (AUGUST), an eminent German philologist and classical antiquary, born at Carlsruhe Nov. 24, 1785. He was educated at Halle, became in 1809 professor in the University of Heidelberg, and obtained in 1810 the chair of eloquence and ancient (or Greek) literature in the University of Berlin, where he taught for forty years or more. His lectures comprised archæology and the history of ancient literature, philosophy, politics, etc. Among his greatest works, which have formed an era in archæology and philology, are "The Political Economy of the Athenians" (2 vols., 1817), which Sir George Cornewall Lewis translated into English, "Investigations concerning the Weights, Coins, and Measures of Antiquity" (Berlin, 1830), and "Records of the Maritime Affairs of Attica" (1840). He commenced in 1824 the great work called "Corpus Inscriptionum Græcarum" (4th vol., 1867), which he destined to comprise all existing Greek inscriptions, whether printed or not. Died Aug. 3, 1867.

Böck′lin (ARNOLD), a German landscape painter, born in Bâle in 1827, studied under Schirmer at Düsseldorf, and became professor in the art-school of Weimar in 1860. His works are remarkable for brilliancy and harmony of color.

Bo′denstedt′ (FRIEDRICH MARTIN), a German poet and journalist, born at Hanover April 22, 1819. He translated into German the works of several Russian poets, published "The Nations of the Caucasus" (1848; 2d ed., 2 vols., 1855), and became professor of the Slavic languages at Munich about 1854. Among his works is a "Thousand and One Days in the Orient" (2 vols. 1854; 4th ed. 1864).

Bode's Law is the name given by astronomers to an empirical formula which seems to mark the relative distances of the planets. The law, however, was not discovered by Bode, having been put forward before his time by Kepler, and by Titius in 1772.

The law may be thus exhibited: Under the names of the several planets in the order of their distance set the number 4. Then below this row of fours write in order the numbers 0, 3, 6, 12, 24, 48, and so on, the 0 falling under Mercury, the 3 under Venus, and so on. Adding the several columns thus obtained, we have the following result:

Mercury.	Venus.	Earth.	Mars.	Asteroids.	Jupiter.	Saturn.	Uranus.	Neptune.
4	4	4	4	4	4	4	4	4
0	[illegible]	6	12	24	48	96	192	384
4	7	10	16	28	52	100	196	388

The numbers thus obtained correspond closely with the relative distances of the planets, except only in the case of Neptune. The real distances, calling the earth's distance 10, are as follows:

Mercury.	Venus.	Earth.	Mars.	Asteroids.	Jupiter.	Saturn.	Uranus.	Neptune.
3.9	7.2	10	15	27.5	[illegible]	95	192	300

It will be seen that the distance of Neptune falls far short of that which Bode's law would assign to a trans-Uranian planet. This empirical law has rendered important services to astronomy.

Similar relations have been detected among the distances of the satellites of Jupiter and Saturn. In the case of Jupiter's system, the constant number is 7, the number multiplied is 4, and the constant multiplier 2½. In the case of Saturn's system, the constant number is 4, the number multiplied is 1, and the constant multiplier 2.

It seems difficult to believe that a law so well marked, and fulfilled so closely in so many instances, is not in reality the result of physical relations of some sort, though it is by no means easy to see what those relations may be.

Bodie, Mono co., Cal. (see map of California, ref. 4–C, for location of county). Here are the noted "Bodie" and "Standard" gold-mines. Pop. in 1880, 2712.

Bodin (Jean), an eminent French political writer, born at Angers in 1530. He published in 1576 a treatise on government entitled "De la République," and in 1586 a Latin version of the same. He advocated a limited monarchy as the best form of government. In the latter part of his life he was an adherent of Henry IV. Died in 1596. His "Heptaplomeres de abditis rerum sublimium arcanis" is considered one of the most interesting books of that age.

Bodle'ian Library, the principal library of Oxford University, restored by Sir Thomas Bodley in 1597, the original library having been destroyed before 1556. Bodley's first presentation was a collection of books, purchased on the Continent for £10,000. Through his influence and example the library was enriched by numerous contributions. Among the earliest benefactors of the Bodleian library, which was opened in 1602 with a collection of about 3000 volumes, were the earl of Pembroke, who presented 250 volumes of valuable Greek manuscripts; Sir Kenelm Digby; and Archbishop Laud, who made a gift of 1300 manuscripts in more than twenty different languages. Upwards of 8000 volumes of the library of Selden went to the Bodleian. Gen. Fairfax presented to it many manuscripts, among which was Dodworth's collection of 160 volumes on English history. During the present century important bequests have been the collections of Richard Gough (1812) on British topography and Saxon and Northern literature; of Edmund Malone (1812); also £40,000 by the Rev. Robert Mason, the interest to be expended on books. The library of Francis Douce was added in 1834. In 1882 it contained 400,000 volumes and 30,000 MSS.

Bod'ley (Sir Thomas), an English diplomatist, born at Exeter Mar. 2, 1544, graduated at Oxford in 1566. He was sent by Queen Elizabeth on diplomatic missions to France, Denmark, and Holland. He expended much money in collecting rare and valuable books, and endowed the great public library of Oxford, called the Bodleian Library (which see). Died Jan. 28, 1612.

Bod'mer (Johann Jakob), a Swiss critic and poet, born near Zurich July 19, 1688. He founded in 1721 a literary journal called "Discurse der Maler," which promoted a reform in German literature, and waged a literary war against Gottsched. Among his numerous works (which lack originality) is the "Noachide" (1752). He was professor of history at Zurich for fifty years. He translated "Paradise Lost" into German. Died Jan. 2, 1783. (See J. J. Hottinger, "Acroama de J. J. Bodmero.")

Bod'min, a town in England, one of the capitals of Cornwall, 26 miles W. N. W. of Plymouth, consists chiefly of one long street in a valley between two hills. It was once an important place. It now contains a court-house, a jail, an ancient priory, and a grammar-school founded by Queen Elizabeth. It is now one of the stannary towns of Cornwall. Pop. in 1881, 5061.

Body Color, a term which, in oil-painting, is applied to the opaque coloring produced by certain modes of combining pigments. When, in water-color painting, colors are laid on thickly, and mixed with white to render them opaque, instead of in tints and washes, the work is said to be executed in body color.

Body's Island, the long, low, sandy strip of land between Roanoke and Albemarle Sounds and the Atlantic Ocean, N. of Oregon Inlet. Body's Island lighthouse, 2 miles N. of Oregon Inlet (lat. 35° 48′ 47″ N., lon. 75° 33′ 20″ W.), is a brick tower with a granite foundation and an iron top, 150 feet high, showing a first-order dioptric white fixed light, 156 feet above the sea. The island is here 2 miles wide, and is in Dare co., N. C.

Boece, or **Boyce** (Hector), a Scottish historian, born at Dundee about 1465. He studied and graduated at the University of Paris, where he became in 1497 professor of philosophy. He was a friend of Erasmus. His chief work is a "History of Scotland" (in Latin, 1526), which is highly esteemed. Died about 1536.

Bœhme'ria [from G. R. Böhmer, a German savant], a genus of plants of the order Urticaceæ, was formerly included in the genus *Urtica* (nettle). The fibres of several species of this genus are used to make ropes, twine, nets, and cloth. The beautiful fabric called China grass-cloth is made of the fibres of *Bœhmeria nivea*, a perennial herbaceous plant, with broad ovate leaves, without stings, cultivated by the Chinese, who call it *tchoo-ma.* It can be propagated by seeds, and it thrives best in shade and moisture. It grows naturally in China, Sumatra, Burmah, and other parts of the East Indies. The Malays call it *ramie.* The cultivation of ramie has been tried in some of the Southern U. S., with decided success. Nepaul produces an important species, *Bœhmeria frutescens*, which grows from six to eight feet high, the fibre of which is said to be equal to flax. The natives call it pooee, yenki, or kienki. This fibre also makes excellent paper, and will probably become an important commercial product. (See Ramie.) The U. S. have one native species.

Bœo'tia [Gr. Βοιωτία], a country or state of ancient Greece, was bounded on the N. by Locris, on the N. E. and E. by the Eubœan Channel, on the S. by Attica and Megaris, on the S. W. by the Corinthian Gulf, and on the W. by Phocis. Area, estimated at 1100 square miles. It may be described as a hollow basin, enclosed on the N. by Mount Parnassus and the Opuntian Mountains, on the E. by a continuation of the Opuntian range, on the S. by Mount Cithæron and Mount Parnes, and on the W. by Mount Helicon. The surface is diversified by other mountains and several valleys and plains. It contained a large lake named Copais (now Topolias), which had no outlet except subterranean channels in the limestone mountains. These channels, now called *Katabothra*, were not sufficient to carry off the water of the lake, which sometimes inundated the surrounding plain. To obviate this evil the ancient Bœotians constructed two tunnels through the rock. One of these tunnels was nearly four miles long, with twenty vertical shafts let down into it. These two great works are perhaps the most remarkable monuments of what is called the heroic age. The largest rivers of Bœotia were the Asopus and the Cephissus, the latter of which rises in Phocis and enters Lake Copais. The Asopus flowed eastward through the southern part, and entered the Euripus. Instead of the pure and transparent air of Attica, the air of Bœotia is rendered damp and heavy by vapors rising from lakes and marshes. The winters were very severe, and the snow sometimes lay on the mountains for many days. The soil, which is mostly a rich mould, was very fertile, and produced in ancient times, as well as in the present, abundant crops of grain. The plain of the Copais is especially remarkable for its fertility. Bœotia was famous for meadow and pasture-land, on which were raised the excellent horses of the Bœotian cavalry. The grape and other fruits flourished in this region. Among the other productions was the auletic or flute reed, which grew in the marshes of Lake Copais, and had an important influence on the development of Greek music.

The most remarkable tribes that inhabited Bœotia in the heroic age were the Minyæ, who lived at Orchomenus, and the Cadmeans or Cadmeones, who lived at Thebes. At the commencement of the historical period, the Minyans and other tribes had nearly disappeared, and the country was occupied by the Bœotians, who are supposed to have come from Thessaly. The principal cities formed a confederacy under the presidency of Thebes. Orchomenus was the second city in importance. Among the other towns were Coroncia, Haliartus, Thespiæ, Tanagra, Platæa, and Anthedon. The Bœotians were regarded as a dull, unintellectual people, and less refined and polished than most of the Hellenic tribes. Their natural dulness was ascribed to the dampness and ungenial quality of their climate. According to Cornelius Nepos, they paid more attention to the development of their physical powers than the cultivation of their minds. Yet this state produced a few great men—Epaminondas, Hesiod, Pindar, and Plutarch. (See FORCHHAMMER, "Hellenika," 1837; LEAKE, "Travels in Northern Greece," 1835; KLUTZ, "De Fœdere Bœotico," 1821; MURE, "Travels in Greece.") WILLIAM JACOBS.

Boer'haave (HERMAN), PH. D., M. D., F. R. S., a Dutch physician of great eminence, was born at Voorhout, near Leyden, Dec. 31, 1668. He studied the ancient languages and history at Leyden, where he took the degree of doctor of philosophy in 1689. He began the study of medicine in 1690, and graduated as M. D. at Harderwick in 1693, after which he practised at Leyden. In 1701 he was appointed lecturer on the theory of medicine in the University of Leyden, and adopted the method of Hippocrates. He afterwards deviated from that method, and substituted mechanical and chemical hypotheses to explain diseases. He published in 1708 an excellent systematic work called "Medical Institutes" ("Institutiones Medicæ in Usus annuæ Exercitationis Domesticos"). He became in 1709 professor of medicine and botany at Leyden, where he acquired great popularity as a teacher. Among his important works are "Aphorisms on the Diagnosis and Cure of Diseases" ("Aphorismi de Cognoscendis et Curandis Morbis," 1709), which is a model for style and other merits, and "Elements of Chemistry" (1724), which some persons consider his capital work. His reputation extended to every part of Christendom, and patients came to consult him from every country of Europe. He received, it is said, a letter from a Chinese mandarin, addressed "To Boerhaave, physician in Europe." He died Sept. 23, 1738.

Boer'ne, capital of Kendall co., Tex. (see map of Texas, ref. 5-G, for location of county). It is situated on the Upper Cibolo, in a rich and picturesque valley. It was founded by Germans in 1851, and was named in honor of the German writer Louis Börne. Pop. in 1880, 346.

Boers are the farmers in South Africa of Dutch descent. After the annexation of Cape Colony by Great Britain, troubles arose between the government and the boers, and in 1836 many of them left the colony and founded the Orange River Free State and the Transvaal Republic. In 1858 they gave themselves a constitution, and after a time the commonwealth was recognized. But in 1877 the Cape government, fearing an outbreak which might lead to a general rising of the natives, took possession of and annexed the territory. In Dec., 1880, the Boers took up arms, and were successful in their encounter with small bodies of British troops. More soldiers were poured into the colony, and the rising would, of course, in time have been quelled; but after a truce the government determined to give up the country to the boers, subject to certain regulations recognizing the suzerainty of the British crown (Oct., 1881), and furnishing ample opportunity for the government to interfere when it wants to.

Boëthius (ANICIUS MANLIUS SEVERINUS), an eminent Roman philosopher and statesman, was born in 470 A. D. He was liberally educated, became a good Greek scholar, was chosen consul in 510, and gained the confidence of Theodoric, king of the Goths, who reigned at Rome, and appointed Boethius *magister officiorum* in his court. His political influence was exerted for the benefit of the country, but his probity and virtues provoked the enmity of powerful courtiers whose corrupt or oppressive conduct he had opposed. He was accused of treasonable designs, was confined in prison, and finally executed by order of Theodoric in 524 A. D. Whether he was a Christian or not is a matter of uncertainty. He was considered such in the Middle Ages, and the Bollandists gave him the position of a saint. Several theological tracts are attributed to him, and were included in the Leyden edition (1671) of his "Consolation of Philosophy." But there is a predominance of argument in favor of the opinion that he was not, in any proper sense, a Christian, and that the tract on the Trinity was from another hand, probably from a monk of the same name. Boethius holds a place in the history of scholastic philosophy from the fact that a passage from his commentary on the "Isagoge" of Porphyry gave rise to the long-continued discussions between the Realists and the Nominalists. While he was in prison he wrote, partly in verse, "De Consolatione Philosophiæ" ("On the Consolation of Philosophy"), which is his greatest work, and was very popular in the Middle Ages. It was translated into Anglo-Saxon by Alfred the Great. It contains no allusions to Christianity—a fact which can hardly be reconciled with the hypothesis of his being a Christian, considering the circumstances under which it was written. (See BARBERINI, "Exposizione della Vita de Boezio," 1783; DOM GERVAISE, "Histoire de Boëce," 1715; HEYNE, "Censura Ingenii Boethii," 1806; "Life of Boethius," prefixed to Ridpath's translation of the "De Consolatione Philosophiæ," 1785.) M. B. ANDERSON.

Boethius (HECTOR). See BOECE.

Bœuf, Bayou, bī'oo bĕf, a river or creek of Arkansas and Louisiana, is fed by water which it receives from the Mississippi River during inundations. It extends from Chicot co., Ark., south-westward into Louisiana, and unites with the Washita River at the S. extremity of Franklin parish. Steamboats can ascend it 100 miles or more during high water.

Bog [Gaelic, *bog*, "soft," "moist"], a swamp or tract of wet land, covered in many cases with PEAT (which see). Bogs, called mosses in Scotland and swamps in America, often contain the well-preserved trunks of trees, especially of the oak in Ireland and of the cypress in America. In many cases these tracts are higher than the surrounding country, and may thus be easily drained, when they often become very fertile land. (See DRAINAGE.)

Bogar'dus (EVERARD), second minister of New York (then New Amsterdam), came to America in 1633, and obtained by marriage a farm (the "Dominie's Bouwerie") of 62 acres, now owned by the Trinity church corporation. Having much trouble with the magistrates and people, he resigned in 1647 and sailed for Holland, but was wrecked on the English coast, and with Governor Kieft and many others was drowned Sept. 27, 1647.

Bogardus (JAMES) was born at Cattskill, N. Y., Mar. 14, 1800. In 1814 he was apprenticed to a watchmaker. He made important improvements in cotton-spinning in 1828, invented a gas-meter (1832), a machine for engraving (1836), a pyrometer, and many other mechanical improvements. In 1847 he built in New York the first iron building in the U. S. Died April 13, 1874.

Bog Butter, a substance which is found in peaty earth in some of the bogs of Ireland. In composition and qualities it exhibits the general properties of a fat, and melts at 124° F. It is probably fossil butter.

Bo'genhau'sen, a village of Bavaria, on the Iser, 2 miles N. E. of Munich. Here is the royal observatory of Munich, which was erected in 1817, and is one of the best in Europe; lat. 48° 8′ 54″ N., lon. 11° 36′ 22″ E.

Boggs (CHARLES STUART), U. S. N., born Jan. 28, 1811, in New Brunswick, N. J., entered the navy as a midshipman Nov. 1, 1826, became a passed midshipman in 1832, a lieutenant in 1837, a commander in 1855, a captain in 1862, a commodore in 1866, a rear-admiral in 1870, and retired from active service in 1873. He commanded the Varuna at the passage of Forts St. Philip and Jackson and capture of New Orleans. Admiral Farragut, in his official report of the affair, says: "We were now fairly past the forts, and the victory was ours, but still, here and there, a gunboat making resistance. Two of them had attacked the Varuna, which vessel, by her greater speed, was much in advance of us: they ran into her and caused her to sink, but not before she had destroyed her adversaries; and their wrecks now lie side by side, a monument to the gallantry of Captain Boggs, his officers, and crew." FOXHALL A. PARKER.

Bog'head Coal, a highly bituminous variety of the cannel coal of Scotland, from Boghead, in Linlithgowshire. The varieties of cannel pass into shale by insensible gradations, so that it is impossible to draw a line which shall properly limit the use of the term coal. The boghead is one of these substances, more valuable for gas-making, and for the oils and paraffine obtained from it by distillation, than for fuel. Dr. Fife found a picked specimen to yield on analysis 70 per cent. of volatile matter and 30 per cent. of ash.

Bog-iron Ore, a mineral of variable composition, in which the peroxide of iron often amounts to 60 per cent., the water to 20, phosphoric acid from 2 to 11 per cent., while silicic acid, clay, and other substances make up the rest. Bog-iron ore occurs in alluvial soils, in bogs, lakes, etc. It is of a yellowish or blackish-brown color. Some varieties are earthy and friable; some are in masses of an earthy character, and some compact, with conchoidal fracture. It is abundant in the northern countries of Europe generally; also in various parts of the U. S. When smelted it yields rather inferior iron, which, however, in Germany is largely used for wrought iron. From the large percentage of phosphorus present, bog iron is highly prized for fine castings, since it makes an excellent surface with clean lines and edges. The ore is easily and extensively wrought.

It is stated with confidence that bog ore consists chiefly of the frustules of diatomaceous plants, many of which incorporate into their frustules a large percentage of iron. *Gaillonella ferruginea* is one of the most important of these minute iron-making plants. It is well known that in some places bog ore will again fill up the cavities in the earth from which it has been removed.

Bog'lipoor, or **Bhag'ulpore,** a city of India, in Bengal, is on the right bank of the Ganges, here several miles wide in the rainy season. It is about 265 miles by rail N. W. of Calcutta. It has several mosques, and an English seminary; also manufactures of coarse silk fabrics. Here are two curious round towers, the origin of which is unknown. Pop., 1881, 68,238.

Bogoduchou, a town of Russia, in the government of Kharkov, on the right bank of the Merla, 30 miles N. E. of Kharkov. Pop. 15,479.

Bog'omiles [a name said to be derived from their prayer in a Slavic language, "*Bog milui*," "Lord, have mercy"], a sect of the Eastern Church in the twelfth century. They were founded by Basil, a physician, who is said to have taught an impure Gnosticism, to have rejected all rites, even baptism, and to have proposed to abolish marriage. Basil was burned alive in 1119, but the sect was in existence a century later. (See NEANDER, "Christian History," iv. 552.)

Bo'gos, a negro tribe inhabiting the highlands N. of Abyssinia, which have only recently become known by the explorations of Werner, Munzinger, and Th. Heuglin. The flora and the fauna of the country of the Bogos are exceedingly rich. Mighty sycamores and tamarind trees, and lions, elephants, buffaloes, and antelopes, as well as the rhinoceros and many varieties of beasts of prey, are found here. The total population is estimated by Munzinger at 10,000 persons, of whom only one-third are true Bogos, who speak the Belen language. The rest are tribes subject to them, who speak the Tigre. The Bogos are well formed, and profess Christianity, but have very little religious knowledge. For several years they have paid a small annual tribute to Abyssinia. In recent times the Bogos suffer much from the invasions of the inhabitants of Barla.

Bogota' (formerly SANTA FÉ DE BOGOTÁ), a city of South America, capital of the republic of Colombia, is pleasantly situated on the San Francisco River, which here joins the Rio de Bogotá, and at the foot of two high mountains. It is on an extensive plateau which is about 8800 feet above the level of the sea, and enjoys a mild and genial climate like a perpetual autumn. Lat. 4° 35′ 48″ N., lon. 74° 13′ 45″ W. The adjacent table-land is very fertile, and is enclosed on several sides by high peaks of the Andes. Bogotá is well built, but as it is subject to earthquakes, the houses are generally only two stories high. No vehicles are used in the streets, which are all narrow. It is the seat of an archbishop, and contains a cathedral and numerous churches, a palace of the president, a university, a national academy, a public library, and a theatre. It has several public squares adorned with fountains, and some very good institutions for higher education. Mines of coal, salt, and precious stones occur in the vicinity. A few miles below the city is the great Cataract of Tequendama, where the Bogotá River has a perpendicular fall of 650 feet. Bogotá was founded in 1537. It has several times suffered considerably from earthquakes. Pop. 40,883.

Bogue (DAVID), D. D., a Scottish preacher, called the founder of the London Missionary Society, was born in Berwickshire Mar. 1, 1750. He preached at Gosport to an Independent church, was the first editor of the "Evangelical Magazine," and wrote an "Essay on the Divine Authority of the New Testament." He was author, in conjunction with James Bennett, of a "History of Dissenters" (3 vols. 8vo, 1689, 1808). He and others founded the London Missionary Society in 1795. Died Oct. 25, 1825.

Bo'gus, an American word signifying "spurious," "fraudulent," was originally applied to counterfeit coin, said by Bartlett to be a corruption of *Borghese*, a noted Western counterfeiter.

Bo'guslaw, a town of Russia, government of Kief, on the river Rossa, 70 miles S. S. E. of Kief, has some manufactures of soap and leather. Pop. 8923.

Bohain, a town of France, in the department of Aisne, 16 miles N. N. E. of St.-Quentin. It manufactures clocks *à carillon*, shawls, and gauzes. Pop. in 1881, 6684.

Bohe'mia [Lat. *Bohemia;* Ger. *Böhmen* and *Böheim*], a former kingdom of Europe, now a part of the Austro-Hungarian monarchy. It is bounded on the N. by Saxony and Prussian Silesia, on the E. by Moravia and Prussia, on the S. by Lower Austria, and on the W. by Bavaria. It is between lat. 48° 33′ and 51° 3′ N., and between lon. 12° and 16° 46′ E. Its area is 20,060 square miles. It is enclosed on all sides by four chains of mountains, which constitute its natural boundaries—namely, the Erzgebirge ("Ore Mountains"), which separate it from Saxony on the N. and N. W.; the Riesengebirge ("Giant Mountains"), which extend along the N. E. frontier; the Moravian Mountains, which separate it from Moravia on the S. E.; and the Böhmerwald ("Bohemian Forest"), which extends along the S. W. border. The Schneekoppe, which is the highest peak of the Riesengebirge, rises 5275 feet above the level of the sea. The surface of Bohemia is mostly undulating, and belongs to the basin of the Elbe, which rises in the N. E. part. The other principal rivers are the Moldau, which rises in the Böhmerwald, flows northward, and enters the Elbe; and the Eger, which flows through the N. W. part into the Elbe. The Moldau and Elbe are navigable for steamboats. The climate is healthy, and mild in the valleys or lowlands. The mean annual temperature at Prague is 49° F. The soil is generally fertile. The staple productions are rye, oats, barley, flax, and wheat. The grapevine is also extensively cultivated. Nearly one-third of the country is covered with forests. Large numbers of cattle and sheep are raised in some parts of the country. Bohemia is rich in minerals, which are found chiefly in the mountains. Among its mineral resources are copper, tin, iron, lead, cobalt, silver, nickel, zinc, arsenic, sulphur, coal, cinnabar, alum, and precious stones. Here are also quarries of marble, granite, and sandstone. Famous mineral springs occur at Marienbad, Carlsbad, and Töplitz. The manufactures of Bohemia are very important and varied, the principal products being linens, cotton goods, woollens, glass, and paper. The manufacture of damask, cambric, lawn, and other linen goods employs about 400,000 flax-spinners and 50,000 weavers. Over 500,000 spindles are employed in the production of cotton yarn. Beet-sugar is extensively manufactured. The number of paper-mills is over 120. Bohemia has long been celebrated for its glass-works, which employ about 30,000 persons. A considerable quantity of iron is manufactured here. Railways extend from Prague in several directions, connecting it with Dresden, the cities of Bavaria, and those of Moravia. The chief towns are Prague, Pilsen, and Budweis. Bohemia has one university (Prague), twenty-three gymnasia, as well as numerous realschulen and other institutions of learning. A large majority of the inhabitants belong to the Roman Catholic Church, that being the established religion, but other churches are tolerated. The number of Protestants in Bohemia in 1880 was 120,120. Pop. in 1880, 5,560,819, of whom 3,470,252 were Czechs, 2,054,174 Germans, 94,449 Israelites, while the remainder belonged to different nationalities.

Bohemia derives its name from the *Boii*, a Celtic people who settled here before the Christian era, and were expelled by the Marcomanni in the time of the Roman emperor Augustus. It was conquered by the Cechi (or Czechs), a Slavic race, who first established themselves in Bohemia in the second half of the sixth century, and in 630 A. D. made themselves independent. For several centuries the family of the Przemyslides ruled with varying success until in 1310 the kings of the House of Luxemburg ascended the throne, and ruled until 1437. John Huss effected a religious reformation in this country (1400–14), and was burned by the Catholics. The consequence was the sixteen years' war of the Hussites. In 1526, Bohemia was annexed to the dominions of Ferdinand I. of Austria. The majority of the Bohemians in the sixteenth century were Protestants, who, for the assertion of their religious liberty, revolted against the emperor of Austria, and in 1619 elected as their king Frederick, the elector palatine. He was defeated near Prague in 1620 by the Austrians, who then commenced a cruel persecution of the Protestants, and almost exterminated them. The population was reduced in twenty years (1617–37) from 3,000,000 to 780,000. In recent times the country has been agitated by a strong political antagonism between the Czechs and the Germans, the former demanding the re-establishment of a kingdom embracing Bohemia and Moravia, and enjoying the same autonomy in point of administration which has been conceded to Hungary. (See AUSTRIA-HUNGARY.) A. J. SCHEM.

Bohe'mian Breth'ren, the former name of a sect of Christian reformers, who may be regarded as the remnant of the HUSSITES (which see). After the division of the Bohemian reformers into Calixtines and Taborites, the Council of Bâle (1432) granted the new sects the use of the wine in the communion. This offer drew many of the Calixtines into the Roman Catholic Church, where they were called Utraquists, from the use of both (*utraque*) elements in the Eucharist. But the Taborites, remodelling and still further reforming their creed, which was published in 1504, took the name of Bohemian Brethren. Persecutions raged against them for 150 years, and the vast majority were killed or driven away from Bohemia. In 1567 they recovered freedom of conscience, but numbers of them having removed to Moravia, they took the name of MORAVIAN BRETHREN (which see). The Bohemian Brethren are looked upon by most Protestants as deserving high regard on account of their purity, faithfulness, and the judicious moderation of their doctrines. (See Von Zezschwitz, "Die Katechismen der Waldenser und Böhmischen Brüder," 1863; Pescheck, "Reformation in Bohemia," 1846; Gindely, "Geschichte der Böhmischen Brüder," 1868.)

Bohe'mian For'est, or **Böh'merwald,** a chain of mountains in Germany, which forms the boundary between Bohemia and Bavaria, and separates the basin of the Danube from that of the Elbe. It extends in a S. E. and N. W. direction, and is about 130 miles long. The rocks of which it is formed are granite and gneiss. The highest summits of this chain are the Aber, 4848 feet, and the Rachelberg, 4743 feet, above the level of the sea. A large portion of these mountains is covered with dense forests. A railway extending from Bavaria to Prague crosses this range through the valley of the Cham.

Bohe'mian Lan'guage, a name commonly applied to one of the principal dialects of the Slavic family of languages. It is sometimes called the *Cechic* (from *Cechi*,* the native name of the people who speak it); it is regarded not only as the harshest (most abounding in consonants), but also as the richest and most expressive, of all the Slavic dialects. The Cechic vowels, *a*, *e*, *i*, *o*, *u*, are essentially the same as those of the Italian language; *y* resembles in sound our *i*, but is somewhat more obscure; *ê*, though written with one letter, is a diphthong pronounced *ya*. The consonants, *b*, *d*, *f*, *k*, *l*, *m*, *n*, *p*, *t*, *v*, and *z*, are pronounced as in English; *c* (as in Polish) has the same sound as our *ts*, even before a hard vowel: thus *ca* is pronounced *tsa*; *g* (like the Swedish *g*) has before the soft vowels *e*, *i*, and *y* the sound of our *y* consonant; *j* is like *i* or our *y* consonant; *w* sounds like our *v*; *s* is always sharp, as in *this*; *r*, as in French and most other European languages, is always trilled. Certain consonants are modified in sound by placing over them this diacritical sign (ˇ): thus *c*, *d*, *n*, *r*, *s*, *t*, and *z* are sounded like our *ch* (in *child*), *d* (in *verdure*, *i. e. dy* uttered in one sound), *ni* (uttered as one sound, as in *minion*), *rzh* (nearly), *sh*, *ty* (uttered as one sound, or *t* in *nature*), and *zh*, respectively. L, with a stroke through it, *ł* (like the Polish), has a sound unknown to our language. *Ch* is pronounced as in German; *sch* nearly as in Dutch. In the variety of its terminations of both nouns and verbs the Cechic may be said to resemble the Latin and Greek. The Bohemians (Czechs) possess no contemptible literature. John Huss himself not only revised the translation of the Bible into the Cechic tongue, but wrote tracts, and poetry in hexameter verse. He appears to have been scarcely inferior to Luther in the impulse which he gave to the mental culture of his countrymen. The golden age of Cechic literature, and of the highest intellectual culture of the Czechs, may be placed between 1450 and 1620 (the opening of the Thirty Years' war), after which both rapidly declined. After a period of depression lasting nearly two hundred years, the literature of Bohemia rose again into active life, and since the commencement of the present century writers have appeared in every department of learning and science. (See Wenzig's "Blicke auf das böhmische Volk, seine Geschichte und Literatur," 1855.) J. Thomas.

Bo'hemond [Lat. *Bohemun'dus*] **I.,** a famous leader of the first Crusade, born about 1056, was a son of Robert Guiscard, duke of Apulia and Calabria. He joined the crusade with a large army in 1095, and took part in the capture of Antioch in 1098. He remained at Antioch while the other crusaders marched to Jerusalem, and he reigned there as prince of Antioch. He waged war with varying success against the Greek emperor Alexis, and married a daughter of Philip I. of France. Died in 1111.

Bohemond II., a son of the preceding, was a minor at his father's death. He became prince of Antioch in 1126, and fought against the Saracens as an ally of Baldwin, king of Jerusalem. He was killed in battle in 1130.

Bohemond III., a prince of Antioch, was a grandson of Bohemond II. He began to reign in 1163. Died in 1201.

Boh'len (Henry), a native of Germany, removed to Philadelphia, where he became a wine-merchant. Appointed a brigadier-general in 1862, he served under Fremont and Sigel, and was killed near the Rappahannock Aug. 22, 1862.

Bohlen, von (Peter), a German Orientalist, born Mar. 13, 1796. He became professor of Oriental languages at Königsberg in 1830, and published, besides other works, an able treatise on Indian antiquities entitled "Das Alte Indien" (2 vols., 1830). Died Feb. 6, 1840. (See his "Autobiography," 1841.)

Böh'ler (Peter), a German theologian and Moravian bishop, born at Frankfort-on-the-Main Dec. 31, 1712. He is recognized, in Methodist history, as having given a decisive impulse to Wesley's opinions and career. He removed to America in 1738, and in 1740 founded the town of Nazareth, Pa. Died in London April 27, 1775.

Böhm (Theobald), a German musician, born in Bavaria in 1802, is noted for an improvement in the construction of the flute. The Böhm flute is more accurate and even in tone, and more easily fingered, than those formerly in use. He has also introduced improvements in other instruments, and has composed musical pieces.

Böhme, or **Böhm** (Jakob), a celebrated German mystic, born near Görlitz, in Upper Lusatia, in 1575. He learned the trade of a shoemaker, worked at his trade at Görlitz, and became a member of the Lutheran Church. He had a very fertile imagination and a remarkable faculty of intuition, and professed to be divinely inspired and illuminated. His first work was entitled "Aurora, or the Morning Redness" (about 1612). This was condemned by the ecclesiastical authorities of Görlitz. He published several other works, which were admired by some eminent men, but they appear visionary and unintelligible to the generality of persons. He died at Görlitz Nov. 24, 1624. His works (10 vols., 1682) were translated into English (2 vols. 4to, 1764) by William Law, who was an admirer of Böhme. He was a religious genius of great depth, and can be understood only by people of strong religious feeling and some religious experience: to them he is as sublime as he is obscure to others. (See La Motte-Fouqué, "Notice sur J. Boehm," 1831; Fechner, "Jakob Böhme, sein Leben und seine Schriften," Görlitz, 1857; Geiss, "Jakob Böhme, der Deutsche Philosoph," Leipsic, 1860.)

Böh'misch-Lei'pa, a town of Bohemia, on the Polzen, 56 miles N. of Prague. It has a gymnasium, and manufactures of woollen and cotton cloths, glass, and hardware. Pop. in 1880, 10,170.

Böh'misch-Trü'ban, a village of Austria, in Bohemia, 44 miles by rail N. N. W. of Brünn. P. in 1880, 4572.

Bohn (Henry George), a London bookseller of German extraction, born Jan. 4, 1796, promoted the popularization of good literature by publishing translations from ancient and modern languages, made several useful compilations, and wrote a "Handbook of Pottery." D. Aug. 24, 1884.

Bohrahs. See Ismaeeliah.

Böht'lingk, or **Boehtlingk** (Otto), an eminent Russian Orientalist, born at St. Petersburg May 30, 1815. He has published, among other works, the text of Kâlidâsa's "Sakuntalâ," with a translation (1842), and, conjointly with Roth, a "Sanscrit-German Lexicon," which is said to be unrivalled in this department of literature.

Bo'hun U'pas [Malay for "poison tree"], the *Antiaris toxicaria*, a tree of the Malay and Philippine archipelagoes, of the order Artocarpaceæ. Many grossly exaggerated reports of its fatal qualities have been published. Its poison appears to be of an acrid, not a narcotic character. The stories of the upas valley in Java, where nothing can grow but the upas tree, probably arose from the now well-ascertained fact that certain close mountain-ravines in that island so abound in poisonous volcanic gases that no plant, not even the upas, can live there. Besides the above, another bohun upas, the *Strychnos Tieute*, is found in that region. It abounds in strychnine, and is even more deadly than the other.

Boiar'do (Matteo Maria), count of Scandiano, an Italian poet, born at Scandiano about 1432. He was patronized by Ercole, duke of Este, and became governor of Módena in 1481. His chief work is the romantic chivalrous poem "Orlando Innamorato," which he left unfinished, and which was published in 1495. He died Dec. 21, 1494. His poem was modified or written over by Berni, whose version of it was so popular that it nearly supplanted the original, the subject of which was also continued by Ariosto in his "Orlando Furioso." According to Hallam, Boiardo was equal to Ariosto in point of novel invention and just keeping of character. (See G. F. Cremona, "Elogio del Conte M. M. Bojardo," 1827.)

Boi'i, an ancient Celtic people who emigrated across the Po and occupied Umbria, where they waged war for several centuries against the Romans. They were defeated by the Romans in 283 B. C., and became allies of Hannibal when he invaded Italy in 218 B. C. Many years later the Romans expelled them from Umbria, and drove them beyond the Alps. A portion of the Boii migrated to the country on the N. side of the Danube, and founded the kingdom of Boiohemum (Bohemia), from which they were expelled by the Marcomanni in the time of Augustus. From them also Bavaria takes its name.

Boil [Lat. *furunculus*], a hard, painful, inflammatory tumor on the surface of the body, which begins as a point of a dusky red color, and is hot, aching, and throbbing.

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* Pronounced *cha'kee*.

These symptoms increase in severity for several days, when it is of a conical form, with a broad firm base, and has on the apex a whitish point, which contains a little matter; this opens and after a few days more there is discharged a slough of cellular tissue, and the cavity left heals, leaving a depressed scar. Boils often attack young and plethoric persons, and their appearance is not incompatible with robust health, although they may be so numerous as to greatly reduce the strength. Men in training for athletic exercises, or others who have suddenly changed their habits, are subject to them. Sometimes boils continue to succeed each other for a length of time. The treatment of boils is simple. The intestinal canal should be cleared by laxative medicines, and the digestive powers improved by tonics and antacids. The tincture of perchloride of iron is often a useful remedy. The skin should be kept healthy by frequent washing, while the inflamed point should be poulticed. Wet lint is a sufficient application after the core has been thrown off. Free incision of the boil greatly hastens its course.

Boildieu, or **Boieldieu** (ADRIEN FRANÇOIS), a French composer, born at Rouen Dec. 15, 1775. He went to Russia in 1803, and was there appointed chapel-master to the emperor Alexander, but he returned to Paris in 1811. Among his works are the operas "La Dame Blanche," "Jean de Paris," and "My Aunt Aurora." Died Oct. 8, 1834. (See RÉFUVEILLE, "Boieldieu, sa Vie et ses Œuvres," 1851.)

Boileau, or, more fully, **Boileau-Despréaux** (NICOLAS), an eminent French poet and satirist, born near Paris Nov. 1, 1636. He was liberally educated, and followed no profession but that of an author. He began his literary career by a satire entitled "Adieu of a Poet to the City of Paris" (1660), the style of which was much admired. In 1666 he produced "Seven Satires," which were very successful. He became a friend of Racine and La Fontaine. His "Twelve Epistles," which appeared after 1669, indicate a more mature genius than his satires, and excel in the ease and grace of the versification. He wrote to Racine and other friends numerous letters, which are very interesting as materials for the literary history of his time. Among his best works are the "Lutrin" ("Reading-desk," 1674) and the "Art of Poetry" ("L'Art Poétique," 1674), which is an exquisite performance, and is considered by some French critics as equal to Horace's "Art of Poetry." Boileau was admitted into the French Academy in 1684. He had an immense influence on French literature. His character is represented as pure and generous. He was visited in 1700 by Addison, to whom, as Macaulay remarks, he talked on his favorite theme, literature, long and well; indeed, as his young hearer thought, incomparably well. He died in Paris Mar. 13, 1711. (See D'ALEMBERT, "Éloge de Boileau;" DESMAIZEAUX, "Vie de Boileau," 1712; DAUNOU, "Éloge de Boileau," 1787; L. S. AUGER, "Éloge de Boileau-Despréaux," 1805.)

Boiler. See STEAM-ENGINE, by PROF. W. P. TROWBRIDGE.

Boiling-Point, the temperature at which the elastic force of the vapor of any liquid is equal to the pressure of the atmosphere. When a vessel containing water is heated, the temperature rises and vapor silently passes off from the surface; but at 212° F., or 100° C. (the barometric column standing at 30 inches at the sea-level) steam begins to be formed in bursts at the bottom, and rising through the liquid, throws it into commotion. If the steam is allowed freely to escape, the temperature of the water rises no higher. The water is then said to *boil,* and the temperature at which it remains is its *boiling-point.* Every liquid has a boiling-point of its own.

TABLE OF BOILING-POINTS OF VARIOUS LIQUIDS.

Liquid sulphurous acid.	17.6°	Water	212°
Aldehyde	71.8	Butyric ether	238.8
Ether	96.3	Perchloride of tin	240.2
Carbon bisulphide	118.5	Terchloride of arsenic	273
Acetone	133.3	Bromide of silicon	308
Bromine	145.5	Terebene	322.9
Wood spirit	151.3	Naphthalin	422.2
Ethylic alcohol	173.0	Sulphuric acid	620
Benzole	177.4	Mercury	662

The boiling-point of liquids is altered by various circumstances. Water with common salt in it requires greater heat to make it boil than pure water. In a glass vessel the boiling-point is several degrees higher than in one of metal. But what most affects the boiling-point is variation of pressure. When the barometer stands at thirty inches, showing an atmospheric pressure of fifteen pounds on the square inch, the boiling-point of water is 212°. When part of the pressure is removed, it boils before coming to 212°, and when the pressure is increased the boiling-point rises. Thus in elevated positions, where there is less air above the liquid to press on it, the boiling-point is lower than at the level of the sea. An elevation of 510 feet makes a diminution of one degree F.; at higher levels the difference of elevation corresponding to a degree of temperature in the boiling-point increases; and a method is thus furnished of measuring the heights of mountains. At the city of Mexico, 7471 feet above the sea, water boils at 198.1°; at Quito, 9541 feet, at 194°; in the Himalayas, at the height of 18,000 feet, at 180°. Boiling water is thus not always equally hot, and in elevated places many substances cannot be cooked by boiling. Under the receiver of an air-pump water may be made to boil at the temperature of summer, and ether when colder than ice. This effect of diminished pressure is largely turned to account in sugar-boiling, in preparing extracts, in distilling vegetable oils, and in other processes where the substances are apt to be injured by high temperature. By increasing the pressure water may be heated to any degree without boiling. Papin's digester is formed on this principle. Under a pressure of two atmospheres the boiling-point rises to 249° F.; of ten atmospheres, 356° F.; of fifty atmospheres, 511° F. At a depth of thirty-four feet the pressure of water is equal to an atmosphere, or fifteen pounds on the square inch; and thus at the bottom of a vessel of that depth the water must be heated to 249° F. before it is at its boiling-point.

If a small quantity of water be poured into a silver basin heated above the boiling-point, but below redness, it will begin to boil violently, or perhaps burst into steam at once. But if the basin is heated to redness, the water will gather itself into a globule, and roll about on the hot surface without coming to the boiling-point. It is remarkable that water which has been freed from air by long boiling has its boiling-point much raised. It has been known to reach 275° F. without boiling. F. A. P. BARNARD.

Bois Blanc Island, in Lake Huron, 10 miles S. E. of Mackinaw, Mich., is 10 miles long and 3 wide, and has a lighthouse on the E. end; lat. 45° 45′ N., lon. 84° 55′ W.

Bois de Boulogne, a grove or public park in the environs of Paris, on the right bank of the Seine, about 3 miles W. of the city. It is nearly three miles long and 1 mile wide. It was the finest promenade in the vicinity of Paris, but many of the trees were cut down and burned when that city was besieged by the Germans in 1870. It is during the afternoon the rendezvous of the elegant society of Paris, and in the height of the season presents a sight of unequalled splendor.

Bois d'Arc [Fr. for "bow-wood"] (popularly pronounced bo'dock), a name given to the Osage orange tree (*Maclura aurantiaca,* order Artocarpaceæ) in some parts of the U. S. It is often used for a hedge-plant. As a tree its timber is tough, elastic, and extremely useful. It is a near relative of the fustic tree, and its wood yields a yellow dye. It was used by the Indians for making bows and arrows. (For its use in hedge-fences, see OSAGE ORANGE.)

Bois-Duval (JEAN ALPHONSE), born at Ticheville, in the department of Orne, France, June 17, 1801, studied medicine and natural history at Rouen and Paris, and did excellent service as a physician during the first invasion of cholera, in 1835. He has written several valuable works on botany and entomology: "Flore française" (1828, 3 vols.), in which the plants are arranged according to natural families, "Histoire des lépidoptères et des chenilles de l'Amerique septentrionale" (1829–47), "Les chenilles d'Europe" (1832, *et seq.,* 2 vols.), "Histoire de lépidoptères de la Californie" (1852), written in conjunction with M. A. Guenée; "Essai sur l'entomologie horticale" (1866), "Histoire naturelle des insectes" (1874).

Boise (JAMES ROBINSON), PH. D., LL.D., born in Blandford, Hampden co., Mass., Jan. 27, 1815, graduated at Brown University in 1840, and was tutor of Latin and Greek in that college from 1840 to 1843, and professor of Greek till 1850. From 1852 till 1868 he was professor of Greek in the University of Michigan. Since then he has filled the same position in the University of Chicago. Prof. Boise has published several classical text-books, among which are editions, with English notes, of Xenophon's "Anabasis" and the first six books of Homer's "Iliad."

Boisé City, the capital of Idaho and of Ada co. (see map of Idaho, ref. 5–A, for location of county), is in the southern portion of the Territory, on Boisé River, 50 miles above its confluence with the Snake, in the great Snake River Valley; lat. 43° 34′′ N., lon. about 116° W. It is surrounded by a fine agricultural and grazing country, and derives large support from the rich placer and quartz mines in the mountain districts within 50 miles N., S., and E. The principal business houses are fireproof brick. The city has a U. S. assay-office, a penitentiary, high school, and various mechanical industries. Two large ditches, bringing the water from Boisé River, give an abundance of water-power, and side ditches for irrigating purposes carry the water to every lot in the city. Stages arrive and depart daily, N., E., W., and S. Pop. in 1870, 995; in 1880, 1899; in 1885, about 2500. Ed. "Idaho Statesman."

Bois-le-duc [Dutch *S'Hertogenbosch, i. e.* "Duke's Wood"], a fortified town of Holland, capital of North Brabant, is at the junction of the rivers Aa and Dommel, 30 miles S. S. E. of Utrecht. It is a clean and well-built town, intersected by several canals, and defended by a citadel and two forts. It has a fine cathedral, a college, an academy of art, an arsenal, and a grammar-school in which the celebrated Erasmus studied. Here are manufactures of cutlery, ribbons, woollen goods, linen thread, etc. It was founded in 1184 by the duke of Brabant in a wood while hunting; hence its name. Pop. 24,875.

Boisserée (Sulpiz), an eminent architect and antiquary of French extraction, was born at Cologne Aug. 2, 1783. He devoted himself to the collection of specimens of early German art, in which he was aided by his brother Melchior (1786–1851). They collected about 200 pictures, which were purchased by the king of Bavaria, and are called the "Boisserean Collection." He published "Monuments of Architecture on the Lower Rhine from the Seventh to the Thirteenth Century" (1830–33), and "Views, Plans, and Details of the Cathedral of Cologne, etc." (1823). Died May 2, 1841.

Boissonade (Jean François), a distinguished French classical scholar, born in Paris Aug. 12, 1774. He became professor of Greek in the University of Paris in 1812, was admitted into the Academy of Inscriptions in 1813, and became professor of Greek in the College of France in 1828, which position he held until a few days before his death. He edited several Greek prose authors, and published "Sylloge Poetarum Græcorum" (24 vols., 1823–26). He acquired a high reputation as a Hellenist, and gave a powerful impulse to the study of classical literature. Died Sept. 8, 1857.

Boissy d'Anglas, de (François Antoine), Count, a French statesman, born at Saint Jean Chambre (Ardèche) Dec. 8, 1756. He became a moderate member of the States-General in 1789, and of the Convention in 1792. He was a member of the Committee of Public Safety in 1794, was chosen president of the Tribunate in 1802, was created a senator and count by Napoleon in 1805, and a peer of France by Louis XVIII. He wrote several political essays and a "Life of Malesherbes" (1819). Died Oct. 20, 1826.

Boivin (Marie Anne Victoire Gillain), M. D., an eminent French midwife, born April 9, 1773, was educated in a nunnery, and afterwards studied the elements of medicine. She married in 1797, but was soon left a widow with one child. To gain a living she worked in the Maternité Hospital, of which she became superintendent in 1801. The king of Prussia gave her the civil order of merit, and the University of Marburg the degree of M. D. She wrote valuable professional works. Died May 16, 1841.

Bo'ker (George Henry), an American poet, born in Philadelphia in 1823, graduated at Princeton, N. J., in 1842. He published "The Lesson of Life and other Poems" (1847); "Calaynos," a tragedy (1848), which was performed with great success in England; "Leonore de Guzman," and "War Lyrics" (about 1862), "Book of the Dead" (1882). In the autumn of 1871 he was appointed minister to Turkey, which position he held till 1878.

Bokha'ra [Lat. *Bucharia;* anc. *Sogdiana* and *Transoxiana*], or **Uzebekistan',** called also **Great Bucharia,** a state of Central Asia, in Independent Toorkistan, is bounded on the N. and W. by Russian Toorkistan, and on the S. by Afghanistan and Toorkomania. Area, estimated at 92,254 square miles. The high mountain-range of Hindoo-Koosh extends along the southern border of Bokhara, the E. part of which is occupied by offsets from the Bolor Tagh, but the greater part of the country is level. This level tract resembles the dry steppes and sandy wastes of the basin of the Caspian. The largest rivers of Bokhara are the Amoo (Oxus), the Jihoon, and the Samarcand River, or Kohik. Along the banks of these rivers there is arable and fertile land, which is about one-tenth of the whole country. The climate is moderate. Gold is found in the sands of the Oxus, but Bokhara is deficient in metals and timber. Among the products of the soil are cotton, rice, wheat, barley, silk, tobacco, and abundant fruits. The inhabitants raise great numbers of camels, sheep, goats, and horses. They manufacture silk stuffs, firearms, cutlery, shagreen, gold and silver ornaments, sabres, etc. This country derives commercial advantage and importance from its position between Russia and the south of Asia. The population is composed of a mixture of races, who mostly profess the Mohammedan religion. Bokhara partly corresponds to the ancient *Bactria.* It was conquered by Jengis Khan in 1222, and was famed as a seat of learning under Tamerlane. The Uzbecks became masters of it in 1505. In 1864 the Russians moved up the Syr-Darya, captured several important cities, together with the northern half of Bokhara, and formed the government of Toorkistan. Between 1866–68 the Russians conquered the cities of Samarcand and Katty Kurgan, with the territory belonging to them. Since then Bokhara has become more and more dependent upon Russia. In 1870, Russia conquered Badakshan and gave it to Bokhara, and in 1873, owing to the victory of the Russians over Khiva, the Amoo was made the boundary between Khiva and Bokhara. Capital, Bokhara. Pop. 2,130,000.

Bokhara (*i. e.* "treasury of sciences"), a famous city of Central Asia, the capital of Bokhara, is situated on a plain near the river Sogd or Zerafshan, 138 miles W. S. W. of Samarcand. The streets are very narrow and ill paved, the houses are small, have flat roofs, and are built of sun-dried bricks. Bokhara is probably the most important commercial town of Central Asia, and has numerous extensive bazaars, in which nearly all kinds of goods can be procured. Among the articles exported from it are silks, cotton, wool, coarse chintzes, lapis-lazuli, and dried fruits. This city is said to have 360 mosques, some of which are beautiful structures. It has long been famous as a seat of Mohammedan learning, and is said to contain over 100 colleges, with about 10,000 students. Among the principal edifices is the palace of the khan, which is enclosed by a wall about sixty-five feet high. Bokhara was ruined by Jengis Khan about 1232, and was rebuilt at the end of his reign. The pop. is estimated at 70,000.

Bol (Ferdinand), a Dutch painter and engraver, born at Dort in 1611, was a pupil of Rembrandt. He painted history and portraits with success, and produced some good etchings. Died in 1681.

Bo'lan Pass, a pass in the mountains of Beloochistan, is 50 miles long, and is on the route from Sinde to Kandahar and Kelat. The highest part of the pass is 5793 feet above the level of the sea. The average ascent is ninety feet in a mile. The Bolan River rises here. In 1839 a small British army with heavy artillery marched through this pass from Sinde to Afghanistan.

Bo'las (the "balls"), a Spanish-American name for a missile used by the Indians of the South American plains, and borrowed from them by the Guachos. It consists of a pair of balls (formerly made of clay by the Indians, but now often of iron) fastened together by a thong of hide. The bolas are hurled with great precision at the ox, horse, guanaco, or ostrich, and, entangling the legs of the animal, detain it till it can be captured or killed. Sixty feet or more is a moderate range for the bolas, which are thrown from the saddle.

Bolbec, a town of France, in the department of Seine-Inférieure, is on a small river of its own name, and 20 miles by rail E. N. E. of Havre, on the railway which connects Paris with the latter place. It is well built, and is adorned with fountains. Here are manufactures of cotton, linen, and woollen fabrics, and chemicals, and three annual fairs doing considerable business. Pop. 11,575.

Bole [Lat. *bo'lus;* Gr. βῶλος, a "lump or mass"], an earthy substance resembling clay, and consisting essentially of silica, alumina, and red oxide of iron. It occurs in nests and veins in basalt and other rocks in various countries. It feels greasy between the fingers; is white, yellow, red, brown, or black; has a dull resinous lustre; is friable, and adheres to the tongue. Armenian bole has a red tint, is often used for coloring false anchovies, and is also employed in coloring tooth-powders and in veterinary medicine. Lemnian earth, a bole from the island of Lemnos, was at one time prescribed as a tonic and astringent medicine, and acted beneficially from the large percentage of oxide of iron present. The boles are employed in veterinary practice. When bole is calcined it becomes hard; and when afterwards levigated, a coarse red kind is used as a pigment under the names of English red and Berlin red. French bole is pale-red; Bohemian bole, reddish-yellow; Silesia bole, pale-yellow; and Blois bole is yellow. The boles are absorbent, astringent, and somewhat tonic.

Bole'ro (named from its inventor), a Spanish national dance, generally in the time of a minuet, and with a peculiar rhythm. It is accompanied with the music of the guitar and castanet, and with songs. The dancer seeks to represent by pantomine the successive symptoms and emotions of amorous affection, with its various moods of jealousy, despair, triumph, etc. Adopted by the ballet-masters, it made its tour all over the world.

Bole'tus [Gr. βωλίτης], a genus of fungi of the division Hymenomycetes. It comprises several species, which resemble the mushroom (*Agaricus*) in form, but instead of having gills, the under side of the cap (*pileus*) is occupied by a layer (*hymenium*) quite distinct from the body of the pileus in substance, and pierced by pores, so as to be composed of numerous small tubes united together. *Boletus edulis* is used as food in France and Germany, where it grows on the ground in woods and mossy places. In moist, warm summers it is very abundant. The part which is eaten is the flesh of the cap, which is firm, white, and delicate. Several other species are edible.

Bo'leyn, or **Bul'len** (ANNE), queen of England, born in 1507, was a daughter of Sir Thomas Bullen, afterwards earl of Wiltshire. Her mother was a daughter of the duke of Norfolk. She was educated at the French court, and became about 1525 one of the maids-of-honor to the English queen, Catherine. Henry VIII., attracted by her beauty, applied to the pope to obtain a divorce from Catherine, and married Anne privately early in 1533. She became the mother of the princess Elizabeth in September of that year. She showed favor to the cause of the Reformation. Having been supplanted in the favor of the king, she was accused of criminal intercourse with several men, was condemned by a jury of peers, and beheaded May 19, 1536. Some writers think that her crime was not proven. (See FROUDE, "History of England," vol. ii.; MISS BENGER, "Memoirs of Anne Boleyn;" MISS STRICKLAND, "Queens of England.")

Bolgrad', a town of Russia, on the river Yalpookh, 23 miles N. of Ismail, and on the frontier between Russia and Roumania. In 1856 it was ceded by Russia to Turkey, but in 1878 it was ceded to Russia. Pop. 8415.

Bo'li, a town in Asiatic Turkey, in Anatolia, 85 miles N. W. of Angora, inhabited by Turks and Armenians. The manufactures are gold ornaments and leather. Pop. about 10,000.

Bolingbroke (HENRY ST. JOHN), VISCOUNT, a celebrated English author and statesman, born at Battersea Oct. 1, 1678. He was educated at Eton and Oxford, and was extremely dissipated in his youth. Having entered Parliament in 1700, he soon became a prominent orator of the Tory party, and was appointed secretary of war in 1704. He lost this office when the Whigs obtained power in 1708, but he continued to be a favorite counsellor of Queen Anne, who dismissed the Whigs in 1710, and placed Harley at the head of a ministry in which St. John was secretary for foreign affairs. He received in 1712 the title of Viscount Bolingbroke, and in 1713 concluded the treaty of Utrecht, which ended a long war between England and France. He quarrelled with Harley (earl of Oxford), and supplanted him as prime minister in July, 1714. His ambitious hopes were blasted by the death of Queen Anne (Aug., 1714), which also frustrated his designs and schemes to restore the Stuart dynasty. He was attainted in 1715, but he had escaped to France, and entered the service of the Pretender as his prime minister. In 1724 he was permitted to return to England, but not to enter Parliament. He wrote for the "Craftsman" many articles against Walpole, and published, besides other works, a "Dissertation on Parties" (1739) and "Remarks on the History of England" (1743). Died Dec. 15, 1751. He was brilliant and versatile, but not profound. His collected works, which have little merit except style, were published by Mallet in five volumes in 1754. (See GOLDSMITH, "Life of Lord Bolingbroke;" G. W. COOKE, "Memoirs of Lord Bolingbroke," 1835; "Edinburgh Review" for Oct., 1835 . F. VON RAUMER, "Lord Bolingbroke und seine Werke," 1841; CHARLES DE RÉMUSAT, "Bolingbroke, sa Vie et son Temps," 1853.)

Bolintineano (DEMETER). See APPENDIX.

Bolivar, capital of Polk co., Mo. (see map of Missouri, ref. 6–F, for location of county), 110 miles S. W. of Jefferson City. It has a fine high-school building, a woollen-mill, cotton-gin, flouring-mill, and other manufactories. Pop. in 1870, 635; in 1880, 516.

Bolivar, N. Y. See APPENDIX.

Bolivar, capital of Hardeman co., Tenn. (see map of Tennessee, ref. 7–B, for location of county), 1 mile S. of Hatchee River, 28 miles S. of Jackson, and 68 miles E. of Memphis, in an excellent cotton region, with fine water-power and plenty of timber. It has a foundry, steam saw and grist mill, two male and two female academies. Pop. in 1870, 889; in 1880, 1043.

Boli'var, one of the nine states of the South American confederation of Colombia, is bounded on the N. by the Caribbean Sea, E. by Magdalena and Santander, S. by Antioquia, and on the W. by Cauca. Area, 26,600 square miles. Besides the Magdalena, which flows along its entire W. boundary, the only river of importance is the Cauca. The principal towns are Cartagena, the capital, and Mompox. Pop. 241,704.

Bol'ivar [Sp. pron. bo-lee'var], (SIMON), or **Boli'var y Pon'te,** surnamed THE LIBERATOR, a South American patriot, born at Caracas July 25, 1783, inherited an ample fortune. He studied law at Madrid, and afterwards joined the patriots who revolted against Spain in 1810. He served as an officer under Miranda in several battles. Having obtained the command of a separate army, he defeated the Spaniards, and entered Caracas in triumph in Aug., 1813, soon after which he was appointed dictator. He was defeated and driven out of Venezuela in 1814, but again rallied to the standard of liberty near the end of 1816, and gained several victories over the Spanish general Morillo in 1817. In Feb., 1819, a congress was opened at Angostura, and Bolivar was chosen president. In Dec., 1819, Venezuela and New Granada were united to form the republic of Colombia, of which Bolivar was elected the first president. He gained a victory at Carabobo in June, 1821, and in 1822 led an army into Peru, which he liberated from the Spaniards. He became dictator of Peru in 1823, and made a tour through that country, in which he was received with triumphal demonstrations. In honor of him the southern part of Peru was named Bolivia, and erected in 1825 into a separate state, of which he became president for life. He was also re-elected president of Colombia in 1826. In 1829, Venezuela seceded from the republic of Colombia, which was much disturbed by faction. Bolivar had many enemies who denounced his ambition. He died Dec. 17, 1830. (See DUCOUDRAY-HOLSTEIN, "Mémoires de S. Bolivar," 1829.

Bolivar City. See ANGOSTURA.

Bolivar Point is at the N. side of the entrance to Galveston Bay, Tex., in Chambers co., lat. 29° 22′ 02″ N., lon. 94° 45′ 34″ W. It has an iron lighthouse 110 feet high, with a fixed white light 117 feet above the sea.

Bolivia [bo-liv'e-a], a South American republic, the central state of the continent, bounded N. and E. by Brazil, S. by the Argentine Confederation and Chili, and W. by Peru and Chili. It lies between lat. 9° and 23° 15 S., and lon. 57° 20′ and 69° 30′ W. The result of the war of 1879–80 between Chili and Bolivia was the ceding by Bolivia of all its coast territory to Chili. Area of Bolivia before this cession was 842,729 square miles. The area of the cession is not definitively known. The executive power is vested in a president elected for four years, and the legislative authority in the Senate and House of Representatives, both elected by universal suffrage. Pop. 1,957,352.

Topography.—The S. central, S. W., and W. portions of Bolivia are a mass of mountains, mainly E. and W. spurs from the Andes, including the great elevated plateau of Potosi, 13,000 feet high, from which spring many peaks, a part of them volcanoes, the highest summits in the New World. Of these, Mount Sajama is 22,760 feet, Mount Illampu 23,000 feet, and Mount Illimani 21,155 feet high. The principal lakes are Titicaca, partly in Peru, and Aullagas in the W. Bolivia is drained by the Beni, Mamore, and Guapore, affluents of the Madeira, and the Vermejo, Pilcomayo, and Paraguay, affluents of the Parana.

Climate.—Five regions are distinguished—1. *Puna brava* (very cold), between 13,000 feet and the snow limits; 2. *Puna* (cold), between 11,000 and 13,000 feet, with heavy forests, and producing potatoes, oca, quinoa, and barley; 3. *Cabezera de Valle,* or high valleys, between 9000 and 11,000 feet, producing wheat, corn, and generally crops of the temperate zone; 4. *Valle,* or *Medio Yunga,* between 6000 and 9000 feet, producing grains, fruits, and plants of temperate and semi-tropical regions; 5. *Yunga,* the tropical region, with its tropical forests and fruits, producing the cacao, coca, bananas, etc.

Minerals.—Both silver and gold are found throughout the cordilleras, the latter in placers on all the streams; there are many mines of both, and also large beds of copper, tin, quicksilver, lead, iron, salt, and excellent coal.

Wild Animals, both of tropical and temperate regions, abound, birds of beautiful plumage, and birds of prey.

Soil, Vegetation, and Productions.—The soil of the third, fourth, and fifth climatic regions is rich; the forest products are valuable; caoutchouc, cinchona, coca, and many other useful and medicinal barks, gums, resins, and roots, and cacao, coffee, cotton, tobacco, rice, barley, oats, some indigo, sugar-cane, bananas, and Brazil-nuts are cultivated successfully. Bolivia has also large guano deposits at Mejillones. Its exports include silver, cinchona, cocoa and coffee, and copper, tin, and other ores, guano, and cubic nitre; and its imports are cottons, woollens, silks, iron, and hardware.

Principal Towns, etc.—La Paz, 76,372; Cochabamba, 40,678; Sucre or Chuquisaca 23,979; Potosi, 22,580; Santa Cruz, 9780; Oruro, 7980; Tarija, 5680; Trinidad, 4170.

Its foreign trade is mostly carried on through Chili, Peru, and Brazil. Bolivia has no sea-coast.

Railways.—Till within the last few years the vast agricultural and mineral resources of the country—its supply, for instance, of India-rubber is of the finest quality and almost inexhaustible—were entirely undeveloped for want of means of communication, but more recently, an attempt has been made to construct roads and railways. A railroad connecting La Paz, the seat of government of the republic, with the port of Aygacha, on Lake Titicaca, was opened for traffic in 1872, and a second line, from Autofagasta to Salar, was completed in September, 1874. The completion of several other lines which were in course of construction in 1879 was abandoned in consequence of the outbreak of the war with Chili, but, unfortunately, the money loaned for the construction has been used for other purposes and is lost. There is a line of telegraph between Chililaga, on Lake Titicaca, and La Paz and Oruro, 180 miles long.

Finances.—Public debt 1880, $30,000,000; revenue at latest report, $2,930,000; expenditure, $4,505,000. There is always more or less deficit of revenue.

Education is at a low ebb; there are three nominal universities, but very few good schools. Illiteracy prevails.

The Army consists of 2000 men, commanded by 8 generals and 1013 other officers—that is, one officer to every two men. The annual cost of that army amounts to about two-thirds of the whole revenue.

History.—The W. part of Bolivia belonged to the old empire of the incas of Cuzco, which existed from about 1018–1524, and which had a high degree of civilization. In 1538 the Spaniards entered the country and conquered it, and in 1557 the inca Sairi Tupac resigned his power to Philip II. But the Spanish dominion was not firmly established until 1780. In this year Bolivia, under the name of Charcas, became a part of the viceroyalty of La Plata or Buenos Ayres. In 1809 the disorders in Spain also caused considerable revolutionary movements in Bolivia. The revolution gradually spread over the whole country, and was carried on with varying successes until 1824. In July, 1825, a congress assembled and declared the country independent, and called the new state Bolivia, in honor of Gen. Bolivar, who had materially aided them. Aug. 25, 1826, a constitution was adopted, and Gen. Sucre was elected president. In 1828 he was forced to leave the country. After a terrible civil war Santa Cruz became president, and succeeded in raising the prosperity of the country considerably. In 1835 he invaded Peru, defeated the rebels, and annexed a part of Southern Peru. A federal republic was formed and Santa Cruz elected protector. But Chili and the Argentine Republic, which had jealously watched his growing success, now took up arms against him, and, although at first victorious, he was in consequence of internal disorders defeated by Chili in 1839, and fled to Guayaquil. After some more revolutions, Gen. Ballivian succeeded in sustaining himself as president in 1840. He conducted the government with vigor, and introduced many reforms. Gamarro, who tried to unite Bolivia with Peru, was repulsed, and the Bolivian troops even entered Peru. Peace was concluded June 7, 1842, and the restoration of the former boundaries was agreed upon. But new troubles arose in the interior, and Gen. Velasco superseded Ballivian, only to be himself superseded in Dec., 1848, by Gen. Belzu. Belzu ruled for over six years, having gained the favor of the lower classes. In 1855 he was compelled to resign by the popular indignation against his arbitrary measures, but had enough influence left to secure the election of his son-in-law, Cordova, who continued the obnoxious policy of Belzu, and in Nov., 1857, was defeated by Dr. Linares, who succeeded him. Linares's attempts to introduce reforms remained futile in consequence of the opposition of his opponents. He was deposed in 1861, and was succeeded by his minister of war, Acha. In 1864, after increasing internal strifes, Belzu made an invasion from Peru. In December of the same year Gen. Melgarejo first defeated Acha, and then defeated and killed Belzu. In 1866, Bolivia joined the alliance of Peru, Ecuador, and Chili against Spain, and in the same year settled amicably the border difficulties with Chili. In 1868 a new congress was elected, which legalized all the acts of Melgarejo. In the same year a contract was made with Col. G. E. Church of New York to open steam-navigation on the Madeira. At the same time citizenship was extended to all Americans who declared their intention to settle permanently in Bolivia. In Feb., 1869, Melgarejo overthrew the constitution of 1868, but in May restored it again. In 1869 a new revolution broke out, Melgarejo was defeated, and Morales declared president. In 1872, Morales was shot by his nephew La Fayé, and was succeeded by Don Adolfo Ballivian. The confusion finally culminated with the unfortunate war with Chili (1879–80), which probably cost Bolivia one-fourth of its territory and one-half of its accumulated wealth. (See Dolence, "Bosquejo Estadistica de Bolivia," 1851; L. H. de Bonelli, "Travels in Bolivia," London, 1854, 2 vols.; H. A. Weddall, "Voyage dans le Nord de la Bolivia," Paris, 1853; Wappäus, in Stein and Hörschelmann's "Handbuch der Geographie," 7th ed., 1863–70; Cortes, "Ensayo sobre la Historia de Bolivia," 1861; and Reck, "Geographie und Statistik der Republik Bolivia," in Petermann's "Mittheilungen," 1866 and 1867. See also Avelino Aramago, whose work has been translated into English, London, 1874, and José Domingo Cortes, "Bolivia," Paris, 1875; Charles Wiener, "Perou et Bolivie," Paris, 1880.)

L. P. Brockett.

Bol'khov, a town of Russia, government of Orel, on the Nugra, 30 miles N. of Orel. It is built mostly of wood, and has about twenty churches, also manufactures of gloves, hosiery, hats, and leather. Hemp, hides, oil, and tallow are exported. Pop. 19,224.

Bol'landists, a term applied to certain Jesuits who compiled, and are compiling, a voluminous work called "Acta Sanctorum," or "Lives of the Saints" (53 vols., 1643–1794). They derived their name from John Bollandus. (See Bollandus.) After his death the work was continued by a number of men, among whom were Daniel Papebroek, Conrad Janning, P. van den Bosche, Suyskens, and Hubens. In 1837 a new Bollandist association was formed by the Jesuits in Belgium, who have continued the work of publication. The sixtieth volume, published in 1867, comes down to the saints of October 29. It is stated that 2000 saints remain whose lives are unwritten, and that at least fifty volumes folio will be required to complete the work. As far as they have gone they have by no means exhausted the old calendars. According to Alban Butler, their work, at least in the early part, does not exhibit much scholarship. (See L. P. Gachard, "Mémoire historique sur les Bollandistes," 1835.)

Bollan'dus, or **Bol'land** (John), a Flemish Jesuit, born at Limburg Aug. 13, 1596. In conjunction with Godfrey Henschen, he published in 1643–58 five volumes of the "Acta Sanctorum." Died Sept. 12, 1665. (See Bollandists.)

Bollène, a French town, in Vaucluse, on a hillside, 24 miles N. of Avignon. It manufactures silk. Pop. 5412.

Bolles (Lucius), D. D., born at Ashford, Conn., Sept. 25, 1779, educated at Brown University, ordained pastor of a Baptist church at Salem, Mass., 1805, and secretary of the Baptist Board of Foreign Missions from 1824. Died Jan. 5, 1844.

Bolo'gna, a province of the kingdom of Italy, was previous to 1860 a delegation of the Papal States. It is bounded on the N. by Ferrara, on the E. by Ravenna, on the S. by Florence, and on the W. by Módena. Area, 1392 square miles. The southern part is mountainous; the soil is mostly very fertile. Among the staple products are silk, wine, grain, olive oil, hemp, flax, and rice. Capital, Bologna. Pop. in 1881, 458,843.

Bologna (anc. *Felsina* and *Bononia*), a famous city of Italy, capital of the above province, is situated in a fertile plain near the northern foot of the Apennines, 23 miles by rail S. E. of Módena and 83 miles by rail N. of Florence; lat. 44° 30′ N., lon. 11° 21′ E. Several railways extend from this point to Ferrara, Ancona, Módena, and Florence; that which connects it with Florence crosses the Apennines by numerous tunnels. Bologna is a handsome city with well-paved streets, lined with rich and varied colonnades, which afford shelter from the rain and sun, and it is adorned with many beautiful churches and fine palaces of the nobility, richly furnished with paintings of the old masters. Among the remarkable edifices are the Palazzo del Podestà; the Palazzo Maggiore del Publico; the leaning tower of Asinelli, built about 1110, and 256 feet high; the cathedral, rich in works of art; the church of San Stefano, one of the oldest in Italy, and containing Greek frescoes of the twelfth century; the church of San Petronio, a noble specimen of the Italian Gothic style, adorned with many masterpieces of painters and sculptors; and the church of San Domenico, in which may be seen sculptures by Michael Angelo, and paintings by Guido, L. Caracci, and Colonna. The number of churches in Bologna is about seventy-four.

Bologna is one of the great centres of learning in Italy. Its university, said to have been founded as early as 425, is the oldest in the peninsula. This school attained great celebrity, and was attended by thousands of students from all parts of Europe. The number of its students about the year 1260 is said to have amounted to 10,000. Several female professors have occupied chairs in this institution. The library of the university has about 160,000 volumes and 1000 valuable MSS. Bologna has an academy of fine arts and several theatres. Here are important manufactures of silk goods, velvet, crape, chemicals, paper, musical instruments, and sausages. This city was the native place of many eminent painters, including Albano, the three Caracci, and Guido; also of Pope Benedict XIV., Galvani, and Malpighi. A town called *Felsina*, founded here by the Etruscans, was perhaps as ancient as the city of Rome. The Romans, who obtained possession of it in 189 B. C., changed its name to *Bononia*. It was taken by Charlemagne in 800 A. D., and was the capital of the most powerful Italian republic from 1118 to 1274. It was annexed to the Papal States in 1514, and to the new kingdom of Italy in 1859. Pop. in 1881, 123,274.

Bologna, da (GIOVANNI), a Flemish sculptor, born at Douay in 1524, went to Italy when quite young, where he won great and lasting fame. His chief works are the "Rape of the Sabines" in the Loggia di Lanzi at Florence, the "Mercury" of the Uffizi, and the great fountain of Bologna (1564). Died in 1608.

Bologna Stone, a radiated variety of heavy spar (sulphate of baryta) which is found near Bologna, and is sometimes called "Bologna phosphorus." When calcined, pulverized, and made into cakes with gum-water, these cakes, after exposure to the sun, emit a phosphorescent light.

Bo'lor Tagh, or **Belur Tagh,** a high mountain-chain of Central Asia, extends along the W. boundary of the Chinese empire, which it separates from Khoondooz and Kafiristan. Its direction is nearly N. and S. It extends from lat. 35° to 45° N., and is connected with the Hindoo-Koosh on the S. The altitude of its highest peaks is said to be 19,000 feet or more.

Bolse'na (anc. *Volsinii* or *Volsinium*), a town of Italy, on the N. shore of Lake Bolsena, about 20 miles N. N. W. of Viterbo. It is now a small and mean village, but in ancient times it was an important Etruscan city and the capital of the Volsci. It was taken and destroyed in 280 B. C. by the Romans, who built here another city. This was the native place of Sejanus. Pop. 2100. The lake was celebrated in the Middle Ages for its eels. Pope Leo X. visited the island in this lake, on which ruins of beautiful castles, built by the Farnese, are still visible.

Bolt, a dart or pointed shaft, a thunderbolt; also a strong cylindrical pin of iron or other metal. Iron bolts are often used to fasten doors and protect dwelling-houses and warehouses against robbers. Metallic bolts, with a head at one end and a screw-thread and nut at the other, are extensively used in building ships and houses, in order to bind together timber or masonry. Bolts in shipbuilding are usually either iron or copper, and are of various forms and sizes, some being many feet long.

Bolton-le-Moors, an important manufacturing town of England, in Lancashire, on the Croal, 11 miles by rail N. W. of Manchester. Several railways extend from this place to Liverpool, Manchester, and Blackburn. Bolton returns two members to Parliament. It is one of the principal seats of the cotton manufacture, and is the birthplace of the inventors Arkwright and Crompton. The chief products of its manufactories are muslins, fine calicoes, counterpanes, dimities, cotton shawls, and fustians. Here are also paper-mills, foundries, and machine-shops. Numerous coal-mines are worked in the parish of Bolton. The manufacture of cotton and wool was introduced into this place by the Flemings about 1337. Pop. in 1881, 105,422.

Bolus [Gr. βῶλος, a "mass"], a dose of medicine given in a mass larger than a pill, yet small enough to be swallowed. The bolus is now seldom used.

Bolzano (BERNHARD), born at Prague Oct. 5, 1781, died there Dec. 18, 1848, studied theology and philosophy, took holy orders, and was in 1805 appointed professor in the university of his native city. Somewhat influenced by Hermes, he tried, like him, to represent the dogmas of the Roman Catholic Church as a complete and consistent system perfectly in harmony with human reason. He made a great impression on the students, but the Curia suspected him, and, though protected by his archbishop, he was in 1820 deposed, and even suspended from his priestly functions. His principal works are "Lehrbuch der Religionswissenschaft," (Sulzbach, 1834, 4 vols.); "Philosophische Wissenschaftslehre" (1837), besides a number of minor essays on mathematical subjects.

Bo'marsund', a fortress of Russia, on the S. E. side of the island of Aland, which forms one of the principal links in that chain of fortifications which guard St. Petersburg from the sea side, and may be called an outwork of Cronstadt; lat. 60° 12′ 40″ N., lon. 20° 15′ E. This important fortress was taken by the allied English and French fleets in Aug., 1854, and was afterwards blown up by the allies.

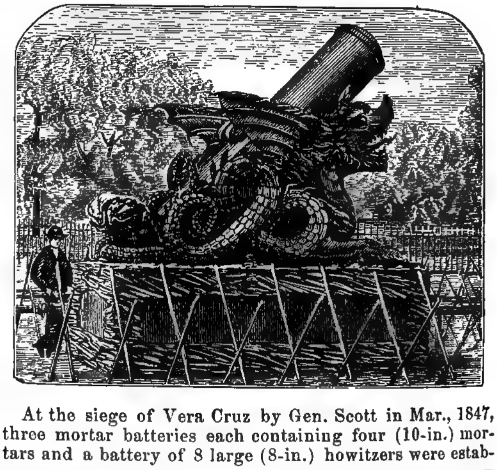
Bomb, bŭm [Fr. *bombe ;* Lat. *bom'bus*], or **Bombshell,** a kind of shell; a hollow ball of cast iron which is filled with powder or other explosive substance, is discharged from a mortar or heavy ordnance, and explodes when it strikes the ground or before it falls. The powder in it is usually exploded by a fuse or hollow tube filled with a slow-burning compound, which is ignited by the discharge of the mortar. The largest bomb in ordinary use is thirteen inches in diameter, weighs about 195 pounds, and is charged with seven or eight pounds of powder. Bombs are thrown at angles varying from twenty to forty-five degrees. (See MORTAR.)

Bom'ba, a surname or nickname given to Ferdinand II., king of the Two Sicilies, in consequence of his cruel bombardment of Messina Sept. 2–7, 1848.

Bom'bard, an ancient kind of ordnance, very short, thick, and wide in the bore. It differed from the mortar in shooting forth stones instead of iron shells. Some of the bombards used in the fifteenth century propelled stones weighing from 200 to 500 pounds each.

Bombardment. In the strict meaning of the term, a bombardment is the firing from mortars of *bombs*—(that is, shells or incendiary projectiles) into a fortress or place to compel, or aid in compelling, its surrender. "Bombardments," says Bardin (*Dict. de l'Armée*) "are an impolitic and barbarous means, since it attacks non-combatants, and is rather a warfare against the inhabitants than against the armed defenders, exasperating the people and *nationalizing* the strife." Of the bombardments recorded may be mentioned that of Genoa in 1684; of Tripoli in 1685, 1728, and 1747; Barcelona, 1691. Brussels was bombarded in 1694 by Louis XIV. ("3000 bombs and three times as many red-hot shot" were thrown in); Prague was bombarded in 1759; Breda, Lille, Lyons, Maestricht, Mayence in 1793, and Menin, Valenciennes, Le Quesnoy, Ostende, Nieuwpoort, and Lécluse in 1794. Some resisted—as Lille and Mayence—others succumbed. That of Lille is most noted, this small place being subjected for 140 hours (6 days and nights) to the fire of 12 mortars and 24 cannons. During the siege of Antwerp in 1832 thirty-one thousand six hundred and eighty-nine shells were thrown into the citadel without material effect in accelerating the surrender.* Glogau, Breslau, and Schweidnitz were bombarded by the French in 1806 and 1807. During the long two years' blockade, 1809–10, of Cadiz by the French under Marshal Victor it was found impossible to reach the city from the lines with shells from ordinary mortars: long bronze howitzers of 10 inches calibre were cast at Seville (one of which is now to be seen as a trophy (see Fig. 1) in St. James's Park near the Horse Guards, London) and called *à la Villantroys*, from the French colonel of artillery who had proposed them. These, elevated 45°, threw their projectiles 5000 metres (3 miles) into the heart of the city; but to attain this range it was found necessary to load the shells (already weighing 95 lbs.) with lead, to the exclusion of most of the bursting-charge. In bursting they produced no effect, and it is stated that the inhabitants were "scarcely aware of the bombardment."

FIG. 1.



At the siege of Vera Cruz by Gen. Scott in Mar., 1847, three mortar batteries each containing four (10-in.) mortars and a battery of 8 large (8-in.) howitzers were established bearing upon the quarter called "La Merced." On the 23d Gen. Scott summoned the place and a conference was had; it proving fruitless, the 12 mortars opened on that day and the howitzer battery the day following. The fire continued throughout the 25th, 26th, and 27th. The La Merced quarter soon became ruinous—200 persons are said to have been injured. The fears of an assault caused Gen. Morales to surrender on the 27th. A shot from the Fort St. Juan entered one of our mortar batteries on the 22d, killing by its "wind" (for though knocking off his cap, the skin was not broken) Capt. Jno. R. Vinton, 3d artillery. During the bombardment our fleet kept up a cannonade on the fort which, though intact, surrendered a few hours after the city.

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* Monster-mortars, like monster-guns, date far back in the history of artillery. One made at Ghent and used in the siege of Oudenarde is yet exhibited in the latter city. At the siege of Antwerp a mortar of sixty centimetres (24 inches) calibre, weighing 7000 kilogrammes and throwing a shell of 500 kil. (1100 lbs.), designed by Col. Paixhans, was used. It threw 15 shells in the last two days of the siege. It was thought that if one fell on a magazine it would destroy it; but the shells actually thrown caused no serious damage. (*Spectateur Mil.*, 1833.) It was fired with 8 kil. of powder, but its full charge was 13 kil. Fired subsequently with this charge it burst.

De Blois (*Capitaine d'Artillerie*) published in 1848 a "*Traité des Bombardements*" to maintain that this means has not, as asserted, fallen into disuse; that bombardments reduce places with much less loss of time, munitions and blood than regular sieges; and, finally, to defend the system "against the unjust reprobation cast upon it in characterizing its employment as an act of barbarity."

The cases cited by him, nearly all of which have been referred to in this, scarcely sustain his thesis; still very recent examples go to prove that it is an agent which will continue, under certain circumstances, to be resorted to. Grivel ["*La Marine dans L'attaque des Fortifications et le Bombardment des villes,*" Paris, 1856] maintains that in the use of *curved* fires, combined with direct, naval armaments will in future find the most effective method of attacking fortified places. By the term *curved fires* he includes fire by which projectiles from rifled guns (or even smooth-bores) can, by elevating the piece, be sent, at long ranges, into the interior of a place. The increase of calibre of modern artillery, and more especially the introduction of the rifled principle, has made such fires as effective as that from mortars, and the term "bombardment" is now extended to such.

At Odessa this species of bombardment was first effectively employed in 1854. The results attained there suggested to the allies the advantages to be derived from this application of floating artillery, and the subsequent bombardment of Sweaborg was provided for, in 1855, by adding to the fleet 21 mortar vessels which were towed to within about 2 miles (3400 metres) of the centre of the Russian arsenal, while the gunboats of the squadron, keeping in constant motion, approached to distances of two or three thousand metres. The fire was maintained 45 hours during which 4150 projectiles (2828 of which mortar shells) were thrown into the place, killing and wounding 2000 men and destroying magazines, supplies, and shipping.

At an early period of our civil war the project of capturing New Orleans was mooted. The reduction of the Forts Jackson and St. Philip seemed a necessary preliminary. For this object a fleet of 20 mortar vessels bearing, each, one of the new model 13-inch mortars, weighing 11,500 lbs, were prepared and under command of Commander (now Admiral) David D. Porter, added to Admiral Farragut's fleet. These vessels were moored to the right bank of the river at distances of 3000 to 4000 yards from the forts, their positions being screened from view by the woods. The bombardment commenced on the 18th April, 1862, continued six days and six nights during which time 7500 bombs were fired, of which 1080 exploded in the air and 1113 were afterwards counted as having fallen upon the fort and solid ground of glacis and levees, and 3339 were computed to have fallen in the wet ditches and overflowed lands surrounding the fort [for the levees being broken by the shells the site was overflowed]. At the end of this bombardment Admiral Farragut forced the passage with his fleet, and, destroying the Confederate flotilla of iron-clads and gunboats, the forts surrendered.

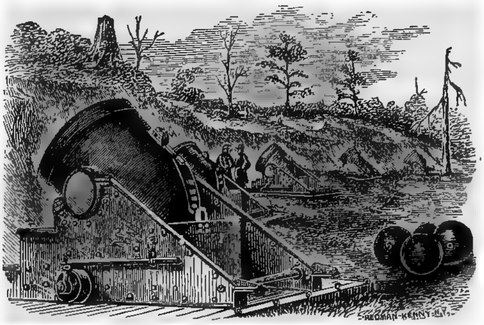
Fort Jackson has a portion of its guns in casemates of the curtains; the arches were of brick of very moderate thickness, roofed with concrete, affording at the crown a thickness of 3 feet of masonry. These were covered by the earthen parapet and terreplein. In the flanks of the bastions were flanking casemates, the brick arches of which were not only destitute of earth covering but of the usual concrete roofing. All the guns of Fort St. Philip were "en barbette." An engineer officer (Gen. Weitzel) examined the work immediately after its capture, and states:

"Fort St. Philip stands with one or two slight exceptions to-day without a scratch. Fort Jackson was subjected to a torrent of 13-inch and 11-inch shells during 144 hours. To an inexperienced eye it seems as if this work were badly cut up. It is as strong to-day as when the first shell was fired at it. The garrison did not bomb-proof the citadel" (*i. e.* had not placed earth over the heavy timber blindage spanning the walls for that purpose) "consequently the roof and furring caught fire. This fire with subsequent shells ruined the walls so much that I am tearing it down and removing the débris to the outside of the work. Three shot furnaces and three cisterns were destroyed. At several points the breast height walls were knocked down. One angle of the magazine on the north side of the postern was knocked off. Several shells went through the flank casemate arches (which were not covered with earth) and a few through the other casemate arches (where two or more struck in the same place). At several points in the casemates the thirteen inch shell would penetrate through the earth over the arches, be stopped by the latter, then explode and loosen a patch of brickwork in the soffit of the arch about 3 feet in diameter and three quarters of a brick deep, at its greatest depth." "To resist an assault, and even regular approaches, it is as strong to-day as it ever was." Gen. Abbot subsequently examined Fort Jackson, and reports that in one case a curtain casemate arch was broken through where there was 3 feet of masonry and 6½ feet of earth (the earth being a very pervious river formation). It does not appear that, otherwise, the forts were much injured or that the efficiency of their fire upon the fleet was seriously impaired. Doubtless, however, the loss of "morale" in the garrison which induced the surrender was due not merely to the successful passage and the destruction of the floating defences, but to the physical exhaustion arising from the six days bombardment and subsequent furious artillery contest with our fleet; and the bombardment is not therefore to be reckoned as without influence in the final result. This conclusion has an important bearing; for the writer, in calling for the use of mortars, in a memoir prepared for the Navy Department, did not maintain that the passage could not be forced; but contended that "to *pass* these works, merely, with a fleet and appear before New Orleans is merely a raid—no capture. New Orleans and the river cannot be held until communications are perfectly established."

Mortar vessels as well as improvised iron-clads were at an early date provided for our fleet in the upper Mississippi. After the fall of Forts Henry and Donelson and the evacuation of Columbus, the agency of bombardment (in conjunction with the fire of the cannon of the fleet) were first brought to bear upon the fortified position of Island No. 10 in the Mississippi, a short distance below New Madrid (Missouri). The bombardment was kept up from Mar. 16 to April 8 (1862), the mortar vessels at one time numbering sixteen. The works and troops being disseminated over an extensive area (the island being over a mile long and 1½ mile wide), neither the bombs nor the cannonade appear to have had much influence in causing the surrender. A similar remark is applicable to Fort Pillow, situated on the Mississippi, about 100 miles above Memphis.

When the course of events decided the establishment of a siege before Yorktown, in April 1862, the Assistant Secretary of the Navy, Mr. Fox, notified Gen. McClellan that ten of the new 13-inch mortars, which had been provided for naval purposes, would be placed at his disposal. As easy water communication made their application practicable, they were accepted and put in battery on the margin of a navigable arm of Wormley Creek, at about 2500 yards distance from the ramparts of the town.

Fig. 2.


REDMAN-KENNY-N.Y.

Besides the above there were established a battery of ten 10-in. siege mortars at 2000 yards, another of five 10-in. sea-coast mortars at 2500 yards, and another of five 10 and five 8-in. siege mortars at 1600 yards. The place was evacuated before our siege and mortar batteries opened.

Fort Pulaski, situated on Cockspur Island, mouth of Savannah River, Ga., and defending the river approach to Savannah, was captured by bombardment and breaching, April 11th 1862, by the U. S. forces under command of Gen. Gillmore. The fort is pentagonal in form with brick casemates on all sides and brick scarp-wall. It mounted one tier of guns in embrasure and one *en barbette.*

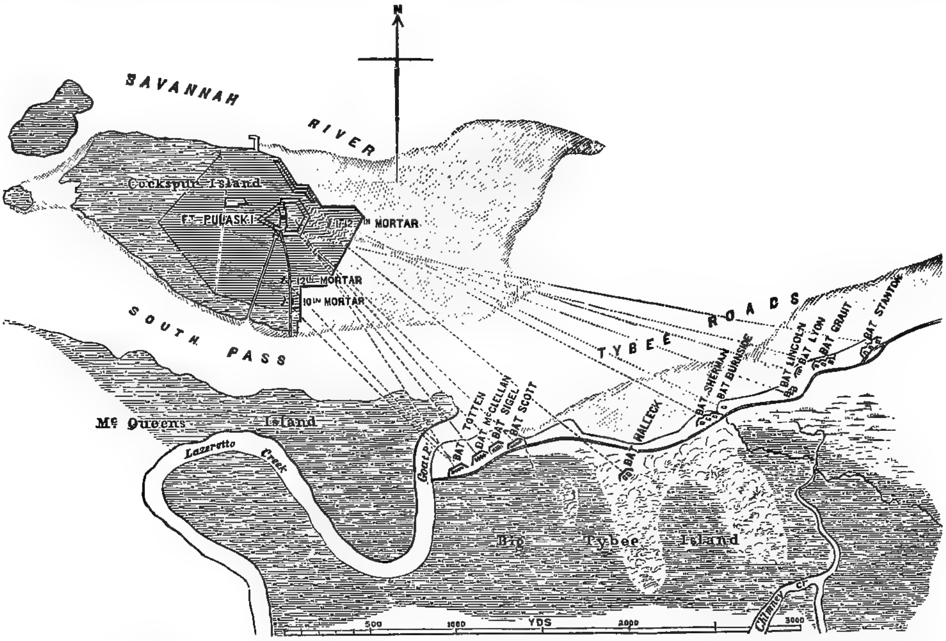
The artillery of the besiegers consisted of thirty-six pieces distributed in eleven batteries along the shore of Tybee Island, at various distances from the work as follows (see Fig. 3):

No. 1—3 heavy 13-in. mortars	3,400	yards distant.
" 2—3 " " "	3,200	" "
" 3—3 10-inch columbiads	3,100	" "
" 4—3 8-in. "	3,045	" "
" 5—1 heavy 13-inch mortar	2,790	" "
" 6—3 " " " 's	2,600	" "
" 7—2 " " "	2,400	" "
" 8—3 10-in. columbiads 1 8 " "	1,740	" "
" 9—5 30-pdr. Parrott rifles 1 48- " James rifle (old 24 pdr.)	1,670	" "
" 10—2 84- " " " (old 42-pdr.) 2 64- " " " (old 32-pdr.)	1,650	" "
" 11—4 10-inch siege mortars	1,650	" "

Batteries 8, 9, and 10 were designed to breach the scarp wall of the work, and all the other batteries to keep down its fire and destroy its barbette armament. Some of the 13-inch mortars were served with the view of breaching the casemate arches.

The bombardment began about 8 o'clock on the morning of April 10th 1862. By half past 9 A. M. all the batteries were in active operation, and were so maintained until the dusk of evening, a period of about ten hours. Throughout the night firing was kept up with two 13-inch mortars, one 10-inch mortar, and one 30-pounder Parrott rifle, the object being to prevent the garrisons making any arrangement for their protection by piling sandbags behind that portion of the wall selected for breaching or against the wall of the magazine, which would be exposed to direct fire as soon as the breach should be effected in the scarp-wall. During the first day's firing the breach was fairly begun in the pan-coupé connecting the South and South-East faces. On the morning of the 11th, a little after sunrise, all the batteries were again opened, and the breach was rapidly enlarged, and by 2 o'clock in the afternoon the scarp wall for a length of about forty-five feet had fallen into the ditch. The fire from the breaching batteries passed freely through two of the casemates, endangering the safety of the powder-magazine on the opposite side of the work. At two o'clock the fort raised a white flag and surrendered.

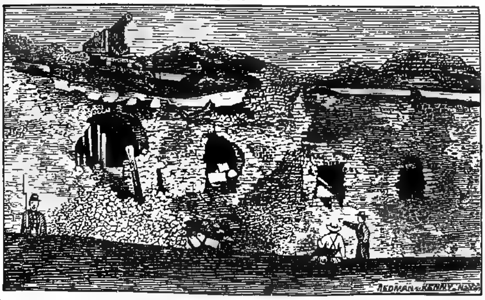
FIG. 3.



Map showing the position of the batteries used by the U. S. Forces in the reduction of Fort Pulaski, April 10 and 11, 1862.

The wall was found to be greatly shattered, much beyond the limits of actual breach, so that one hundred feet of its length had to be replaced by new brick-work. (See Fig. 4.)

FIG. 4.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Fort Pulaski: front view of breach, from opposite side of ditch.

The number of shots fired is shown below:
From—

Mortars: 1,144 13-in. shells and 588 10-in. shells.
10-in. columbiads: 203 shots and 321 shells.
8- " " : 298 " " 428 "
84-pdr. James rifles (old 42-pdr. rifled): 190 shots and 207 shells.
64- " " " (" 32 " "): 380 " " 16 "
48- " " " (" 24 " "): 133 " " 116 "
30- " Parrott " : 150 shots and 1,101 shells.

It was estimated that 110,643 pounds of metal thrown from the breaching batteries struck the breached portion of the wall, equal to 2,458 pounds per lineal foot of wall, the average distance of the breaching gun from the work being 1,687 yards. With small smooth-bore guns at 500 yards distance, used during the Peninsular war in Spain, it was estimated by Sir W. Dennison that 2,544 pounds of metal was expended per lineal foot of wall, in breaching good rubble masonry backed by earth.

The barbette armament of Fort Pulaski was so much injured during the first day as to render it unserviceable. No injury was inflicted upon the arches by mortar shells. Not more than one-tenth of the 13-inch shells fired fell inside the work.

Only twenty pieces of ordnance of the fort bore on the besiegers' batteries on Tybee Island.

The recapture of Fort Sumter and the occupation of Charleston was from the first deemed by the federal government as of urgent importance.

Fort Sumter was a strong casemated brick-work of five faces, designed to mount a total armament of 135 guns, two tiers in embrasure and one *en barbette*, located on a shoal on the south side of the entrance to the inner harbor, at its narrowest point, and three and a half miles from the nearest part of Charleston City. The scarp wall was 7½ feet thick and 40 feet high above the enrockment from which it rose. The embrasures of the second tier had never been finished, and before the siege began had been walled up with brick. The fort never received its full armament. The nearest land is the north end of Morris Island, nearly due south about 1400 yards distant from the fort, and from this point the island—a narrow strip of sand—stretches along the coast in a southerly direction for a little more than three miles and a half. When siege operations began, the Confederates had possession of the whole of Morris Island, and had erected a strong and heavily-armed earthwork—Fort Wagner—1300 yards from the north end of it, and 2700 yards from Fort Sumter, with the object of holding at least the northern half of the island, in order to prevent the establishment of batteries thereon, within effective breaching distance of Fort Sumter. They also had defences on the south end of the island to prevent its capture. The plan of attack agreed upon comprised:

1. The capture of the south end of Morris Island by assault.
2. The siege and capture of Fort Wagner.
3. The demolition of Fort Sumter by batteries established on the north end of Morris Island; and
4. The entrance of the monitors into the inner harbor, and their passage up to the city of Charleston.

This programme was carried out with the following results:

On the 10th of July, 1863, the south end of Morris Island and the several batteries erected for its defence was captured by a brigade of infantry, which approached in small boats and landed under fire.

Two open assaults of Fort Wagner—on the 11th and 18th of July respectively—demonstrated the impracticability of carrying the position by that method of attack.

The plan of operations was then changed so as to give the demolition of Fort Sumter precedence, in point of time, over the capture of Fort Wagner, in order not to delay unnecessarily the entrance of the fleet and the capture of Charleston, for although Fort Wagner, in the hands of the besieged, was intended to prevent the erection of effective batteries against Fort Sumter, it did not protect the channel of approach by Fort Sumter to the inner harbor, or any of the channel obstructions erroneously supposed to exist there.

First Bombardment of Fort Sumter.—The demolition of Fort Sumter over the heads of the garrison of Fort Wagner was then the next step in the modified plan.

The armament placed in position for this purpose, and their several distances from Fort Sumter, are shown in the following table:

1.	2 8-inch Parrott rifles	3,516	yards distant.
2.	3 6.4 “ “ “	3,447	“ “
3.	2 6.4 “ “ “	3,428	“ “
4.	2 8 “ “ “ 2 80-pdr. Whitworth rifles	3,938	“ “
5.	1 8-inch Parrott rifle	4,172	“ “
6.	1 8 “ “ “ 2 6.4 “ “ “	4,272	“ “
7.	2 6.4 “ “ “	4,278	“ “
8.	1 10 “ “ “	4,290	“ “

Firing from these batteries commenced on Aug. 17th, 1863. Its first stage ended Aug. 23. The firing from the most advanced of these batteries, which were less than 900 yards distant from Fort Wagner, was seriously interfered with and at times partially suspended, by the galling fire from that work, to which the cannoniers were almost constantly exposed. The combined fire of mortars and light pieces, aided by the gunboats and iron-clads, failed to subdue it, and it was necessary occasionally to turn the breaching batteries upon it. The result of this seven days' bombardment is thus given in the official report of the chief of artillery of the siege:

The fire from the breaching batteries upon Sumter was incessant, and kept up continuously from daylight till dark, until the evening of the 23d. For five days all the guns were directed upon the gorge wall, and had resulted in bringing it down to such an extent that on the evening of the 21st a practicable breach had been accomplished. On the morning of the 22d the fire from Batteries Nos. 1, 2 and 3 was directed upon the south-easterly face or right flank of the work, with the view of dismounting the guns on the barbette of this face, which commanded the entrance to the harbor, as well as to destroy the guns on the north-easterly face, which this fire would take in reverse. The fire upon the gorge had, by the morning of the 23d, succeeded in destroying every gun upon the parapet of it, and, as far as could be observed, had disabled or dismounted all the guns upon the parapet of the two faces looking towards the city, which it had taken in reverse. The parapet and ramparts of the gorge were, for nearly the entire length of the face, completely demolished, and in places every thing was swept off down to the arches, the débris forming an accessible ramp to the top of the ruins.

There being nothing further to gain by a longer fire upon this face, all the guns were directed this day upon the south-easterly flank, and continued an incessant fire throughout the day. The demolition of the fort at the close of this day's firing was complete, so far as its offensive powers were considered. Every gun upon the parapet was either dismounted or seriously damaged; the terre-pleine for the entire circuit of the place must have been shattered and ploughed up by our projectiles, hundreds of which had been seen to strike upon it. The parapet could be seen in many places, both on the sea and channel fronts, completely torn away down to the terre-pleine. The place, in fine, was a ruin, and effectually disabled for any immediate defence of the harbor of Charleston.

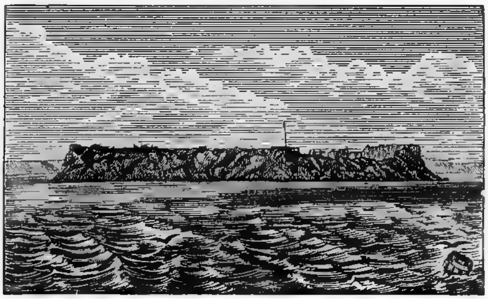
Having accomplished the end proposed, orders were accordingly issued, on the evening of the 23d, for the firing to cease, having been continuously sustained for seven days. There had been thrown five thousand and nine projectiles, of which about one-half had struck the fort. The weight of metal thrown during the seven days ending Aug. 23d was 289,986 pounds, omitting that expended by the four rifles in the naval battery (No. 4), say 20,000 pounds. The enemy remained in possession of the work, having constructed a system of subterranean galleries within the ruined casemates of the fort.

Second Bombardment of Fort Sumter.—Fort Wagner was captured on the morning of Sept. 7, thus giving the besiegers possession of the whole of Morris Island. Heavy guns bearing upon Fort Sumter were at once established in Fort Wagner and on the north end of the island. Up to this time the gorge wall only had been breached. The south-east face, the only one seen from Morris Island except the gorge, remained standing, although badly shattered in many places. Reports having been made by reconnoitering parties that the garrison were attempting to remount guns on this face, it was determined to cut down that face with the rifled guns established in Fort Wagner and on the north end of this island, so that the fire of the besiegers passing over the débris of the gorge and north-east face would take the casemates of the opposite or channel fronts in reverse, and prevent the mounting of guns there.

Fire was opened on the south-east face on the 26th of October. The armament used for this purpose comprised one 10-inch, two 8-inch and nine $6\frac{4}{10}$-inch rifles, one 10-in. columbiad and four 10-inch sea-coast mortars. The distances of these several guns from Fort Sumter varied from 2,500 to 1,300 yards.

In a few days the S. E. face was more completely a ruin than the gorge wall. The débris formed a continuous and practicable ramp, reaching from the water to the summit of the breach. The two faces of the work seen from Morris Island were both in ruins, many of the casemate arches of the channel fronts had fallen in from the reverse fire, and the entire armament of the work had been destroyed or removed to prevent destruction. (For these notices of bombardments of Forts Pulaski and Sumter, the writer is indebted to the distinguished officer who commanded, Gen. Q. A. Gillmore.) A view of the work after the second bombardment is shown below.

Fig. 5.

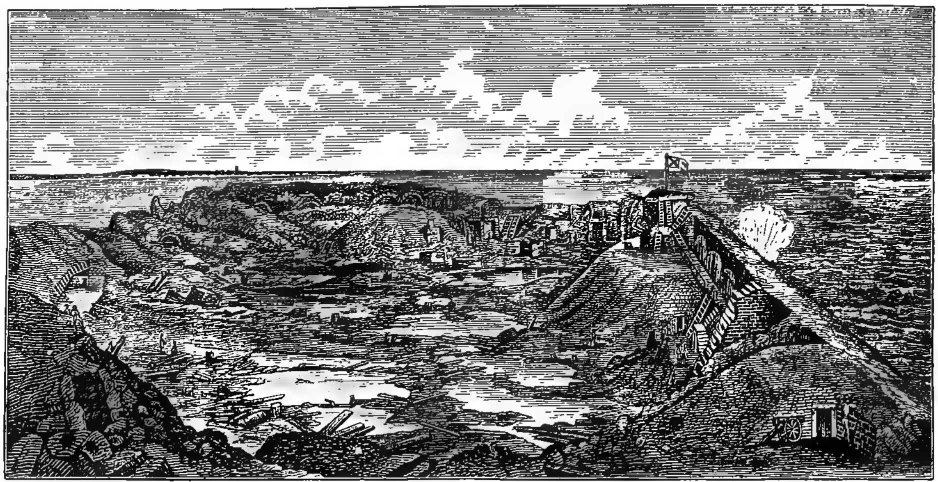


Fort Sumter, Nov. 1, 1863, after the second bombardment.

The recent great European war furnished numerous examples of a resort to bombardment as an auxiliary to siege or blockade, of which the most conspicuous are the sieges of Strasburg and Paris. The former city, fully invested on the 8th of August, was attacked by regular siege approaches and surrendered (Sept. 27) only after, its walls breached, it became exposed (according to Gen. Ulrich) to the "doubtful chances of sustaining an assault." But a bombardment from Krupp guns, howitzers and mortars commenced Aug. 18th and threw shells into the streets of the city with ruinous effect and to the serious injury of the venerable and magnificent cathedral.

Paris was invested soon after the surrender at Sedan; and it was doubtless believed that its surrender would follow. No attempt or regular siege was ever made and it was not until late in December (probably owing to the difficulty of collecting siege artillery, the Strasburg and numerous minor sieges employing all available) that from the heights of Chatillon a cannonade was opened upon the southern forts. Early in January shells commenced to be thrown from the same point into the southern quarters of Paris and this was continued till the 27th. On the 21st January a violent cannonade and bombardment was opened upon the detached forts of St. Denis and also upon the town, 120 shells falling there in one hour (22d) and many hitting the ancient cathedral. The population took refuge in Paris. At the time (1840–48) the defenses of Paris were constructed the extreme range of projectiles did not exceed two and a half miles; and it was in relation to the artillery service of the day that the forts were located. Hence they did not perfectly protect Paris (as intended) from bombardment, which, however, had no important effect. The distance from the Prussian batteries on the heights of Chatillon to the nearest fort (Vanvres) is about one mile—to the nearest part of the "*enceinte*," 2¼ miles; to the populous regions of the southern quarters 3 miles; to the Palace of Luxembourg, Pantheon, Hotel des Invalides, and the "monumental" portions of Southern Paris, 3½ miles. Hence the modern rifle (Krupp's guns of the Prussians) extends its range (with high elevation) to all these regions.

FIG. 6.



Fort Sumter, Dec. 9, 1863. Interior view from the south-west angle—from a drawing made by the Confederates. The original bears the autograph approval of the Confederate general commanding the Department of South Carolina, Georgia, and Florida, and may therefore be assumed to be correct. Morris Island and the U. S. fleet are seen on the right, and Sullivan's Island and Fort Moultrie on the left. The right of view shows the gorge face and the top of the adjoining face looking down the harbor. Both were breached by the Morris Island batteries, although oblique to the line of fire. The débris formed an easy ascent from the water to the crest. The left and foreground show the other faces, in ruins from the reverse fire from Morris Island. The interior slopes were subsequently made much steeper by the besieged than shown in the view, and were revetted with gabions. Bomb-proof quarters were also constructed under the ruins for the garrison. These quarters consisted of a continuous gallery all around in the ruins, protected on top and on the side next Morris Island by thick embankments of earth. Throughout the autumn of 1863 the ruins contained no mounted guns. It was simply an infantry outpost. It repulsed a naval assault from small boats Sept. 8, 1863, and was held until February, 1865. On April 14, 1865, the fourth anniversary of its capture by the Confederates, the U. S. flag was again raised over the ruins with imposing ceremonies.

In 13 days from 5th to 18th of January it is computed that about 500 shells a day fell in Paris, hitting and wounding 308 persons, a fourth of whom mortally, *i. e.*, an average of 25 persons each day and 25 shells for each person hit. The shells made little distinction of age or sex though it is asserted that during the latter days more women and children than men were struck. The number of private edifices hit averaged 50 a day, double the number of persons hit. The surface over which the bombardment extended was about 2000 hectares (5000 acres) or one-fourth the total area of Paris. (The batteries being mainly on the heights of Chatillon south of Paris and of the southern forts this area is mostly on the left or south bank of the Seine.) The population of this portion may be estimated at about 500,000. The Pantheon, the Museum, the Hotel des Invalides (with its church and tomb of Napoleon) are among the monumental structures of this portion of the city. All were more or less injured.

It is asserted (L. Simonin, Revue des Deux Mondes, Feb., 1871) that in a military point of view the bombardment by itself was wholly inefficacious.

Nevertheless, though a city so extensive as Paris may endure a protracted bombardment, the destruction of life and property is something serious, and it must especially be so in *small* fortified towns; hence the increased range and accuracy of hollow projectiles have rendered the old system of closely surrounding a town with a continuous rampart or enceinte both useless and dangerous unless supplemented by a system of detached forts sufficiently in advance to keep an enemy's artillery beyond that distance, from which he might destroy the place by his shells: and it is now contemplated to supplement the fortifications of Paris by a second and much further removed cordon of detached forts.

Small forts, by *themselves*, may however very safely defy bombardment, if reasonably provided with casemates or bomb-proofs. Fort Jackson, subjected to vertical fire only, was materially intact after a six days' bombardment, though doubtless the surrender was in *some* degree due to it. Fort Pulaski surrendered because its walls were thrown down and its magazines exposed, by the agency of *direct* fire. Fort Sumter was reduced to a ruin by breaching fire directed against its exposed vertical walls, but it never surrendered: while the little sand work, Fort Wagner, defied both direct and curved fire for two months and was finally evacuated. An attempt to destroy by shells the bomb-proof or timber blindage covered with sand which sheltered its garrison—the exposed end of which could be seen over the parapet—signally failed; the sand running in quite as fast as it could be blown away by shells.

Hence, though the fortification of capitals, great naval or military depots, must, if attempted at all, be undertaken on an immense scale, yet the applicability of modern rifled guns (in place of *mortars*) to the purposes of bombardment, and the increased range of their curved fire, has not destroyed the utility of small forts as elements of the outer cordon of great fortified places, or, used isolatedly, for the special purposes of guarding great military routes, railroads, or water approaches.

J. G. BARNARD.

Bom'bax, a genus of large soft-wooded trees of the natural order STERCULIACEÆ (which see), nearly related to the baobab tree. They are natives of tropical climates, especially America. They yield great quantities of cotton, but the fibre is short, does not spin well, and is not durable. Nevertheless, in India cloth is made of it to a small extent. It would probably make good paper.

Bombay', a presidency of British India, is bounded on the W. by the Indian Ocean or Arabian Sea. Area, including Sindh, 124,465 sq. m. A large part of the surface is mountainous. The long range of the Western Ghauts extends parallel to the sea-coast in a direction nearly N. and S. Between this range and the sea is a narrow tract called the North and South Concans, the climate of which is very hot and moist. The annual rainfall in the Concans is more than one hundred inches, in consequence of the vapors of the south-west moonsoon being intercepted by the Ghauts. This province is intersected by the Nerbudda and Taptee rivers, which flow westward into the Gulf of Cambay, and is also drained by the sources of the Godavery and the Kishna, which run in the opposite direction. The soil of the valleys and plains is fertile. Cotton and rice are the staple productions of this region, which contains the richest cotton-fields of India. Sugar and indigo are also raised here. Among the indigenous plants are the cocoa-palm and the teak tree. Bombay has important manufactures of silk stuffs and of woollen and cotton cloths. In 1880 it had over 1800 m. of railway in operation. The administration of this country is vested in a governor and three councillors, subject to the superintendence, direction, and control of the governor-general of India in council. To this province belongs the naval force for all the presidencies. Capital, Bombay. The annual revenue for the fiscal year 1880 amounted to £12,164,215. Pop. in 1881, 16,383,422.

Bombay [from the Port. *Bom Bahia* (or *Boa Bahia*), *i. e.* "good harbor"], a city and seaport of British India, the capital of the above province. It is situated on the S. end of the island of Bombay and on the Indian Ocean; lat. 18° 56′ N., lon. 72° 54′ E. It has an excellent harbor, affording good anchorage for ships of the largest size, and is favorably situated for commerce, being in a direct line between Calcutta and Aden. It is the W. terminus of a railway which connects it with Calcutta. The mean temperature is 82° F. At the southern end of the island, which is eight miles long and three miles wide, is the fortified European town, and one mile N. of that is the Black Town, in which the Hindoos and Mohammedans reside. The density of the population of this part of the city is more than three times that of the most populous districts of London—namely, 759 persons on an acre (according to the census of 1882), while the extreme ever reached in London is 222. Between these two towns is the esplanade and the barracks. Among the most remarkable buildings are the town-hall, mint, cathedral, the custom-house, the library of the Asiatic Society, the Elphinstone Institution, the missionary houses, the Grant Medical College, the great Hindoo temple of *Momba Dêvî*, and the Jamsetjee Hospital. The chief articles of export are raw cotton, shawls, opium, coffee, pepper, ivory, and gums. Bombay imports raw silk, sugar, and silk stuffs from China, and cotton yarn, cotton cloth, hardware, glass, copper, etc. from England. The exports of Bombay for the year ending Mar., 1881, amounted to £28,549,207; the imports for the same year were £27,149,167. Bombay, excepting Calcutta and Canton, is the greatest commercial emporium of Asia, and is the chief Indian port connected with the establishment of steam navigation between India and England. There is now a regular communication by steamers between Bombay and England through the Red Sea and the Mediterranean. Steamers also ply between this port and Point-de-Galle in Ceylon. Among the races that compose the population of Bombay, the Parsees, descended from the Persian fire-worshippers, are distinguished for their respectability, wealth, and commercial enterprise. They are extensively engaged in shipbuilding, which is one of the most important interests of the city. The most flourishing and important industry in Bombay is the manufacture of yarn and cotton cloth, for which it has numerous large steam spinning and weaving mills. Pop. in 1881, 753,000.

Bombay Hook Island, Delaware, is a part of Duck Creek hundred, Kent co., and is separated from the mainland by Duck Creek. Its N. end (lat. 39° 21′ 46″ N., lon. 75° 30′ 19″ W.) has a brick lighthouse 36 feet high, with a fixed white light 46 feet above the water.

Bomb-Ketch, an obsolete form of mortar-vessel, which was nearly seventy feet long and drew eight or nine feet of water.

Bomb Lance, an explosive missile used in the whale-fishery, consists of a cylindrical shell of iron armed with a sharp and heavy point of a triangular form. It is charged with powder, introduced through an opening at the rear end of the shell, and the opening is afterwards stopped by melted lead. The lance is discharged from the barrel of a musket, and is exploded by a fuse after it has penetrated the body of the whale.

Bomb-Proof, a term applied to a military structure of great thickness and strength which is capable of resisting the explosive force of bombs falling on it. The powder-magazine of a fort is usually protected by a bomb-proof vault built of stone or brick, and covered with three or four feet of earth. (See CASEMATE.)

Bom′ford (GEORGE), an American officer, born in New York in 1780, graduated at West Point in 1805, chief of ordnance, U. S. A., May 30, 1832, with the rank of colonel. He was engaged as an engineer upon the construction of fortifications till 1812, when he was placed on ordnance duty. To the skill and inventive talent of this invaluable officer the country was largely indebted preceding and during the war of 1812–15 with Great Britain, he being almost the only one well informed as to the manufacture of ordnance and ordnance stores; he also introduced the bomb-cannon under the name of "columbiads." Brevetted lieutenant-colonel Dec. 22, 1814, for meritorious services in the ordnance department. After 1842 he was on inspection duty, and made many ingenious and valuable experiments on the best forms for heavy artillery. Died Mar. 25, 1848, at Boston, Mass., aged sixty-eight.

GEORGE W. CULLUM.

Bomford (JAMES V.), a son of the preceding, born in New York, graduated at West Point in 1832, served with distinction in the Mexican war, winning several brevets. He became colonel of the Eighth Infantry in 1864, and served with honor in the late civil war.

Bom Jardim (*i. e.* "good garden"), a town of Brazil, province of Bahia, in a rich and beautiful valley, 20 miles S. by E. of Crato. It has a considerable trade and large manufactures of millstones. Pop. about 6000.

Bo′na, or **Bonah** [Fr. *Bone;* anc. *Hippo Regius;* called by the Arabs *Beled-el-Arab*], a fortified seaport-town of Algeria, in the province of Constantine, is on a bay of the Mediterranean, 74 miles N. E. of Constantine; lat. 36° 54′ N., lon. 7° 48′ E. It is finely situated at the foot of a hill near the mouth of the river Seibous or Sebus, and is defended by Fort Cigogne, which is on the top of the hill. Bona was occupied by the French in 1832, since which it has been much improved. It has new markets, bazaars, and reading-rooms; also manufactures of tapestry, saddles, and native clothing. Wool, hides, grain, and coral are exported from it by steamboats. Near Bona are the ruins of the great city of *Hippo Regius*, once the see of Saint Augustine. It was destroyed by the Arabs in 646 A. D. Pop. in 1881, 19,687.

Bona (GIOVANNI), a cardinal of the Roman Church, was born at Mondovi, in Piedmont, Oct. 10, 1609, was made cardinal in 1669, and died at Rome Oct. 25, 1674. His principal works are "De Divina Psalmodia," 1663, and "Res Liturgicæ," 1671. He was equally distinguished for piety and learning.

Bo′na De′a (the "good goddess"), a Roman divinity, the sister or wife of Faunus, was worshipped only by the Roman women, who concealed her name from the men. According to some authorities, she was identified with Ops. Her annual festival was celebrated on the 1st of May, in the house of the consul, with mysterious rites, from which all males were strictly excluded. Her symbol was a serpent.

Bo′na Fi′de [Lat.], "in good faith," without fraud, innocently; without notice. A *bona fide* purchaser is one who purchases for a valuable consideration, without notice. This subject is of great importance in equity jurisprudence. It is a general rule that a court of equity will grant no relief against a purchaser in good faith. If, on the other hand, the purchaser has notice, actual or constructive, of the equitable rights of others, he will stand in no better position than the person from whom he acquired his title. Thus, if a mortgage of land were cancelled through mistake by a mortgagee, a purchaser in good faith from the mortgagor would hold free from the mortgage. On the other hand, if he had notice of the facts, a court would set up the mortgage against him as well as against the mortgagor. (See NOTICE.) The same question is presented in the case of bills of exchange, promissory notes, and other commercial paper. If the acceptor or maker has a defence to it as to the payer, it will in general be shut off as to a purchaser in good faith before maturity. But if the purchaser had notice of the defence before the purchase, he would stand in the same position as the payee.

Bonald, de (LOUIS GABRIEL AMBROISE), VICOMTE, an eminent French publicist and ultra-royalist, born near Milhau Oct. 2, 1754. He emigrated in 1791, and published a "Theory of Political and Religious Power" (3 vols., 1796). Having returned to France about 1806, he was elected to the Chamber of Deputies in 1815, and acquired much influence under the Bonapartes and the Bourbons. He advocated absolutism and the infallibility of the pope. In 1823 he became a peer of France. Among his works is "La Législation Primitive." Died Nov. 23, 1840. (See HENRI DE BONALD, "Notice sur le Vicomte de Bonald," 1841.)

Bonanza. See APPENDIX.

Bo′naparte, on R. R., Van Buren co., Ia. (see map of Iowa, ref. 7–G, for location of county), 35 miles N. W. of Keokuk. It has one of the largest woollen factories W. of the Mississippi, extensive furniture and sash, door, and blind manufactures, flouring-mill, saw-mill, pottery, etc. It possesses fine water-power. Pop. of township in 1880, 1252, including 689 in village; of township in 1885, 1266.

Bonaparte (CARLO), a Corsican lawyer, born Mar. 29, 1746, was the father of Napoleon I. He married in 1767 Letitia (Letizia) Ramolino, and had five sons and three daughters. He became counsellor and assessor of Ajaccio in 1773. Died Feb. 24, 1785.

Bonaparte (CAROLINE MARIE ANNONCIADE), queen of Naples, a daughter of the preceding, was born at Ajaccio in 1782. She was married in 1800 to Joachim Murat, who became king of Naples in 1808. She was the mother of two sons and two daughters. After the death of her husband she took the title of countess of Lipona. Died in 1839.

Bonaparte (Charles Lucien Jules Laurent), prince of Canino, a son of Lucien Bonaparte, was born in Paris May 24, 1803. He was distinguished as an ornithologist, and took little part in political affairs. His wife was a daughter of Joseph Bonaparte. He resided in Phila. and Italy, and published "American Ornithology, or a History of the Birds of the U. S." Died July 30, 1857.

Bonaparte (Jerôme), king of Westphalia, a brother of Napoleon I., was born at Ajaccio Nov. 15, 1784. He entered the French army in 1800, and during a visit to the U. S. married, in 1803, Miss Patterson of Baltimore, without the consent of Napoleon. This marriage was annulled by order of Napoleon in 1805. (Madame Jerôme Bonaparte, *née* Elizabeth Patterson, died Apr. 1, 1879, in Baltimore.) Jerome served as gen. of brigade against the Prussians in 1806, and was crowned king of Westphalia in 1807. In the same year he married a daughter of the king of Würtemburg. He lost his throne in Oct., 1813, and led a division at Waterloo in June, 1815. After many years in exile he became a marshal of France in 1850. Died June 24, 1860.

Bonaparte (Jerôme Napoléon), a son of the preceding by his first wife, was born in England in July, 1805, and graduated at Harvard in 1826. He greatly resembled Napoleon I. in appearance. He left two sons, Jerôme and Charles Joseph. Died June 17, 1870.

Bonaparte (Jerôme Napoléon), an American and French officer, grandson of Jerôme Bonaparte, king of Westphalia, and grand-nephew of Napoleon I., born 1830 at Baltimore, Md., graduated at West Point in 1852, and till his resignation of his lieutenancy in the Mounted Riflemen, Aug. 16, 1854, served on frontier duty. He entered the French imperial army Sept. 5, 1854, as second lieutenant of the Seventh Dragoons, became chef d'escadron Third Cuirassiers Aug. 15, 1855, and was transferred Mar. 16, 1857, to the Dragons de l'Imperatrice. He served in the Crimean war against Russia 1854–55, engineer at Balaklava, Inkerman, Tchernaia, and the siege of Sebastopol; for all of which active and distinguished services he was decorated by the sultan of Turkey with the "Medjidie Order," made knight of the Legion of Honor of France, and received the Crimean medal from the queen of England. He was in the Algerian campaign in 1856–57, engaged in several actions with the Kabyles; in Italian campaign against Austria 1859, engaged at Montebello, Solferino, and various outpost affairs, receiving for his gallantry the French "medaille d'Italie" and the decoration of "Military Valor" from the king of Sardinia; in garrison at various posts 1859–67, and in the guard of the empress of France 1867–72. On the fall of the empire he with difficulty escaped from the hands of the Commune in Paris. He was exiled in 1886. George W. Cullum.

Bonaparte (Joseph), king of Spain, the eldest brother of Napoleon I., was born in Corsica Jan. 7, 1768. He studied law, married Julie Marie Clary, and was elected to the French Council of Five Hundred in 1797. He negotiated the treaty of Lunéville with Austria in 1801, and that of Amiens with England in Mar., 1802. On these and other occasions he showed considerable talents for diplomacy. Urged by the imperious will of Napoleon, he accepted the throne of Naples in 1806, though he does not appear to have been ambitious of such a position. He was transferred in May, 1808, to the throne of Spain against the will of the majority of the Spanish people, who obstinately resisted the domination of the French. During his nominal reign many battles were fought between the French and the allied English and Spanish armies, who expelled him from Spain in June, 1813. In 1815 he emigrated to the U. S., and lived at Bordentown, N. J., under the name of the count de Survilliers. He died at Florence, in Italy, July 28, 1844. (See A. du Casse, "Mémoires et Correspondance du Roi Joseph," 10 vols., 1854; Thiers, "History of the Consulate and the Empire.")

Bonaparte (Letizia Ramolino), the mother of Napoleon I., was born in Corsica Aug. 24, 1750. She was considered a beauty, and had an uncommon intellect. According to her son Napoleon, "she had a great character, with much energy, elevation, and pride." She was married to Carlo Bonaparte in 1767. In 1804 she received the title of Madame Mère. Died Feb. 2, 1836.

Bonaparte (Louis), a brother of Napoleon I., was born at Ajaccio Sept. 2, 1778. He entered the army in youth, and served at Arcola and Rivoli (1797). In compliance with Napoleon's will, he married Hortense de Beauharnais in 1802, and became king of Holland in June, 1808. He and his wife separated about 1807, in consequence of their incompatibility. As nominal king of Holland he was not able to pursue the policy which he preferred, but was compelled by Napoleon to sacrifice the interests of the Dutch to the designs of the emperor, who was offended because Louis was not sufficiently subservient. Louis abdicated the throne in 1810, after which he resided in Italy. He was the putative father of Napoleon III. Died at Florence June 29, 1846. (See Thiers, "History of the Consulate and the Empire;" "Mémoires sur la Cour de Louis Napoléon et sur la Holland," Paris, 1828.)

Bonaparte (Louis Napoleon). See Napoleon III.

Bonaparte (Louis Lucien), a son of Lucien and a nephew of Napoleon I., was born Jan. 4, 1813. He was elected to the French National Assembly in 1849, became a senator in 1852, and grand officer of the Legion of Honor in 1855. He is distinguished for his labors in philology and chemistry.

Bonaparte (Lucien), prince of Canino, a brother of Napoleon I., was born at Ajaccio May 21, 1775. He was an active and energetic republican in the French Revolution. In 1795 he married Christine Boyer, a woman of obscure birth. He was chosen in 1798 a member of the Council of Five Hundred, in which he opposed the Directory. On the 18th Brumaire (Nov., 1799) he displayed great resolution, and efficiently promoted the success of Napoleon. Lucien became minister of the interior in Dec., 1799, ambassador to Spain in 1800, and a tribune in 1802. Having lost his first wife, he married in 1803 a widow named Jouberthon without the consent of Napoleon, who was angry at the match. Lucien went into exile, and refused the throne of Italy, which Napoleon offered him on condition that he should divorce his wife. He was in France during the Hundred Days, 1815, and actively supported Napoleon in that crisis. He passed the latter part of his life in Italy, and died at Viterbo June 29, 1840, leaving five sons and six daughters. With the exception of his brother Napoleon, he was undoubtedly the most eminent and talented member of his family. (See Lucien Bonaparte's "Autobiographic Memoirs," 1836; P. W. Forchhammer, "Denkrede auf den Fürsten von Canino, L. Bonaparte," 1840.)

Bonaparte (Lucien Louis), a son of Charles Lucien, was born at Rome Nov. 15, 1828. He entered the priesthood, and on Mar. 13, 1868, was made a cardinal priest.

Bonaparte (Marie Anne Élise), princess de Piombino, a sister of Napoleon I., was born in Corsica Jan 3, 1777. She was married in 1797 to Felix Bacciochi, a Corsican officer, and received in 1805 the title of princess of Lucca and Piombino. She was for about six years (1809–14) grand duchess of Tuscany, which she ruled with ability. Died Aug. 7, 1820.

Bonaparte, Napoleon. See Napoleon I.

Bonaparte (Napoléon Joseph Charles Paul), Prince, a son of Jerôme, king of Westphalia, was born at Trieste Sept. 9, 1822. His mother was a daughter of the king of Würtemberg. As a professed democrat he was elected to the French Constituent Assembly in 1848. In 1852 he received the title of prince, and was recognized as the heir of his cousin, Napoleon III., in case the latter should die without issue. He married Clotilde, a daughter of King Victor Emmanuel. His features resemble those of his uncle, Napoleon I. He was banished from France in 1873, and again in 1886.

Bonaparte (Pauline), Princess Borghese, born at Ajaccio in 1780, was the most beautiful of Napoleon's sisters. In 1801 she became the wife of General Leclerc, who died in 1802. She was married in 1803 to Prince Camille Borghese, an Italian, from whom she soon separated. A statue of Pauline, executed by Canova, is said to resemble the Venus of Praxiteles. Died in 1825.

Bonaparte (Pierre Napoléon), a son of Lucien, was born at Rome Sept. 12, 1815. He passed his youth as an adventurer in America, Italy, and Greece, and committed several homicides. In 1869 he murdered, in his own house near Paris, Victor Noir, for which he was sentenced to pay a fine. D. Apr. 8, 1881.

Bona'sa, a genus of gallinaceous birds of the family Tetraonidæ, and one of the genera included in the popular term "grouse." It comprises the hazel-grouse, a European bird, the *Tetrao bonasa* of Linnæus. This bird, which is about as large as the common partridge, is prettily mottled with gray and reddish brown. It prefers the deep solitude of the forests. Its flesh is so highly esteemed that it is consistent with German etiquette to serve it twice in succession on the table of a prince. Another species of this genus is the American ruffed grouse (*Bonasa* (or *Tetrao*) *umbellus*), which is about eighteen inches long, and is called the pheasant in Pennsylvania and the partridge in New

York and New England. The male has on each side a large shoulder tuft or ruff. In the breeding season it struts with erected ruff and tail like a turkey-cock. The loud thumping or "drumming" sound heard in the localities frequented by this bird is produced by the bird beating on its sides with its wings. It is heard most often in the morning and evening. This handsome bird makes its nest on the ground in the forests. Its flesh is a favorite article of food.

Bonaventu′ra (Giovanni di Fidanza), Saint, an eminent Italian scholastic theologian, born in Tuscany in 1221, was called the Seraphic Doctor. He taught theology in Paris, became general of the order of Franciscans in 1256, and a cardinal in 1273. He had great influence in the Church, and was venerated for his ascetic piety and the miracles ascribed to him. Bonaventura was one of the most eminent of the Schoolmen. "His great mind," says Neander, "grasped the whole compass of learning as it existed in his time." Among his numerous works are "Breviloquium," "Biblia Pauperum" ("Poor Man's Bible"), and "Itinerarium Mentis in Deum" ("Progress of the Mind towards God"). He died July 14, 1274, was canonized in 1482, and was made a doctor of the Church in 1587. (See J. C. Boule, "Histoire de la Vie de Saint Bonaventure," 1747; Ignaz A. Fessler, "Bonaventura's mystiche Nächte, oder Leben und Meinungen desselben," 1807; Vincenza, "Des heil. B. Leben und Wirken," 1874.)

Bonavis′ta, a port of entry and capital of Bonavista district, Newfoundland, is one of the oldest towns on the island. It has rather a poor harbor, a jail, and a fine Anglican church. Its people are mostly fishermen, but agriculture is also carried on. Pop. about 2600. The lighthouse on Cape Bonavista (lat. 48° 41′ 56″ N., lon. 53° 5′ 20″ W.) is a catoptric revolving white and red light, 150 feet above the sea.

Bonchamp, de (Charles Melchior Artus), Marquis, born at Jouverdeil, France, May 10, 1760, was one of the most distinguished royalist generals in the Vendean war in France, in which he was mortally wounded at Chollet, Oct. 17, 1793. His soldiers were about to massacre 5000 republican prisoners to avenge him, but at his dying request they were spared.

Bond [from the root of the noun *band,* and the verb *bind*], in law, an instrument in writing, sealed and delivered, whereby a person binds himself to pay a sum of money. It is also called a deed. It is either simple or with a condition. A bond is said to be simple when the engagement to pay is absolute. An instrument in the form of an ordinary promissory note becomes a simple bond if executed under seal. The most common form of bond is one executed under a condition. The instrument in this case consists of two parts—the engagement to pay, and the condition upon which the engagement to pay will become inoperative and void. The condition may be either for the payment of money or the performance of an act, such as the faithful execution of the duties of a public office or of agency or other authority. When for the payment of money, it is usually called a "money bond." In this case it is common to make the engagement to pay, called the penalty, double the amount expressed in the condition of the bond. The penalty will not, however, necessarily limit the amount of the recovery. In other words, in certain cases more may be recovered than the amount named in penalty of the bond; as, for example, the real debt and the interest accruing from delay in payment. At an early day, if the money named in the condition was not paid punctually, the whole penalty could be recovered. Courts of equity, however, regarded this result as in the nature of a forfeiture, and confined the recovery to the debt and the interest. When the bond is given for the performance of an act, the recovery is limited to the damages sustained by non-performance. The person who enters into the bond is called the *obligor;* the person to whom the engagement is made is termed the *obligee.* When it is executed by two or more persons, they may be either "joint" obligors or "joint and several;" that is, they may either bind themselves collectively, or both collectively and separately. An execution of the instrument by two persons simply would be joint. Express words should be used to create a "joint and several" obligation. This is an important distinction where some of the obligors are sureties, as is usual in bonds executed by incumbents of a public office. In the case of a *joint* bond, if one of the sureties should die, his estate would be discharged both in law and equity. This would not be the case had it been both *joint* and *several,* since the individual obligation would remain, though that which is joint would be at an end. A bond is otherwise termed a specialty. It is of a higher grade than an ordinary contract, which is termed a simple contract. Accordingly, if A should owe money to B for goods sold or services rendered, and should give his bond for the amount, the original claim would be merged in the bond, and if the debt were not paid an action could be brought only on the bond. This would not be the case if A had given B his promissory note, or other engagement not under seal, for the amount of the claim. If the note were not paid at maturity, the original cause of action would remain. A bond, as a general rule, is not negotiable, but assignable. A purchaser would take it subject to the equities between the original parties. (See Assignment.) The obligor of the bond commonly professes not only to bind himself, but his heirs, executors, administrators, etc. However, if these words were omitted, his obligation would be transferred to these successors in interest to the extent of the assets received from the obligor, it being a general rule in the U. S. that a debtor's property, both real and personal, is liable for his debts in the hands of heirs and other successors in interest. T. W. Dwight.

Bond (George Phillips), an American astronomer, born at Dorchester, Mass., May 20, 1825, graduated at Harvard in 1845. He aided his father, W. C. Bond, in the observatory at Cambridge, and wrote several works, among which is an article "On the Construction of the Rings of Saturn," and a work on Donati's comet. D. Feb. 17, 1865.

Bond (Henry), M. D., born at Watertown, Mass., Mar. 21, 1790, graduated at Dartmouth in 1813, settled in Philadelphia as a physician in 1819, where he gained a high reputation. He published, besides many professional papers, a "History and Genealogies of Watertown" (1855), one of the best works of its class. Died May 4, 1859.

Bond (Shadrack), born in Maryland, and an early emigrant to Illinois, was for many years a distinguished member of the Territorial legislature; delegate to Congress 1811–15; in 1815 became receiver of public moneys in Kaskaskia, Ill.; governor of Illinois 1818–22. Died at Kaskaskia, Ill., Apr. 13, 1832.

Bond (Thomas Emerson), D. D., M. D., a physician and Methodist writer, born at Baltimore, Md., in Feb., 1782. He became a professor in the medical college of Maryland, and afterward a local Methodist preacher. He edited the "Christian Advocate and Journal," an influential Methodist publication, for twelve years, and wrote important pamphlets in defence of his Church. Died Mar. 19, 1856.

Bond (William Cranch), an American astronomer, born at Portland, Me., Sept. 9, 1789, was appointed director of the observatory at Harvard University. He distinguished himself by his observations on Saturn, and discovered a satellite of that planet. Died Jan. 29, 1859.

Bond (William Key), born in St. Mary's county, Md., emigrated to Ohio in 1812; practised law in Chillicothe, and afterward at Cincinnati; became colonel of militia; member of Congress from Ohio 1835–41. Died Feb. 17, 1864.

Bon′dager, in Scotland, a laborer who rents a cottage from a farmer under an obligation to work for him at current wages at certain seasons. There are male and female bondagers. When wanted, they are obliged to turn out, though at a sacrifice of wages.

Bonded Warehouse. See Warehousing System.

Bön′der, a name given to the yeomanry of Sweden and Norway. The bönder often claim an aristocratic origin, and display a rude and antiquated hospitality to visitors. They have many virtues as a class, and constitute a large majority of the population.

Bondoo′, or **Bondou,** a small kingdom of Western Africa, in Senegambia, is about lat. 14° to 15° N. and lon. 11° to 13° W. It is bounded on the E. by the river Falemé, which separates it from Bambook. The surface is mostly level; the soil is fertile, well watered, and extensively covered with forests. The staple productions are cotton, indigo, maize, tobacco, and millet. Among the forest trees are the baobab and acacia. Iron is abundant here, and wild animals are numerous. The Foolahs are the most numerous of the tribes which inhabit Bondoo. The government is an absolute monarchy. Capital, Bulibani, a mean town on the Falemé. Pop. estimated at 1,500,000.

Bone [Ger. *Bein;* a word found in various forms in all Germanic languages], the substance of which the hard internal skeleton or framework of most vertebrate animals is formed, although some of the lower fishes have no bony skeleton, one of cartilage taking its place, while the surface (exoskeleton) of some of these cartilaginous fishes is covered with bony plates. In animals below the vertebrates there is no true bone, for the hard internal shell ("cuttle-fish bone") of certain cephalopods differs in composition from bone.

Living bone is of a reddish-white tint externally, and is of a much deeper red within. It consists of two parts: (1) an organic substance called ostein (converted by boiling into gelatine), besides a little fat, nerves, and blood-vessels, and some cartilage, amounting in all to about one-third of the whole, though the percentage is greater in young subjects. If a bone be soaked in dilute hydrochloric acid for a sufficiently long time, the organic matter alone remains, having the form of the original bone, and being flexible, tough, and translucent. If, on the other hand, a bone be burned in a hot fire with a strong blast of air, the animal matter is all burned away, leaving (2) the earthy or inorganic matter, a white, brittle mass, with just the form of the original bone. It consists of calcium phosphate (which constitutes more than half the weight of the whole bone), together with calcium carbonate and fluoride, magnesium phosphate and sodium chloride, with traces of other elements. The proportions vary in different parts of the skeleton, in the same bone at different ages, in various diseases, and in the corresponding bones of different species. Bones are usually covered at their ends and in some other parts by cartilage; but the greater part of the surface is covered by a tough, skinny membrane called periosteum; and hollow bones have a similar membrane within, called endosteum. These membranes are of the utmost importance in the growth, nourishment, and repair of bones. The endosteum also nourishes the marrow, a substance the importance of which in the animal economy has but recently been duly appreciated. It is probable that the marrow, like the closed glands, has, especially in the fœtal state, an important part in the preparation of nutriment for the organism generally.

From the periosteum, arteries and nerves enter the bone, traversing the longitudinal "Haversian canals," which are from $\frac{1}{200}$ to $\frac{1}{2500}$ of an inch in diameter, and lined with a delicate membrane resembling periosteum. Each canal is surrounded by concentric layers of bone, constituting an "Haversian rod" or "system" in which are certain variable vacuities called "Haversian spaces," which appear to be produced by the absorption and disassimilation which is continually going on in all tissues. Bone also contains innumerable "bone-cells," each occupying a cavity called a "lacuna." The lacunæ send out branches called "canaliculi," each $\frac{1}{14000}$ to $\frac{1}{20000}$ of an inch in diameter, which communicate freely with each other, and which are filled with blood-plasma. Bones are said to consist of two kinds of tissue, the compact and the cancellous; but the two differ only in relative density and the relative size of the contained cavities, in the proportion of oily matter, and perhaps in the proportion of earthy ingredients, which appears to be greatest in compact bones.

Osseous tissue is liable to several diseases, such as caries, necrosis, rachitis (rickets), osteomalacia, periostitis, cancer, exostosis, etc., each described under its own name. (For descriptions of the several bones and of their relations to each other, see OSTEOLOGY and the names of particular bones, such as CLAVICLE, HUMERUS, etc.)

CHAS. W. GREENE.

Bone, Chemical Composition of. Bones consist of bone-cartilage, or ossein, and earthy salts, besides a certain quantity of fat, which is easily removed by ether, and is not considered as a constituent of the bone. By burning bones till white, the ossein is destroyed, and the earthy salts remain as brittle bone-ash. By subjecting the bones to the action of dilute hydrochloric acid the earthy salts are dissolved and removed, and the ossein remains as a flexible, translucent substance retaining the forms of the bones. This ossein or bone-cartilage consists of about 50.13 carbon, 7.07 hydrogen, 18.45 nitrogen, and 24.35 oxygen. By long boiling with water it is completely dissolved, being converted into gelatine, which sets to a jelly on cooling. The ratio of ossein to earthy salts is very variable in different animals, and also in the bones of the same animal. Human bones average, perhaps, ossein 34 and earthy salts 66 per cent. The earthy salts contain, in 100, phosphate of lime 83.889, phosphate of magnesia 1.039, carbonate of lime 13.031, fluoride of calcium 0.470, and chloride of calcium 0.286. M. Papillon found that the bones of pigeons and rats which he had fed with food containing phosphate of strontia and phosphate of alumina contained considerable quantities of these compounds. Bones undergo considerable changes in composition in certain diseases.

Uses of Bones.—Bones are extensively used for soup, though it is stated by Liebig and others that the gelatine derived from them is not only valueless as food, but positively objectionable. Others strenuously deny the truth of the statement. In the arts, bones are employed as substitutes for ivory for buttons, handles of knives, brushes, etc., and for combs; they are also used as cattle food in the form of bone-meal; as a fertilizer, either in the form of bone-meal, bone-ash, or after treatment with sulphuric acid. They are used for the manufacture of BONE-BLACK (which see), of gelatine, of phosphorus, of phosphate of soda, superphosphate of lime for raising bread, and bone-ash is used for cupels.

C. F. CHANDLER.

Bone-Ash is the residue left on burning bones; it amounts to about 66 per cent. of the weight of the original bones. It consists of the earthy salts of the bone, the composition of which in 100 parts is given above. Bone-ash is largely exported from South America. It is used as manure, for the manufacture of superphosphates, phosphorus, cupels, and is an important constituent of English china.

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Bone-Black, or **Animal Charcoal,** is the residue left on calcining bones in close vessels. The bones are placed either in retorts, like those used in making coal-gas, or in iron pots. On the application of heat destructive distillation takes place. Combustible gases escape, accompanied by vapors which condense to ammoniacal water and offensive oils. Bone or Dippel's oil is thus produced. The residue in the vessels amounts to about 50 per cent. in weight of the original bones. It is passed between rollers, and separated by sieves into different sizes. Bone-black usually contains, after exposure to the air, from 1 to 6 or 7 per cent. of moisture. The average composition of dry bone-black, in 100, is carbon, containing nitrogen, 10, phosphate of lime, including a little phosphate of magnesia, 88, carbonate of lime, 8, sulphate of lime, 0.2, alkaline salts, 0.8, oxide of iron, 0.1, and silica, 0.3.

Animal charcoal possesses to a high degree the property of absorbing gases, and also of absorbing various substances from solutions. Its action is not limited to any one class of substances. It absorbs vegetable bases, bitter principles, astringent bodies, coloring-matters, iodine, metallic oxides, salts, etc. Its chief application in the arts is for the purification of sugar. The raw sugar is dissolved in water, more or less completely freed from suspended impurities by the aid of blood, and filtered through bags of cotton cloth, and then passed through high cylinders of iron containing the bone-black. It is thus almost completely decolorized, and at the same time freed from lime and other salts, and from certain organic substances which interfere with crystallization. On subsequently concentrating the solution in the vacuum-pan it readily yields perfectly white loaf sugar. (See SUGAR.) By washing with warm water, and subjecting to a red heat in suitable retorts, the black is *revivified,* when it may be used again. Sometimes it is also purified by fermentation and treatment with small quantities of dilute acids or alkalies. By repeated reheatings, however, the black becomes greatly condensed, owing to the semi-fusion of the phosphate of lime, and its decolorizing and purifying power is reduced to such a degree that it must be replaced by fresh black. This exhausted black, as well as the fine dust which is not suited for sugar-refining, finds a ready market for the manufacture of superphosphates to be used as fertilizers, for the manufacture of phosphorus, etc. In France, pulverized bone-black in fine powder is often boiled with the raw sugar before it goes to the bag filters.

When bone-black is to be used for decolorizing acid solutions, the phosphate of lime is first removed from it by dilute hydrochloric acid. Bone-black is sometimes employed to remove lime from highly calcareous waters. Many other forms of charcoal possess these properties, but none of them have been found so well adapted for the use of sugar-refiners as bone-black. Under the name of ivory-black animal charcoal is used as a pigment, especially for the preparation of shoe-blacking.

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Bone-Dust, a valuable manure, obtained by grinding bones in stamping-mills, by heavy revolving wheels, or by passing them through toothed iron rollers. The bone is sometimes subjected to the action of hot water and steam in a digester at a temperature of about 275° F., which dissolves out two-thirds of the gelatine and leaves a friable mass, which can easily be reduced to powder. Bone-dust is applied to the soil either in its ordinary insoluble state or as dissolved bones, the fertilizing force of which is expended in the first year.

Bone-Gelatine. See GELATINE.

Boneset, a common name of the *Eupatorium perfoliatum,* an herbaceous plant, a native of the U. S., growing in low or moist places. It is a bitter weed, having hairy leaves, which are united at the base around the stem, and are serrate, very veiny, and wrinkled. An infusion of the leaves is used as a tonic, diaphoretic, etc.

Bon'fire [*bann,* a "beacon," and *fire*], a fire kindled as an expression of public joy in the open air, usually on a conspicuous place, as the top of a hill or in the street of a city. The materials consumed are tar-barrels, wood, and other combustibles. The practice of kindling bonfires is very ancient.

Bon'gar (*Bungarus* or *Pseudoboa*), or **Rock Snake,** a genus of venomous serpents, natives of the East Indies. They are allied to the *naja,* and are distinguished by a much-keeled back, which has a row of hexagonal scales larger than the rest. The *Bungarus annularis* sometimes measures six or seven feet in length.

Bon'ham, a city, capital of Fannin co., Tex. (see map of Texas, ref. 2–I, for location of county), on R. R. and Bois d'Arc Creek, 270 miles N. N. E. of Austin, has fine flouring mills, etc. Pop. in 1870, 928; in 1880, 1880.

Bonham (Milledge L.), a statesman and Confederate general, born in South Carolina about 1815, graduated at South Carolina College in 1834, became a lawyer, and served in the Mexican war. He was solicitor for the southern circuit 1848–50, and a member of Congress from 1856 to 1860; was appointed major-general of South Carolina troops, and afterward brigadier-general in the Confederate army, and was engaged in the battles of Blackburn's Ford and Bull Run. Having been elected to the Confederate Senate he withdrew from the army, and became governor of South Carolina in 1862–64, after which he resumed his position in the army, and held it at the time of Gen. Lee's surrender.

Bonheur (Rosa), an eminent French painter of animals, born at Bordeaux Mar. 22, 1822, was a pupil of her father, Raymond Bonheur. She produced in 1850 "The Nivernais Ploughing," in the Luxembourg gallery, "The Horse Fair" (1853), "Horses in a Meadow," and "Cows and Sheep in a Hollow Road." She has received several medals, also the decoration of the Legion of Honor, and has been elected a member of the Institute of Antwerp.

Bonhomme, former capital of Bonhomme co., Dak. (see map of Dakota, ref. 8–F, for location of county), on Missouri River, 36 miles W. of Yankton. Pop. in 1880 not in census.

Bo'ni, or **Bony,** a state in the S. W. peninsula of the island of Celebes, is about 80 miles long, and is on the W. side of the Gulf of Boni. The surface is partly mountainous. The soil of the N. part is fertile, producing rice, sago, and cassia. The natives manufacture cotton cloth and articles of gold and iron. The British attacked the Bonese in 1814, and killed their king as a punishment for their piracy.

Boni, Gulf of, called also **Bughis Bay,** separates the two southern peninsulas of Celebes. It is nearly 200 miles long, and from 40 to 80 miles wide. It is dangerous to navigation from its numerous reefs.

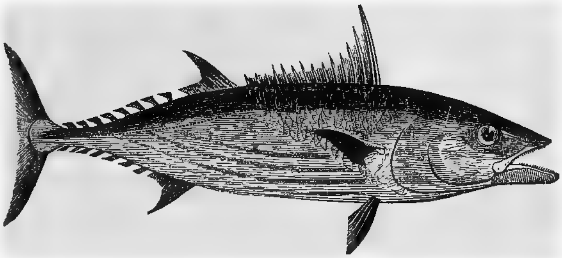
Bon'iface [Lat. *Bonifacius*] **I.,** Saint, Pope, was elected in 418 A. D. Saint Augustine dedicated several works to him. Boniface died in 422.—Boniface II., a Goth, born at Rome, succeeded Pope Felix IV. in 530. Died in 532 A. D.—Boniface III. was chosen pope in 607, and died the same year. He was the first to whom the title of "universal bishop" was given by the Greek emperor (Phocas).—Boniface IV., Pope, born at Valeria, in Italy, succeeded Boniface III. in 608. He converted the pagan Pantheon of Rome into a church. Died in 615.—Boniface V., a native of Naples, became pope in 619. He died in 625, and was succeeded by Honorius I.—Boniface VI., a native of Rome, succeeded Formosus in 896, and died fifteen days after his election. He was an abandoned character.—Boniface VII., considered by some authors an anti-pope, was elected in 974 as a rival of Benedict VI. He was driven out of Rome in 975. He was starved to death in prison in 985.—Boniface VIII., Cardinal (Benedetto Gaetani), was born at Anagni about 1228. He became pope in 1294. He issued a bull forbidding all the clergy to pay any tax on ecclesiastical property, by which he was involved in a contest with Philip the Fair of France. He excommunicated Philip, who accused the pope of heresy and simony, and caused him to be imprisoned at Anagni. Boniface was skilled in both civil and canon law, and published the sixth book of "Papal Decretals." He died Oct. 11, 1303. (See Dante, "Inferno," canto xxvii.; W. Drumann, "Geschichte des Papstes Bonifacius VIII.," 2 vols., 1852; Luigi Tosti, "Storia di Bonifazio VIII.," 1847.)—Boniface IX. (Pietro Tomacelli) succeeded Urban VI. in 1389. He was a despotic ruler, and was accused of selling benefices and indulgences. He died Oct. 1, 1404, and was succeeded by Innocent VII.

Boniface [Lat. *Bonifacius*], (Winfrid), Saint, called the Apostle of Germany, was born in Devonshire, England, about 680. He began in 716 to preach in Germany, where he converted a great number of people and founded schools and monasteries. He was made bishop by Pope Gregory II. in 723, and in 732 Gregory III. made him archbishop and primate of all Germany. In 718, in 723, and again in 738, he visited Rome, and brought the German Church into complete subjection to the papacy. Pepin le Bref, whom he consecrated king of the Franks in 752, appointed him archbishop of Mainz. June 5, 755, he was assassinated by a pagan mob at Dockum in West Friesland, and his remains were finally taken to the famous abbey of Fulda, founded by him. (See Willibald, "Life of St. Boniface;" George W. Cox, "Life of St. Boniface," 1853; Werner's "Boniface," 1875; Pfahler, 1880; Fischer, 1881.)

Bonifa'cio, Strait of (anc. *Fretum Gallicum*), is between Corsica and Sardinia. The narrowest part of it is 7 miles wide. The navigation is obstructed by rocks, which are favorable to the production of coral, a large quantity of which is obtained here.

Bo'nin, or **Archbishop Islands,** in the Pacific Ocean, extend from lat. 26° 30′ to 27° 44′ N., and are about lon. 142° E. They are divisible into three groups, the most northern of which are called Parry Islands, and the most southern, Baily Islands. Area, about 120 square miles. Peel Island, which is one of the middle group, is occupied by a small number of European and Polynesian colonists, the only inhabitants of the group. Spain claims this group.

Bonito, bo-nee'to, a name given to several fishes of the family Scomberidæ, which are allied to the mackerel. One of these, *Thynnus pelamys*, sometimes called the stripe-bellied tunny, is a native of tropical seas, and is often seen pursuing the flying-fish. It is a beautiful fish, about two and a half feet long, and resembles a mackerel in form. The color of its back and sides is a brilliant steel-blue. Four dark lines extend along each side of the belly from the throat to the tail. Its flesh, though rather dry, is eaten and relished by many, but is sometimes poisonous. The term bonito is applied to two species found in the Mediterranean, the *Auxis vulgaris* and the *Pelamys Sarda*. The former is of a uniform blue color, without stripes, and has an average length of about fifteen inches. It is usually eaten salted. The *Pelamys Sarda* is distinguished from the tunny by large and strong teeth. It measures about two feet in length, and is found on our Atlantic coast.



The Bonito.

Bo'nitz (Hermann), a German philologist, born July 29, 1814, became professor at Vienna in 1849; recalled to Berlin 1867, filling important positions, and in 1875 succeeding to Wiese's place on the ministry of instruction. He published "Platonic Studies" and other works on Plato and on Aristotle, especially an edition of the "Metaphysics" (2 vols., 1849), and a complete "Index Aristotelicus" (4to, Berlin, 1870), as supplement to Bekker's "Aristotle."

Bonn (anc. *Bonna*), a city of Rhenish Prussia, beautifully situated on the left bank of the Rhine, 19 miles by rail S. S. E. of Cologne. It is on the railway which connects Cologne with Coblentz. It has an ancient cathedral, which is a fine specimen of the Romanesque style. Here are manufactures of cotton goods, earthenware, and soap. Bonn is the seat of a celebrated university founded in 1818, which has a library of 250,000 volumes, and is attended by nearly 1000 students. Connected with it are an observatory, a botanic garden, and a museum of natural history. The buildings of this institution are excellent and very extensive. Niebuhr, A. W. Schlegel, Hermes, Simrock, and other eminent men have been professors in this university. Here are several large and elegant hotels for the accommodation of tourists, who are attracted by the picturesque scenery of the vicinity. Bonn is a very ancient town. *Bonna*, which was an important Roman station, is said to have been rebuilt by the emperor Julian in the fourth century. It was conquered by the French in 1802, and annexed to Prussia in 1814. It is the native place of Beethoven, and a statue was erected to him in the Münsterplatz in 1845. Niebuhr is buried in the cemetery outside of the Sternthor, where there is a monument to him erected by Frederick William IV. Pop. in 1880, 31,514.

Bon'ner (Edmund), an English prelate notorious as a persecutor, was born about 1495. He gained the favor of Henry VIII., who about 1532 sent him on a mission to the pope, and appointed him bishop of Hereford in 1538 and bishop of London in 1539. Having showed himself hostile to the Protestant cause, he was deprived of his bishopric in 1549, but he was restored on the accession of Queen

Mary in 1553. He was the principal instigator of the bloody persecutions which disgraced the reign of Mary. Refusing to take the oath of supremacy on the accession of Elizabeth in 1558, he was imprisoned in the Marshalsea, where he died Sept. 5 1569. (See FROUDE, "History of England.")

Bonner (ROBERT), proprietor of the "New York Ledger," was born in the north of Ireland April 28, 1824. He came to America in early youth and learned the trade of a printer. He went to New York in 1844 and purchased the "New York Ledger," which, by energy and business talents, he made extremely successful. He has made munificent gifts of money to the College of New Jersey at Princeton, and is noted for liberality in charitable causes.

Bon'net, in fortification of the old school, is a small defence-work constructed at salient angles of the glacis or larger works. It has only two faces, with a parapet three feet high and ten or twelve broad. A larger kind, with three salient angles, is called a priest's bonnet.

Bonnet (CHARLES), LL.D., F. R. S., an eminent Swiss naturalist and philosopher, born at Geneva Mar. 13, 1720. He made discoveries in the reproductive and other functions of insects, etc., which he announced in his "Treatise on Insectology" (2 vols., 1745). He published in 1754 a valuable work "On the Use of the Leaves of Plants." His sight having become impaired by the use of the microscope, he turned his attention to philosophy. Among his other works (all in French) are "Considerations on Organized Bodies" (1762) and "Philosophical Palingenesis" (3 vols., 1769), in which he argued that the Christian revelation is true. Died May 20, 1793. The genus Bonnetia was named in his honor. (See H. B. DE SAUSSURE, "Eloge historique de C. Bonnet," 1787; J. TREMBLEY, "Mémoire de la Vie de C. Bonnet," 1794; A. LEMOINE, "C. Bonnet de Genève, Philosophe et Naturaliste," 1850.)

Bonneval, de (CLAUDE ALEXANDRE), COUNT, a French adventurer, born in Limousin July 14, 1675. He deserted from the French army and entered the service of Austria, in which he distinguished himself by several daring exploits, and obtained the rank of general. Having quarrelled with the governor of the Low Countries, he was condemned to death by a court-martial about 1724, but the penalty was commuted to exile. He entered the Turkish army, took the name of Achmed, and became a pasha of three tails. Died Mar. 27, 1745. (See D. FASSMANN, "Leben des Grafen von Bonneval," 1740; "Memoirs of the Bagshaw Count Bonneval," London, 1750.)

Bonneville (BENJAMIN L. E.), an officer, born in Tennessee, graduated at West Point in 1815. He became a captain in the U. S. army, and served in the Mexican war (1846–47). He published a "Journal of an Expedition to the Rocky Mountains." D. June 12, 1878.

Bon'nycastle (CHARLES), born at Woolwich, England, in 1792, was a son of John, noticed below. He was one of the professors brought over by Mr. Jefferson for the University of Virginia in 1825. He at first occupied the chair of natural philosophy, and afterwards that of mathematics. He published a treatise on "Algebra," one on "Inductive Geometry," and various scientific papers. Died at Charlottesville, Va., Oct., 1840.

Bonnycastle (JOHN), an English mathematician, born in Buckinghamshire. He was professor of mathematics at the Royal Military Academy at Woolwich, and published, besides other works, "Elements of Geometry" (1789) and "Elements of Algebra" (2 vols., 1813), which were highly esteemed. Died May 15, 1821.

Bonnycastle (Sir RICHARD HENRY), a son of the foregoing, born in 1791, served in Flanders, and afterward in Canada against the U. S. (1812–15), becoming in 1848 lieutenant-colonel of British engineers. Most of his life was passed in British North America. He was knighted for services in defence of Kingston, Canada, in 1837, and published "Canada at it Was, Is, and May Be," and other works on Canada, and also one on "Spanish America" (1818). Died in 1848.

Bonpland (AIMÉ), an eminent French botanist, born at La Rochelle Aug. 22, 1773. He studied medicine and botany at Paris, and formed a friendship with Humboldt. In 1799 he accompanied Humboldt in a scientific expedition to South America, where they travelled about five years. After their return to France he published a splendid work entitled "Equinoctial Plants collected in Mexico" (2 vols., Paris, 1808–16, with 140 plates). He had collected 6000 species of plants, of which 3500 were entirely new. He became professor of natural history at Buenos Ayres in 1816, and departed in 1821 on an excursion to the Andes, but as he was passing through Paraguay he was arrested by order of Dr. Francia, who detained him as a prisoner nearly ten years. After his release in 1831, he resided for many years in Uruguay, and died May 11, 1858. Humboldt, Bonpland, and Kunth published a work called "Nova Genera et Species Plantarum" (7 vols., 1815–25, with 700 plates).

Bonpland, Lake, of California, is in Eldorado co. It is 14 miles long and 6 miles wide, and was named in honor of Aimé Bonpland, a French botanist and traveller.

Bo'nus (a Latin adjective signifying "good") is used in English to denote a premium given for a charter or other privilege; also a special allowance or extra dividend to the shareholders of a company. If the previous dividend has been 4 per cent., and if the profits of the current year are equal to 5 per cent., of the capital, the directors sometimes declare a dividend of 4 per cent., and add a bonus of 1 per cent.

Bo̍nyhad, a town of Hungary, in the county of Tolna, 106 miles W. of Szegedin. Pop. in 1880, 5970.

Bony Pike (*Lepidosteus*), a genus of ganoid fishes found in America, especially remarkable as being examples of a type of fishes now almost extinct, but which in the old red sandstone period were extremely numerous. To this genus belong the gar-pike and the alligator-gar of the U. S. The latter is sometimes six feet in length, and resembles the alligator in appearance. It is thought by some naturalists to approach the character of the reptiles.

Bonze, a name given to the priests of Fo (or Booddha) in Japan and China. They profess celibacy, and are addicted to ascetic practices and superstitious notions and rites. They are generally very ignorant. Some of them live in monasteries. They usually wear a yellow dress. (See GAUTAMA.)

Boo'by (*Sula fusca*), a species of aquatic birds of the same genus as the gannet, and of the family Pelicanidæ. It is found on the coasts of tropical and sub-tropical countries. It seldom swims, but is a bird of powerful wing, and feeds on fish, which it catches near the surface of the water by a sudden plunge. It is remarkable for stupidity and slow movement on the land, and will sometimes remain motionless when it is approached by a man, and permit itself to be killed with a club. The boobies are persecuted by the albatross and frigate-bird, which sometimes compel them to give up the fishes they have caught, and even to disgorge those they have devoured.

Bood'dha, or **Buddha,** the title of an Asiatic divinity, or rather of a series of divinities, whose votaries or worshippers are said to constitute more than one-third of the human race. The name is derived from the Sanscrit verb *bud* ("to know"), and signifies, literally, "wisdom," and also the "wise one" or the "sage;" but it has been applied particularly to certain divine sages who are believed to have become possessed of transcendent power as well as wisdom. It is one of the remarkable features of the Hindoo system of belief, Brahmanical as well as Booddhistic, that they hold the doctrine of accumulative merit to an unlimited extent; not only can one in the present life, by persevering prayer, penance, and sacrifice, gradually acquire great merit, but this merit is supposed to be transferred to his account in the next life. It is thus that those beings who become Booddhas are enabled to acquire, in the course of innumerable transmigrations, an amount of merit which for all practical purposes may be termed infinite; and this merit, according to a commonly-received belief, confers infinite wisdom and power. The aspirants to the Booddhaship (called in Sanscrit Bôdhissattvas) are supposed, in the course of their countless transmigrations, to be born sometimes as *dêvas* (inferior deities), and sometimes in the form of various animals, even insects or animalcules; but when they are about to assume the rank of supreme Booddha, they are always born as men, and their human form becomes glorified, when they attain their highest perfection and take their rank as the supreme power of the universe. But they continue only a very brief period in this exalted state; they soon die and pass into nirvâna—a term variously interpreted; according to the majority of Booddhists, including those of Ceylon, it signifies simply non-existence or annihilation, but according to others, the soul, in nirvâna, does not cease to be—it merely ceases its separate existence, having been absorbed into the essence of the supreme, eternal Spirit. The latter view is held by the Aishwarikas of Nepaul, who call the eternal Spirit Adi-Booddha (*i. e.* "First Booddha"). It is supposed that there have been innumerable Booddhas in the eternity of the past, each being separated from his nearest successor by a space of several thousand years. (For a more particular account of the doctrines of the Booddhists, see GAUTAMA.)

J. THOMAS.

Bood'room', Budroum, or **Bodrun,** a seaport-town of Asiatic Turkey, in Anatolia, is finely situated on the N. shore of the Gulf of Cos, about 96 miles S. of Smyrna; lat. 37° 2′ N., lon. 27° 25′ E. It has a safe harbor, defended by a castle which was built by the Knights of St. John in 1402. The streets are narrow and dirty. Pop. estimated at 12,000. It probably occupies the site of the ancient *Halicarnassus*, a great city of Caria, the birthplace of Herodotus. Here are remains of ancient magnificence.

Boofa'rik, or **Boufarik,** a village of Algeria, 18 miles S. S. W. of Algiers, on the road from Algiers to Blidah and Oran, is an important military station. It has a trade in cotton, grain, olives, oranges, etc. Pop. in 1881, 3290.

Book [Anglo-Saxon, *boc;* Ger. *Buch*, supposed to be from the root of *Buche*, "beech," because thin pieces of this wood were used for writing before paper was invented], the general name of almost every literary composition, but in a more limited sense applied only to such compositions as are large enough to form a volume. Short and fugitive pieces are denominated *pamphlets*, in contradistinction to books, which are of greater length and embrace more general or permanent topics. According to their sizes and forms, books are distinguished as folios, quartos, octavos, duodecimos, etc. The materials of which books have been composed have differed much in different nations and in different stages of civilization. Plates of lead and copper, bricks, stone, and wood were anciently employed for this purpose. At a later period the bark of trees formed the chief material, as is indicated by the meaning of the words which in some languages are employed for the term book (*liber*). Materials for books were afterwards derived from the Egyptian plant papyrus, but as the demand increased more durable materials were sought for, and leather, made chiefly from the skins of goats or sheep, was employed for this purpose. Next followed the use of parchment, on which the ancient manuscripts were chiefly written, but all these systems were swallowed up by the invention of PAPER, which, though long known in China and Japan, was not made in Europe until about the thirteenth century, and facilitated the circulation of knowledge to an incalculable extent. The first books were in the form of blocks and tablets, but when flexible materials came into use it was found more convenient to roll them up in a scroll, called by the Romans *volumen* (from *volvo*, to "roll"). Books were anciently written on one side only of rolls of paper or parchment. When written on both sides they were called *opisthographi*. To save the expense of writing materials, it was sometimes the custom to wash out what were considered unimportant writings, and use the paper or parchment again. These were then called PALIMPSESTS (which see). Leaves of palm-trees are still used in parts of India, etc. for making manuscript books.

REVISED BY C. W. GREENE.

Book'binding, the art of fastening together and enclosing the leaves of a book for preservation and use, has been practised for many centuries. Long before the invention of printing the written leaves of missals and other books were united together, and enclosed in covers of wood, parchment, and other materials. Much labor and expense was bestowed on a single volume, and the covers were frequently decorated with jewels and ornaments of gold and silver. Some of these volumes are still preserved in the monasteries and museums of the Old World, and are objects of interest and study.

Since the invention of printing, and especially from the beginning of this century, the rapid advancement of the mechanical arts, the extension of education, and the general diffusion of knowledge have made books as much a necessity of life as food and clothing, and their preservation is therefore an object of importance.

The modern operations of bookbinding may be grouped in two main divisions—"forwarding" and "finishing," the first comprehending what is necessary for the preservation of books, the latter pertaining to their embellishment. In each of these departments there are various subdivisions, which may be noted. The sheets are generally received from the printer in bundles containing a thousand, more or less, of one kind.

The first operation is to fold the sheet, by means of a thin piece of ivory or bone, about nine inches long, called a "folder." The object of this is to bring the pages together in regular order; and on the care with which the folding is done much of the appearance of the book depends. The next process is "gathering" and "collating." Gathering consists in putting together one each of the various sheets of which the book is made, and collating is the examination of the numbers 1, 2, 3, etc., which are placed at the foot of the outside page of the folded sections, and which are called "signatures."

The next thing required is to make the book solid. This is done by placing it either in a hydraulic press or under some other form of pressure, such as the nature and size of the book may require. After being pressed the book is prepared for sewing by having indentations made in the back of the sheets by passing them over rapidly revolving circular saws. They are now sewed on a frame called a "sewing-bench," each sheet being sewed around twine bands, which are afterwards fastened to the boards. Much of its durability depends on the sewing being well done, and all large work is improved by having the sections at the beginning and end of the book cross or "whip-stitched."

The greater part of the labor has so far been done by women, who by practice acquire great dexterity in the performance of the various processes. Machinery has been used with considerable success in folding, and lately a machine has been introduced for sewing, but all work in the early stages is still in great measure done by hand-labor. In the more advanced stages of binding machinery is used extensively, and our description will be in accordance with the methods pursued where large quantities are constantly being bound, and where machinery is used to facilitate production. The book, after being removed from the sewing-bench, and having about an inch of the twine left on either side to fasten to the pasteboard cover, has the end leaves applied. These are of colored, white, or marble paper, as the nature of the work may require. The book is now "cut" by being fastened tightly in a cutting-machine, and a vibrating knife is brought down on the edge, which is cut off smoothly at the point desired. The edges are either left white, are colored by being sprinkled with color thrown on finely with a brush, or are marbled, which is done by dipping the edge on colors which float on the surface of gum-water. The "comb edge" so much used is made by a comb being drawn through the colors on the surface of the gum-water before the book is dipped. If the book is to have gilt edges, it is placed in a press and a coating of red color applied. The edges are then sized with white of egg, and gold-leaf laid over the size. When the sizing is thoroughly dry, the gold is burnished with agate or bloodstone.

A coating of glue is now applied to the back, and when partially dry by a slight hammering on the back a round is formed in the front and back. The book is then fastened firmly between iron clamps in a backing-machine, lately invented, and a roller is pressed heavily across the back, which turns part of it over either side of the clamps, making a groove to hold the board of which the inside of the cover is made. The piece of silk braid or colored cloth which projects over the leaves of the back inside the cover, and is called the "head-band," is now fastened with glue, and the whole back has a lining of cloth or strong rope paper firmly applied to it with glue and paste. The open or spring back is now made by applying two thicknesses of paper, open in the centre, but fastened at the edges—one thickness of the paper being attached to the back of the book, and the other thickness to the leather or other material of which the outside cover may be made. The book is now ready for the cover, the outside of which may be of muslin, sheepskin, calf, Turkey morocco, or such other materials as may be desired. The cover, or "case," is made by boards being cut larger than the leaves of the book, over which the outside material is fastened by glue or paste, a space being left between the two boards large enough to fit the back of the book in, the boards being required to fit nicely into the grooves made in backing. Much of the material used for boards of common books is straw, but all good work should have a hard, smooth board made of rope. The edge of the board is frequently ground off on a rapidly revolving emery wheel, which makes a bevelled edge, now much used.

After the cover is dry the embellishment is done by stamping in gold, blank, and colors. If in gold, the leather or cloth is sized with albumen, and gold-leaf laid on with oil. The ornamental die or lettering being fastened in an "embossing-press" and heated, it is brought with sufficient pressure on the cover to make the gold-leaf adhere. The surplus gold being brushed off, leaves the impression of the die. The dies are cut in brass or steel, and very elaborate and beautiful designs, which a few years ago would have taken many weeks to execute by hand-labor, are now produced almost instantly by the embossing-press.

The cover having received all intended ornament, the back of the book is glued and fitted into it, the end-papers are pasted to the inside of the cover, and the book is placed in a press to remain till dry. When removed from the press it is ready for the publisher and the public.

"Half binding," much used for library and reference books, is that style of binding where the back and corners are covered with leather, and the sides with cloth or paper.

The old process of "forwarding" by hand, in which each book is backed by a hammer and cut singly by press and plough, and the book finished by the slow method of former times, is still followed to some extent in small binderies, but requires no minute description, as the system is almost obsolete for books in quantities.

In America, during the last quarter of a century, machinery for the binding of books has been invented, improved, and applied to a greater extent than in any other country; hence books in large editions are produced in a style of great elegance and durability, and at prices so moderate as to be within reach of all classes of the community. The number of persons engaged in bookbinding throughout the various States is very large. In the cities of New York, Philadelphia, and Boston many of the establishments employ from 100 to 300 hands (about one-half of the number being women), and produce from 1000 to 5000 volumes per day. JAMES SOMERVILLE, *Bookbinder, New York.*

Book-Catalogues. See CATALOGUES OF BOOKS.

Books, Censorship of. See CENSORSHIP OF BOOKS.

Book-Club, a society for the purchase of books to be read by its members. It is customary in book-clubs, after the books have been read by all, to sell them at auction. These clubs are quite numerous in Great Britain.

Book-keeping is the art of recording, in a regular and systematic manner, the transactions of merchants or other persons engaged in pursuits connected with money. There are two modes of keeping books of account—the one by what is termed *single,* and the other by *double entry.* Both are in general use. The system of single entry is much the simplest mode of book-keeping, and consists of only a day-book and a ledger. In the day-book the dealer enters his sales and purchases, and in his ledger he carries the former to the debit of his customers, and the latter to the credit of the merchants who supply him with goods. By making at any time a list of the sums due to him by his customers, and of those due by him to wholesale merchants, the dealer may, after adding to the debts due to him the value of his stock on hand, arrive at an approximation to the real state of his debts and assets. This, however, is but an imperfect method of book-keeping, and in the case of wholesale mercantile business, where extensive and multifarious transactions have to be recorded, recourse is had to the system of *double entry.* This system possesses all the advantages of single entry, besides being so complete and comprehensive in its principles, and so certain in its results, as to admit of universal application.

No authentic accounts exist of the origin of book-keeping. The double-entry system appears to have been first practised in the latter part of the fifteenth century in Italy, then the great centre of the mercantile world.

The objects of book-keeping are to exhibit transactions in the most minute detail and in the most condensed form; advancing from the earliest stage to the latest by such clear and lucid steps as to admit of every fact being traced in its progress, so as to be secured at every step against error.

The three principal books required under the system of double entry are a cash-book, journal, and ledger. In the first of these every transaction is recorded where money is one of the elements. The journal forms a most important part of the system. It exhibits a narrative of every transaction of which an actual transfer of money does not form one of the elements, arranging the facts in as simple a form as correctness and intelligibility will admit of; and the results of those entries in the journal are afterwards introduced into the ledger, which thereby becomes a key to the history of every transaction. In like manner cash transactions are often introduced into the journal, and are at stated periods classed and arranged in a condensed form and transferred to the ledger. The journal is advantageously ruled with four columns—two for entries debtor, and two for entries creditor; and all the transactions being connected either with personal and property accounts or nominal accounts, such as charges, profit and loss, and so-forth, they are classed accordingly in the columns on the debtor or creditor side of the journal respectively; and as the debit entries are at all times equal to the credit entries, the aggregate of the two columns on the debtor side must tally with the aggregate of the two on the creditor side of the journal. Experience and practice are occasionally suggesting minor improvements upon the forms of the cash-book, journal, and ledger to suit particular cases; and indeed an intelligent book-keeper may accomplish much by a judicious classification of the facts in auxiliary books; but the fundamental principles of the double-entry system of book-keeping remain perfect and unchanged; and after the length of time during which they have successfully withstood all attempts at innovation or change, it may safely be affirmed that the system is the best hitherto discovered.

Boo′lâk, Boulac, or **Bulak,** a town of Egypt, on the right bank of the Nile, about a mile from Cairo, and at the origin of the Pelusiac arm of the Nile. It formerly stood on an island. The vessels navigating the Nile discharge their cargoes at Boolâk, which is the port of Cairo, and contains a custom-house. It has manufactures of cotton and silk, a government printing-office, and a very valuable museum of Egyptian antiquities. Pop. about 13,000.

Boole (GEORGE). See APPENDIX.

Boolga′rin, Boulgarine, or **Bulgaria** (THADDEUS), an eminent Russian writer, born in Lithuania in 1789. He served as an officer in the army of Napoleon I., after whose fall he settled in St. Petersburg and devoted himself to literature. He published the popular novels "Mazeppa" and "Ivan Vuizhegin," and other works, among which is "Russia in its Historical, Statistical, Geographical, and Literary Aspects." Died Sept. 13, 1859.

Boom, bōm, a town of Belgium, in the province of Antwerp, is on the river Rupel at its junction with the Brussels Canal, 9 miles S. of Antwerp. It has a gymnasium and extensive brick- and tile-works, tanneries, ropewalks, and manufactures of sail-cloth. Pop. 10,064.

Boo′mer (GEORGE B.), an American general, was born at Sutton, Mass., July 26, 1832, and became a citizen of St. Louis in early youth. At battles of Iuka, Champion Hills, and Vicksburg he behaved with conspicuous gallantry; killed in a charge at Vicksburg, May 22, 1863.

Boom′erang, an instrument used in war and the chase by the aborigines of Australia. It is about two feet in length, flat on one side and rounded on the other, and is made of hard wood bent into a curve nearly resembling an obtuse angle. The method of using this remarkable weapon is very peculiar. It is taken by one end with the bulged side downward, and thrown forward as if to hit some object twenty-five yards in advance. Instead of continuing to go directly forward, as might be expected, it slowly ascends in the air, whirling round and round, and describing a curved line, till it reaches a considerable height, when it begins to retrograde, and finally sweeps over the head of the projector and falls behind him. This surprising motion is produced by the reaction of the air upon a missile of this peculiar shape. The Australians are said to be very dexterous in hitting birds and other small animals with this weapon, as, being behind the thrower, they are perhaps not aware that they are objects of attack. It is asserted that a kind of boomerang is employed by some of the hill-tribes of Southern Hindostan.

Boone, on R. R., a city of Boone co., Ia. (see map of Iowa, ref. 5–G, for location of county). Immense quantities of coal are shipped from here. Pop. in 1870, 2415; in 1880, 3330; in 1885, 4331.

Boone, N. C. See APPENDIX.

Boone (DANIEL), a famous American pioneer and hunter, born in Bucks co., Pa., Feb. 11, 1735. He emigrated to North Carolina, where he married. In 1769, with five companions, he penetrated into the forests of Kentucky, which were then uninhabited by white men. He was captured by Indians, but escaped, and continued to hunt in that region for more than a year. Having returned home early in 1771, he moved with his own and five other families to Kentucky in the autumn of 1773. To defend his colony against the savages, he built in 1775 a fort at Boonesborough, on the Kentucky River. The Indians attacked this fort several times in 1777, but were repulsed. Boone was surprised and captured by them in Feb., 1778. They took him to Detroit, and treated him with lenity, but he soon escaped, and returned to his fort, which he defended with success against 450 Indians in Aug., 1778. He removed in 1795 to a place which is nearly forty-five miles W. of St. Louis, Mo., and found there a new field for his favorite pursuits. Died Sept. 20, 1820. (See SPARKS, "American Biography," vol. xiii., second series; W. H. BOGART, "Life of Daniel Boone," 1857.)

Boone (ENOCH), son of the preceding, and the first white male child born in Kentucky. Died Mar. 8, 1862, aged 84.

Boonesborough, a small village of Madison co., Ky., on the Kentucky River, about 18 miles S. E. of Lexington. Here is the site of a fort built in 1775 by Daniel Boone, the pioneer, which was the first fort erected in the State.

Booneville, on R. R., capital of Prentiss co., Miss. (see map of Mississippi, ref. 3–H, for location of county), 20 miles S. of Corinth, is the seat of Paine Male School (Methodist) and Booneville Male Academy. Pop. in 1870, 458; in 1880, 603.

Booneville, capital of Owsley co., Ky. (see map of Kentucky, ref. 4–I, for location of county), on S. fork of Kentucky River. Pop. in 1870, 111; in 1880, 201.

Booneville, or **Boonville,** a city and river-port, capital of Cooper co., Mo. (see map of Missouri, ref. 4–G, for location of county), is situated on the right (S.) bank of the Missouri River, 227 miles by water and 187 miles by railroad W. by N. of St. Louis. It stands on a bluff about 100 feet above the river, is very healthy, and has an advantageous position for trade. Lead, coal, marble, hydraulic lime, and iron are abundant here. During the recent civil war a Confederate camp was established at this place. On the 16th of June, 1861, Gen. Lyon reached Rockport, opposite Booneville, and on the following day attacked the forces in camp at Booneville under Col. Marmaduke. The Confederate force amounted to only about 2500 raw troops, poorly armed and utterly deficient in drill; they were easily routed, abandoning two guns and a large quantity of clothing, camp equipage, etc. Pop. in 1870, 3506; in 1880, 3854.

Boon Island, 10 miles E. of the harbor of York, Me., is in lat. 43° 07′ 16″ N., lon. 70° 28′ 16″ W. It has a granite lighthouse 123 feet high, showing a fixed white dioptric light of the second order, 133 feet above the sea.

Boons′boro′, on R. R., capital of Boone co., Ia. (see map of Iowa, ref. 5–G, for location of county), in the edge of the best body of timber in the State. Coal is excellent, abundant, and extensively mined. The river affords good water-power. Pop. in 1880, 1438; in 1885, 1586.

Boonsborough, Washington co., Ark. (see map of Ark., ref. 2–A, for location of co.), is the site of Cane Hill College (Cumberland Presbyterian). Pop. in 1880, 289.

Boon′ton, Morris co., N. J. (see map of New Jersey, ref. 2–D, for location of county), is on R. R. and the Rockaway River, about 30 miles from New York City. It has iron-works among the largest in the U. S.; the rolling-mills, nut-mills, plate-mills, nail-mills, and blast furnaces covering at least 50 acres of land. Pop. of township in 1870, 3458; in 1880, 2682, including 2277 in village.

Boon′ville, R. R. junction, capital of Warrick co., Ind. (see map of Indiana, ref. 11–B, for location of county), 11 miles from the Ohio River and 17 miles from the city of Evansville. Pop. in 1870, 1039; in 1880, 1182.

Boonville, Oneida co., N. Y. (see map of New York, ref. 4–H, for location of county), 25 miles N. of Utica, on R. R. and the Black River Canal. It has several mills. Pop. in 1870, 1418; in 1880, 1677.

Boonville. See BOONEVILLE.

Boor′hanpoor′, or **Burhanpoor** [Hindoo, *Barhanpoora*], a city of Hindostan, the ancient capital of the Candeish, is on the river Taptee, 309 miles by rail N. E. of Bombay. It is on the Great Indian Peninsular R. R. It is one of the largest and best-built cities of the Deccan, and has wide and regular streets and brick houses. Among the remarkable buildings is a mosque built by Aurungzeb, and an old royal palace which is nearly ruined. This city was taken by Akbăr about 1600. It has manufactures of gold and silver thread for brocade. Pop. 20,000.

Boo′ro, Buru, or **Bouro,** an island of the Malay Archipelago, is about 60 miles W. N. W. of Amboyna, and lies between lat. 3° and 4° S., and between lon. 126° and 127° E. Area, estimated at 2000 square miles. The surface is mountainous, but the soil is fertile. It contains Mount Dome, which is said to be 10,400 feet high. Cajeli Bay, on the N. side, affords good anchorage.

Boo′roogird′, Boorojird, or **Burugird,** a town of Persia, province of Irak-Ajemee, is in a fertile valley about 184 miles N. W. of Ispahan, and 74 miles S. S. E. of Hamadan. It has a castle and several mosques. It has an extensive trade in cotton goods, of which it is said to export over 1,000,000 francs' worth annually. Pop. 20,000.

Boos′sa, or **Boussa,** a town of Central Africa, in Soodan, is on an island in the Niger, in about lat. 10° 20′ N., lon. 4° 30′ E. It is enclosed by a wall. Pop. estimated at 14,000. Mungo Park died here.

Boot [Fr. *botte; Sp. bota,* a "boot," originally a "leathern bottle," and applied to a boot from its fancied similarity to a bottle], a covering for the foot and lower part of the leg, which seems to have been worn in England as far back as the times of the Anglo-Saxons. Various similar coverings for the foot are known to have been worn in Egypt and other countries in very ancient times, but they all seem to have more closely approached the shape of the modern shoe. Before the time of the wars of the Roses the boot was a part of the regular dress of knights. The names "top-boot," "Wellington boot," "jack-boot," etc. are applied to forms of the boot that have been worn at various times.

BOOT, an instrument for the judicial torture of accused persons and recusant witnesses, once used in Scotland. It was a case made of wood or iron, which enclosed the leg, and wedges were driven between the boot and the leg until the questions asked were satisfactorily answered. In many cases the leg was crushed and still no answer was given. The use of this torture was not abolished until the reign of Queen Anne.

Boot (JOHN FLETCHER). See APPENDIX.

Boo′tan′, Boutan, Bhotan, or **Butan,** a state or country of India, is bounded on the N. by the Himalaya Mountains, which separate it from Thibet, on the E. by Thibet, and on the S. and W. by Bengal. Area, about 13,600 square miles. The surface is mountainous. The Peak of Shumalari on the N. border rises about 27,000 feet above the sea. Wheat, barley, rice, and maize are cultivated here. The religion of Bootan is Booddhism. The people practise polyandry and polygamy. Pop. about 200,000.

Boö′tes [Gr. Βοωτης], a name of PHILOMELUS, a son of Ceres and a brother of Plutus. He is said to have invented the plough, and used it in cultivation of the soil. To reward him for this service he was translated into a constellation, under the name of Boötes.

Boötes, a northern constellation, is represented on celestial globes as a man holding in one hand a club, and in the other a leash by which he leads two hunting-dogs. This constellation comprises Arcturus, a star of the first magnitude. Boötes is bounded on the N. by Draco, on the E. by Corona Borealis and Serpens, on the S. by Virgo, and on the W. by Canes Venatici and Coma Berenices.

Booth (ABRAHAM), born at Blackwell, Derbyshire, England, in May, 1734, from 1769 till his death pastor of the Baptist church in Goodman's Fields, London. He was author of "The Reign of Grace" (1768) and "Pædobaptism Examined," 2 vols. 12mo, 1784. The latter work was republished in 2 vols. 8vo in 1829, and is regarded by the Baptists as an able argument in defence of their opinions. Died in 1806.

Booth. This name, long eminent on the stage, was first made famous by BARTON BOOTH, born in 1681. He first appeared in 1698 at Dublin, Ireland, in Thos. Southern's "Oroonoko." In 1701 he first acted in London, as Maximus in Lord Rochester's "Valentinian." Thenceforward his career was prosperous and distinguished. He left the stage in 1728, and died in 1733. He was deemed excellent in such various parts as Hotspur, Antony, Othello, and Henry VIII. He wrote a masque entitled the "Death of Dido" (1716). He was twice married, but left no children. He was an Englishman of good family, a good classical scholar, a quaint poet, and a notably handsome person. His grave is at Cowley, near Uxbridge, England.—JUNIUS BRUTUS BOOTH, born near London May 1, 1796, first appeared on the stage Dec. 13, 1813, at Deptford, England, as Campillo, in Tobin's "Honeymoon," and within four years became famous in London as Richard III. and Sir Giles Overreach. These and Pescara were his great parts. He first acted in America, July 13, 1821, at Richmond, Va., as Richard III. His career on the American stage was one long triumph—marred, however, by intemperance and incipient insanity. He died on a Mississippi River steamboat, Nov. 3, 1852, and was buried at Baltimore, Md. His wife was a Miss Holmes, of Reading, England. His children were: Junius Brutus, Rosalie Anne, Edwin Thomas, Annie Sydney, Joseph Addison, Henry Byron, Mary, Frederick, Elizabeth, and John Wilkes. The first of these and the last five are dead.—EDWIN BOOTH, a son of J. B. Booth, born at Baltimore Nov. 15, 1833, first appeared on the stage, Sept. 10, 1849, at the Boston Museum, as Tressel, in "Richard III." After several years of "strolling" in Cal. and Australia, he returned to New York and other Northern cities, and speedily acquired a high professional rank. He opened Booth's Theatre, N. Y., Feb. 3, 1869, and made a highly successful professional tour in Europe in 1882–83. His name, as an actor, is identified with Hamlet, Richelieu, Iago, Bertuccio, and Lucius Brutus. His acting is remarkable for intellectual power, refinement, and gleams of passionate fire. (See his "Life," by WINTER, 1886.) WM. WINTER, *of the New York "Tribune."*

Booth (JOHN WILKES), the assassin of Abraham Lincoln, born in Harford co., Md., in 1838, was a brother of Edwin, noticed above. He became an actor, and in the civil war sided with the Confederates. To avenge the "lost cause," he formed a conspiracy with Suratt, Powell, and others. On the 14th of April, 1865, he entered Ford's Theatre, Washington, and shot President Lincoln, who was sitting in a private box. Exclaiming, *"Sic semper tyrannis!"* he leaped down to the stage and broke his leg, but he mounted a horse that was standing ready and escaped to Virginia. He concealed himself in a barn near Bowling Green, where he was discovered by the detectives, and, refusing to surrender, he was shot, April 26, 1865.

Booth (MARY L.) was born at Yaphank, N. Y., April 19, 1831, has published a "History of the City of New York" (1859–67), and more than thirty volumes of French translations, prominent among which are the works of De Gasparin, Cochin, and Laboulaye on the American civil war, and Henri Martin's "History of France." From its beginning, in 1867, she has been editor of "Harper's Bazar."

Booth (NEWTON). See APPENDIX.

Booth'bay, Lincoln co., Me. (see map of Maine, ref. 10–D, for location of county), on the Atlantic Ocean. It has a fine harbor, and many of the inhabitants are employed in shipbuilding, coasting, and the fisheries. Pop. of township in 1870, 3200; in 1880, 3575.

Boo'thia Fe'lix, a peninsula or island of North America, in the Arctic Ocean, extends from lat. 69° to 75° N. It is bounded on the E. by Boothia Gulf. It was discovered by Sir John Ross, and named in honor of Sir Felix Booth. It contains the N. magnetic pole.

Boo'ty [from the root of the Ger. *beuten*, to "buy," to "capture"], in international law, personal property captured on land by a public enemy in time of war. It differs from prize, which is captured at sea. (See PRIZE.) In the case of prize the ownership of the property does not pass to the captor until condemnation by a prize court. Booty belongs to the captor after an undisturbed possession of twenty-four hours, and the right of *post liminium* is at an end. (See POST LIMINIUM.) In strictness of law, booty belongs to the sovereign, and not to the individual soldier who captures it. It is quite common for the sovereign power to bestow a portion or the whole of it upon its subjects. This matter, however, is not governed by international rules, but by the municipal law of the captor.

Bopp (FRANZ), an eminent German philologist, was born at Mentz Sept. 14, 1791. He studied languages in Paris and Göttingen, and became in 1821 professor of philology at Berlin. He published a "Glossarium Sanscritum" and a "Critical Grammar of the Sanscrit Tongue." He was an efficient promoter of the study of Sanscrit, and is regarded as the founder of the science of comparative philology. His most important work is a "Comparative Grammar of the Sanscrit, Zend, Greek, Latin, Lithuanian, Old Sclavonian, Gothic, and German Languages" (1833; 2d edition, 3 vols., Berlin, 1857–61), which has been translated into English and published at Oxford (3 vols., 1845–50). Died Oct. 23, 1867. (See Preface to the French translation of Bopp's "Comparative Grammar," by Bréal, Paris, 1866–72, 4 vols.)

Bo'ra, von, or **Boh'ren** (KATHARINA), a German nun who became the wife of Martin Luther, was born in Saxony Jan. 29, 1499. She was converted to the Lutheran doctrines, and escaped from her convent in 1523. She was married to Luther in June, 1525. In his last will he commended her as a good wife. She died Dec. 20, 1552. (See WALCH, "Geschichte der Catharina von Bora," 2 vols., 1752–54; HOFFMANN, "Catharina von Bora," 1845.)

Boraç'ic (or **Bo'ric**) **Aç'id** (B_2O_3), a compound of two equivalents of boron with three of oxygen. It is obtained in white shining scales, which are soluble in water and in alcohol, to the flame of which this acid imparts a beautiful green color. Boracic acid occurs native in certain lagoons of Tuscany, and in a crater in the island of Vulcano (Volcano), north of Sicily. The native boracic acid is of great commercial importance in the manufacture of borax. It also occurs in borax (biborate of soda) in many waters, especially in certain springs and lakes in Thibet and Cal.

Bor'age (*Borago*), a genus of herbs of the order Boraginaceæ, have five stamens and a wheel-shaped corolla, the mouth of which is closed with five teeth. The common borage (*Borago officinalis*) is a native of Europe, has blue flowers, and rough, hairy leaves and stems. It is mucilaginous and emollient. It was formerly much cultivated, and supposed to possess valuable medicinal virtues and exhilarating qualities.

Boragina'ceæ, a natural order of exogenous plants, natives of temperate climates. It comprises nearly 600 species, mostly rough, hairy herbs, with alternate entire leaves. The corolla is generally regular and imbricated in the bud, with five stamens inserted on the tube of the corolla. It has a single style and a deeply 4-lobed ovary, which forms in fruit four seed-like nutlets or achenia. The whole plant is mucilaginous and emollient. Among the examples of this order are borage, alkanet, and comfrey (*Symphytum*), to which some botanists add the fragrant heliotrope.

Bo'rax, or **Bibo'rate of Soda** (sodium-biborate or sodic-biborate), a compound of boracic acid and soda ($2NaBO_2.B_2O_3.10H_2O$), is found native as a saline incrustation on the shores of lakes in Persia, Thibet, and India. The impure borax collected on these shores is called *tincal* or crude borax, which is also found in Peru, Chili, California, Nevada, and other regions. Borax is also prepared from boracic acid by solution in boiling water, and the addition of a boiling solution of carbonate of soda (Na_2CO_3). It is also prepared from borate of lime, a salt largely procured from Chili, Peru, etc. The common hexagonal crystalline borax contains ten equivalents of water, one of soda, and one of boracic acid. When it crystallizes in octahedrons it contains only five atoms of water. Borax is a white salt of a sweetish taste, soluble in twice its weight of boiling water. It is useful as a flux in promoting the fusion of metallic mixtures, and producing fusible silicates in assaying and in welding iron. As an agent in experimenting with the blowpipe it is valuable for the readiness with which it forms colored glasses with various metallic oxides. It is also used in medicine, and as a detergent in the laundry. More than 4,000,000 pounds are annually produced from native boracic acid in Italy, hot springs affording the heat necessary in the manufacture. (See BORACIC ACID.)

Borax Lake, a small lake in California, N. of San Francisco, the water of which is a strong solution of borax. Crystals of borax are also found in large numbers in the muddy sediment at the bottom. Many hundreds of tons of these have been collected and sent to San Francisco.

Borda (JEAN CHARLES), an eminent French mathematician and astronomer, born at Dax May 4, 1733. He served as an engineer in the army, and became a captain in the navy. As a naval officer he fought for the U. S. in 1778–82. He wrote several scientific works, contributed much to the progress of nautical science, and invented or improved the reflecting circle. Aided by Delambre and Méchain, he measured an arc of the meridian from Dunkirk to the Balearic Isles. Died Feb. 20, 1799.

Bord à Plouffe, a post-village of Laval co., Quebec (Canada), on the Isle Jesus and on the river des Prairies, 10 miles N. of Montreal, has a very large trade in lumber and horses. Pop. about 1200.

Bordeaux, a city and seaport of France, capital of the department of Gironde, is finely situated on a plain on the left bank of the river Garonne, 58 miles from its mouth and 364 miles by rail S. S. W. of Paris; lat. 44° 50′ N., lon. 0° 34′ W. It has a capacious harbor, and is accessible by vessels of 600 tons at all stages of the tide. The river, which is here about 650 yards wide, is crossed by a noble bridge of seventeen arches. Bordeaux is an archbishop's see. It is connected by several railways with Paris, Toulouse, Marseilles, and other towns. It is probably the most commercial city of France except Marseilles. The harbor is large enough to admit 1200 vessels of the largest size. Its commerce extends to all parts of the world. The newer portions of the city have wide streets and pleasant promenades lined with trees. Among its remarkable edifices are the Gothic cathedral, built or commenced about 1100; the church of Saint Croix, more than 850 years old; the town-hall; the Hôtel de la Marine; the bridge, which cost about $1,300,000; and the Great Theatre, which is one of the finest in Europe, and was built by Louis XVI. Bordeaux contains a mint, a college, a university or *Académie Universitaire*, a normal school, a school of navigation, and a public library of 190,000 volumes. Here are extensive manufactures of wine, brandy, chemicals, printed calicoes, woollen goods, carpets, hats, paper, etc. The chief articles of export are wine, brandy, vinegar, dried fruits, turpentine, and glass bottles. Wine of superior quality, called Médoc, claret, or Bordeaux wine, is produced in this vicinity. The principal merchants of Bordeaux are engaged in the wine-trade. The Canal du Midi affords a communication with the Mediterranean. Pop. in 1881, 221,305.

Burdigala was founded before the Christian era, and was the capital of the Bituriges Vivisci. It became the capital of Aquitania Secunda in the reign of Hadrian. In 1152 it was transferred to the crown of the English kings by the marriage of Henry of Normandy (afterward Henry II. of England) with Eleanor of Guienne. It received important liberties and privileges from the English. The famous Black Prince held his court here. It has belonged to France since 1451. Among the remains of the ancient city is a palace of Gallienus. During the revolution of 1789 this city was the head-quarters of the Girondists, and suffered terribly at the hands of the Terrorists. In consequence of the damage to its commerce by the continental system of Napoleon, Bordeaux was one of the first cities to declare for the Bourbons. On Dec. 10, 1870, the seat of government was transferred to Bordeaux while Paris was besieged by the German armies and several members of the provisional government were shut up in the metropolis. The provinces were then subject to the authority of Gambetta and his colleagues, who, after they had been driven from Tours by the approach of the enemy, removed to Bordeaux. The National Assembly, elected in Feb., 1871, met first in this city, but removed to Versailles in March of that year.

Bordeaux Wines, a general name for several sorts of

French wine produced in the department of Gironde. The red wines of Bordeaux are commonly called claret in the U. S., to which they are largely exported. The average quantity produced annually in the Gironde is about 48,000,000 gallons. Among the best of these wines are the Médoc, which is red, and the Graves, which is white. No French wines except champagne are so largely exported.

Borden (Gail), the inventor of that industrial product known as "condensed milk," was born in Norwich, N. Y., in 1801. In 1829 he removed to Texas, where he was first a U. S. surveyor, then a journalist, and at last collector of the port of Galveston. In 1853 he succeeded in producing condensed milk, after arduous and persevering efforts; and after securing a patent on his invention he began to introduce it in the market. He died Jan. 11, 1874, at Bordenville, Tex., where he had a large factory for the production of concentrated foods. He lived to see his inventions utilized very extensively.

Borden (Simeon), a civil engineer and mechanician, born in Fall River, Mass., Jan. 29, 1798. He was appointed in 1834 director of the geodetic survey of Mass., for which he invented valuable apparatus. He was an engineer in the construction of several railroads. Died Oct. 28, 1856.

Bor′dentown, R. R. junction, a city of Burlington co., N. J., on the Delaware River (see map of New Jersey, ref. 5–D, for location of county), 30 miles N. E. of Philadelphia and 6 miles S. E. of Trenton. It is the terminus of the Delaware and Raritan Canal, and is about 60 feet above the river. It has 2 colleges, a park, water and gas works, an opera-house, and several foundries and manufactories. Here is a mansion built by Joseph Bonaparte, ex-king of Spain. Pop. of township, including city, in 1870, 6041; of township in 1880, 5334, including 4258 in city; of city in 1885, 4683.

Bore, called also **Ea′gre** (perhaps from the sea-jotun Œgir, which see). In estuaries into which large rivers flow, the struggle between the ascending tidal wave and the opposing current of the stream produces the imposing phenomenon of a huge wave, which, like a moving wall of water, advances with great rapidity and a deep roaring noise up the river, often for hundreds of miles, to the limit of tide-water. This is called the *bore*. In the Hoogly River, one of the main mouths of the Ganges, the bore rushes up the river with great impetuosity. In the Chinese river Tsientang it rises to thirty feet in height, and travels at the rate of twenty-five miles an hour, sweeping everything before it. In the Amazon River, at the time of the equinoxes, bores of fifteen feet in height follow each other in quick succession, and within the space of 200 miles five such mighty waves may be seen travelling simultaneously up the river. The Indians, imitating the roaring sound of the bore, call it *pororoca*. Arnold Guyot.

Bore, the internal cavity of any kind of firearm, which is more commonly cylindrical, but often furrowed spirally. (See Ordnance, by Gen. John C. Tidball.)

Boreas. See Appendix.

Borel′li [Lat. *Borellus*], (Giovanni Alfonso), an Italian physician and astronomer, born at Naples Jan. 28, 1608. He is called the founder of the iatro-mathematical school, which proposed to apply mathematics to medicine. He resided for many years in Rome, and was patronized by Queen Christina of Sweden. His most remarkable work is "De Motu Animalium" (1680). Died in Rome Dec. 31, 1679.

Boreman (Arthur Ingraham), born at Waynesburg, Pa., July 24, 1823, settled in West Virginia, where he practised law. He became the first governor of the new State in 1863, and in 1869 was elected to the U. S. Senate.

Bo′rer, a name applied to the larvæ of many insects which feed upon trees and vegetables, in which they eat holes. Their ravages are very great. The peach tree borer is the larva of *Ægeria exitiosa*, a lepidopterous insect; and species kindred to the last named attack the pear tree, the currant bush, and many other useful plants. The locust tree borer is the larva of a coleopterous insect, the *Clytus pictus*, which, with other larvæ, has seriously diminished the supply of this valuable timber tree. The apple tree is especially attacked by the grub of the *Saperda bivittata*. Borers are most easily destroyed by a wire or gouge while they are in their holes; and though many plans have been devised for preventing their ravages, none as yet are very successful.

Borĝet′to, a town on the island of Sicily, in the province of Palermo, 13 miles W. S. W. of Palermo, is finely situated on a cliff. Pop. 5977.

Borghese (Camillo), Prince, was born at Rome July 19, 1775. He served in the French army in his youth, and married in 1803 Pauline, a sister of Napoleon. He was in 1806 created duke of Guastalla. He sold the Borghese collection of antiquities and artistic treasures to Napoleon for 13,000,000 francs. These had been collected by his father, Marc Antonio. Died April 10, 1832.

Borghe′si (Bartolommeo), Count, an Italian antiquary and numismatist, born at Savignano June 11, 1781. He formed a rich collection of medals and coins, and distinguished himself by his successful efforts to illustrate the military, political, and municipal institutions of ancient Rome. His chief work is "Nuovi Frammenti dei Fasti Consolari Capitolini" (2 vols., 1818–20). Died April 10, 1860.

Bor′gia (Cesare), duc de Valentinois, an infamous Italian cardinal and soldier, was a natural son of Pope Alexander VI. He was raised to the rank of cardinal in 1492, and received from Louis XII. of France the title of duc de Valentinois in 1498. He married a daughter of the king of Navarre in 1499. With the connivance of the pope, his father, he waged with success an aggressive war against several princes of the Romagna who were feudatories of the Roman see. He was guilty of many acts of cruelty and treachery, and procured the death of several persons by poison. He made himself master of the duchy of Urbino, but his prosperity was ruined by the death of Pope Alexander VI. in 1503, and the accession of Julius II., who was an enemy of Cesare Borgia. The latter was arrested and imprisoned in 1504, but he escaped in 1506 and joined the army of the king of Navarre. He was killed in battle Mar. 12 1507. (See Tomasi, "Vita del Duca di Valentino," 1655; "Leben des C. Borgia," Berlin, 1782.)

Borgia (Lucrezia), an Italian woman renowned for beauty, talents, and vices, was a sister of Cesare Borgia, noticed above. She was married in 1493 to Giovanni Sforza, lord of Pesaro, and in 1501 to Alfonso of Este, a son of the duke of Ferrara. She patronized Bembo and other literati, who complimented her in their works. She was accused by contemporaries of incest and poisoning, but several modern writers maintain that the charges against her character are greatly exaggerated. Died in 1520. (See Gilbert, "Lucretia Borgia, Duchess of Ferrara," 2 vols., London, 1869; Gregorovius, "Life of L. Borgia.")

Borgne, a lake or bay in the S. E. part of Louisiana, is 12 miles E. of New Orleans. It is 60 miles long, and 25 miles wide at the broadest part. It communicates with the Gulf of Mexico on the E., and is connected with Lake Pontchartrain by the Rigolets Pass, which is 10 miles long. The lake is surrounded to a great extent by marshes and cane-brakes, separated from it by a narrow ridge of shells. Steamers plying between New Orleans and Mobile traverse this lake.

Bor′go, an Italian word signifying "town" or "castle," occurs as a part of the names of many places in Italy and the Tyrol.

Bor′goo, a kingdom in Central Africa, W. of the Niger, S. of Gourma, E. of the Fellatah country, and N. of the kingdoms Egga and Yarriba. The banks of the Niger are fertile and thickly populated, producing rice, indigo, grain, cotton, yams, lemons, bananas, honey, and game in abundance. The sorghum-fields yield five hundred-fold. The forests are full of elephants of immense size. The population consists of the original inhabitants and Fellatahs and a Mohammedan conquering tribe speaking a language cognate with the Yarriba tongues. The government is an hereditary monarchy.

Bo′rie (Adolph E.), born in Philadelphia Nov. 25, 1809, educated at the University of Pennsylvania and in Paris. He became a successful merchant of Philadelphia, and in 1862 was one of the founders of the Union League, and was a prominent supporter of the national government throughout the late civil war. He was secretary of the navy in 1869 under President Grant. D. Feb. 5, 1880.

Boring, for water, see Artesian Wells, by Prof. E. H. Hilgard, Ph. D.; Cannon-boring, see Ordnance, by Gen. John C. Tidball; Cylinder-boring, see Machinery.

Borissov′, a town of Russia, on the Berezina, in the government of Minsk, 46 miles N. E. of Minsk. Near this place the army of Napoleon suffered a great disaster in its passage of the Berezina in Nov., 1812. Pop. 7629.

Borissoglebsk′, a town of Russia, in the government of Tambov, 100 miles E. S. E. of Tambov. Pop. 12,610.

Bor′kum, an island in the North Sea, is at the mouth of the Ems, and 26 miles N. W. of Emden. It belongs to Prussia, is about 6 miles long and 2 miles wide. A lighthouse has been erected on it in lat. 53° 36′ N., lon. 7° 12′ E.

Bor′land (Solon), a general in the Confederate army, and former U. S. Senator from Arkansas, born in Virginia, studied medicine and settled in Arkansas. In the Mexican war he served as major of volunteers, and was taken prisoner. He was elected to the U. S. Senate 1849, appointed U. S. minister to Central America 1853; and it was during his term that the inhabitants of Greytown committed the act which he resented, and for which the town was destroyed by Com. Hollins, U. S. N., acting under instructions of his government. In April, 1861, and previous to the secession of Arkansas, he organized a force and captured Fort Smith, was appointed brigadier-general in the Confederate army, and died in Texas Jan. 31, 1864.

Bor'mio [Ger. *Worms*], a town of Italy, in the province of Sondrio, is near the Adda, and 32 miles N. E. of Sondrio. It is near the saline baths called Bagni di Bormio, having a temperature of 99° F. Pop. 1630.

Bor'na, a town of Saxony, 15 miles S. S. E. of Leipsic. It has manufactures of woollen cloths and earthenware. Pop., including Altstadt-Borna, in 1880, 7991.

Bör'ne (LUDWIG), a German satirical writer, born of Jewish parents at Frankfort-on-the-Main May 18, 1786, studied at Berlin and Heidelberg, adopted the Protestant faith in 1817, edited the liberal "Wage" and "Zeitschwingen," and published in 1826 his celebrated "Denkrede auf Jean Paul." After 1830 he lived in Paris, was correspondent of the "Allgemeine Zeitung," and edited "La Balance." His "Briefe aus Paris" and other writings on political and æsthetical subjects are eloquent and witty, and display a singularly delicate critical sense, but are marked with bitterness of political feeling. ("Sämmtliche Werke," 12 vols., 1862–63.) Died Feb. 13, 1837. (See biographies of BEURMANN, 1841, and GUTZOW, 1840, and "Heine über Boerne.")

Bor'nemann (FRIEDRICH WILHELM FERDINAND), a Prussian jurist and statesman, born at Berlin Mar. 28, 1798, became minister of justice in 1848. He died Jan. 28, 1864, leaving several valuable legal works.

Bor'neo, called by the natives **Poolo-Kalamantin,** an island in the Malay Archipelago, extends from lat. 7° 1' N. to 4° 10' S., and from lon. 108° 50' to 119° 2' E. Its length is 807 miles, and it is about 600 miles wide. The area is about 290,000 square miles. The interior is traversed by chains of mountains, but has not been much explored by Europeans. Near the N. extremity of the island is a peak called Kinibaloo, which rises 13,680 feet above the sea. The maritime parts of the island are mostly marshes or low plains covered with dense forests. It is probable that a large portion of the interior consists of fertile valleys and plains. The outline is nowhere deeply indented by inlets. It is thought by many that the form of Borneo was formerly similar to that of Celebes, but that the bays have been filled up in the course of time, and now form those marshy districts on the coast so unhealthy to the inhabitants. Borneo is watered by numerous navigable rivers—viz., the Brunai, the Sarâwak, the Pontianak, the Kootai, the Pembuan, the Murong, and others. These mostly enter the sea through extensive deltas, and their mouths are so obstructed that large vessels cannot enter them; but they afford facilities for inland navigation. The climate in the low grounds is hot. The rainy season begins about October, and continues till April, during which period heavy rains fall. In the higher lands of the interior the climate is moderate and healthy. The mountains are chiefly formed of granite, syenite, limestone, and quartz. Among the mineral resources are gold, tin, antimony, zinc, diamonds, iron of fine quality, and coal, which latter is very abundant, and is excellent and easily mined. The principal commercial supply of antimony is at present from Borneo. Diamonds are widely disseminated in the soil, at a depth of several feet. One diamond found in Borneo weighed 367 carats. The vegetation of Borneo is exceedingly luxuriant. Among the forest trees are the teak, the ironwood, the gutta-percha tree, the ebony, the cocoa-palm, and various sago trees. The island produces also cinnamon, camphor, betel, pepper, ginger, cotton, rice, and yams. The forests and jungles are infested with tigers, bears, leopards, buffaloes, and orang-outangs. The elephant also is found here. The population (estimated at 1,750,000) is chiefly of four races—Malays, Dyaks, Boogis, and Chinese. The Malays, who mostly occupy the maritime parts, are partly Mohammedans and partly pagans. The Dyaks, who live farther inland, are the aboriginal inhabitants, and are the most numerous of all the races in the island. They are divided into many tribes, and subsist mostly by hunting, fishing, and piracy. "They are not all," says Craufurd, "in an equally abject condition; for while some are mere naked hunters, the majority have fixed abodes, and have made some progress in the useful arts. . . . With respect to religion, they have neither priests nor temples, nor do they pray or fast." The population of the Dutch colonies in 1880 amounted to 1,016,347. Borneo is divided into many separate states, governed by native sultans. Among them are Borneo proper, Pontianak, Sambas, Sarâwak, Matan, Simpang, Sooloo, and Banjermassin. Borneo proper is a level tract which extends along the N. W. coast, and is bounded on the S. E. by a chain of mountains. The chief towns and centres of authority of the Dutch are Pontianak on the W. coast, and Banjermassin on the S. coast. Among the other towns are Borneo, Sambas, Sarâwak, and Succadana. About two-thirds of the island is included within the Dutch East India possessions, but over much of it their sway is only nominal. The most of it is ruled by native sultans, who recognize a suzerainty on the part of the Dutch. On the N. W. coast is a tract of about 35,000 square miles, called Sarâwak, with a population of about 250,000, of which an Englishman, Sir James Brooke, obtained control in 1841 from the sultan of Borneo. He had the title of rajah of Sarâwak, which with the English rule has descended to his nephew, Rajah Charles Johnson Brooke. The imports of Borneo are opium, tea, cottons, cloths, hardware, brass, iron, etc.; exports, sago, beeswax, edible birds' nests, camphor, hides, rattans, tortoise-shell, trepang, cinnabar, antimony, tin, coal, diamonds, and gold.

History.—Borneo was discovered in 1518 by the Portuguese, who formed a settlement at Banjermassin in 1690. The Dutch, who first visited the island in 1598, made a treaty of commerce with the sultan of Sambas in 1609. They erected a fort and a factory at Tatis in 1643, and another at Pontianak in 1778. The Sarâwak settlement is under British control. A. J. SCHEM.

Borneo, or **Brunai,** a seaport-town on the N. W. coast of Borneo, is the capital of the sultan of Borneo proper. The houses are built on posts, and canals pass through all the streets. Pop. about 25,000.

Born'holm, an island of Denmark, in the Baltic Sea, 90 miles E. of Zealand, and 25 miles from the southern extremity of Sweden. It is 24 miles long by 18 miles wide, and has an area of 225 square miles. Pop. in 1880, 35,364. The surface is mountainous, and the coasts rocky and dangerous to navigators. A lighthouse has been erected on Cape Hammeren, the most northern point of the island, in lat. 55° 18' N., lon. 14° 47' E. The soil in some parts is fertile. Valuable porcelain clay and rock-crystals are found here.

Bornoo', Bornu, or **Bornou** [native *Kanowra*], a state of Central Africa, in the Soodan, is bounded on the N. by the Sahara Desert, on the E. by Lake Tchad, on the S. by Mandara (or Fumbina), and on the W. by Houssa. The surface is mostly level; the soil is fertile, producing maize, millet, rice, cotton, indigo, pulse, etc. Cattle, horses, and sheep form a large part of the riches of the Bornoöese. The climate is excessively hot, the thermometer often rising to 105° F. in the shade. The rainy season lasts from October to April. The principal rivers of Bornoo are the Shary and Yeou, which flow into Lake Tchad. A large portion of the country is inundated in the rainy season. Lions, panthers, and other beasts infest the forests, which occur only in the vicinity of the rivers. Minerals are said to be rare in Bornoo. The natives manufacture cotton cloth and coats-of-mail, which they use in warfare. The chief exports were until lately slaves and gold-dust. The dominant race, called Shouas, are of Arab descent and are bigoted Mohammedans.

History.—Bornoo was formerly a part of the kingdom of Kanem, which, founded in the ninth century, rose to its highest point of power in the twelfth. At the end of the fifteenth century, King Ali-Dunamâmî founded Bornoo. It attained its greatest power under Edrîss Alaoma (1571–1603), who conquered all the surrounding tribes, and even extended his territory to the shores of the Atlantic. Under his peaceful and extravagant successors the power of Bornoo again declined, until in 1808 it could no longer resist the continued attacks of the Fellatah, who took and destroyed the old capital, Birni. The king then established himself at Kuka. An Arab from Fezzan, however, soon defeated the Fellatah at Ngornu. His son Omar removed the old dynasty, and ascended the throne himself in 1835. Although not as strong and determined against his neighbors as his father, his rule has been extremely beneficial for the country, as he has encouraged trade and industry. He also assisted, as much as was in his power, the European travellers who visited his country, among them Denham, Clapperton, Beurmann, and Rohlfs, the latter of whom says in his account, "No European prince could have assisted a traveller more than Omar, the negro prince of Soudan, assisted me, the white Christian." Chief town, Kuka. Pop. about 5,000,000. A. J. SCHEM.

Bo'ro Bud'dor, or **Bo'ro Bo'do,** an ancient Booddhistic temple of Java, on the river Probo, 25 miles N. W. of Yugyakarta, believed to be the most elaborate specimen of Booddhist architecture now existing, and to have been built in 1350 A. D. It is a square pyramid, with nine terraces or stories (116 feet high, in all), and 400 feet square at the base, each terrace covered with cells or small houses for monastics, and the whole covered with profuse carvings.

Borodi'no, a village of Russia, in the government of Moscow, and on the Kolocza River, 70 miles W. S. W. of Moscow. It is celebrated as the scene of a great battle between the army of Napoleon (125,000 strong) and the Russian army, of about 130,000 men, commanded by Gen. Kutusof, Sept. 7, 1812. The French remained masters of the field and claimed the victory, but they lost nearly 30,000 men. The loss of the Russians was still greater; some say 50,000 killed and wounded. The French took Moscow a few days after this battle, which they call the battle of the Moskwa; this is the name of a river near the battle-field.

Bo'ron [Lat. *borium*], (symbol B; equivalent 11; specific gravity about 2), a non-metallic element which Sir Humphry Davy discovered about 1808 by exposing boracic acid to the action of a galvanic battery. Combined with oxygen, it forms boracic acid, and it occurs in nature only in combination with oxygen, generally in the form of that acid or of BORAX (which see). Boron is obtained in the form of an olive-brown powder, which is infusible, and has neither taste nor smell. It is not used in the arts in a separate state. It may also be obtained in a graphitoidal form, in six-sided crystals. Crystallized boron is one of the most unalterable and indestructible of all simple substances. Wöhler and Deville have obtained boron by heating in a crucible a mixture of pure dry boracic acid with the metal aluminium, when the latter unites with the oxygen, leaving the boron as minute quadratic octahedral crystals, called boron diamonds. These rival the real diamond in lustre and refractive power, and are scarcely inferior to it in hardness. They scratch glass and the corundum, and resemble diamonds so much that they can scarcely be distinguished by external characters. No acids, pure or mixed, have any effect upon the boron diamond, nor can it be oxidized even when raised to a high temperature.

Borough, bŭr'rŭh, called in Scotland **Burgh** (pron. bŭr'h, almost bŭr'rŭh), in Great Britain and some of the U. S. is a name applied to certain corporate municipalities. Places in England sending burgesses to Parliament are called parliamentary boroughs.

Borough English is a custom that prevails in some ancient boroughs in England, according to which the youngest son inherits the property within the borough in preference to his elder brothers. A posthumous son is entitled to this privilege, and dispossesses his elder brother. If the youngest son dies during the life of the father and leaves a daughter, she will inherit the property.

Borovit'chi, a town of Russia, in the government of Novgorod, on the river Msta, 92 miles E. S. E. of Novgorod. It has an active trade in salt, coal, etc. Pop. 9918.

Borovsk', a town of Russia, in the government of Kalooga, 45 miles S. W. of Moscow. Pop. 9491.

Borrome'an I'slands, a group of four small islands of Northern Italy, in Lago Maggiore. They derive their name from the family of Borromeo. In 1671, Count Borromeo covered them with soil, and converted them from barren rocks into gardens. Their beauty is such that they are sometimes called the "Enchanted Islands." The largest of them is named Isola Madre, and is covered with orange trees and exotic plants. The most celebrated of the group is the Isola Bella, occupied by a beautiful palace of the Borromeo family, and a garden which rises in ten terraces, presenting the form of a truncated pyramid. Many tropical flowers are cultivated here.

Borrome'o [Lat. *Borromæus*] (CARLO), born at Arona, on Lago Maggiore, Oct. 2, 1538, a nephew of Pope Pius IV., was appointed a cardinal and archbishop of Milan in 1560. His diocese was haunted by all the vices of the Church of Rome and vehemently stirred up by the invasion of the Reformation, whose ideas were poured into the country from Switzerland and found ready acceptance among the excited population, but, placing himself at the head of the Roman Catholic reaction and supported by the Jesuits, he succeeded in reforming his clergy and suppressing the Reformation. He also distinguished himself by the purity and devoutness of his personal life, and was in 1610 canonized by the pope. He wrote several religious works (5 vols. fol., Milan, 1747). Died Nov. 3, 1584. (See POSSEVINO, "Vita di Carlo Borromeo," 1591; GODEAU, "Vie de Saint Charles Borromée," 1748; TOURON, "Vie de Saint Charles Borromée," 3 vols., 1761; ALBAN BUTLER, "Vita di S. C. Borromeo," 1835; ALEXANDRE MARTIN, "Histoire de la Vie de S. C. Borromée," 1847.)

Bor'row (GEORGE), an English author, born at Norwich in Feb., 1803. He became master of several modern languages, for learning which he had remarkable talents. In his youth he associated with the gypsies. As an agent of the British and Foreign Bible Society he travelled through many countries of Europe. He published in 1841 "The Zincali, or an Account of the Gypsies in Spain," and in 1843 "The Bible in Spain, or Journeys, Adventures, and Imprisonment of an Englishman in an attempt to Circulate the Scriptures in the Peninsula," which is a graphic and interesting work. His next work, "Lavengro, the Scholar, the Gypsy, and the Priest" (3 vols., 1851), is regarded as an autobiography. He has also written "Rommany Rye" (1857), "Wild Wales," etc. D. July 30, 1881.

Bor'rower, one to whom a chattel is loaned without compensation, which is to be returned in a specified time or on demand. (See BAILMENT.) The word is often used in a popular sense to denote a hirer of money, who pays a compensation for its use. The difference between these two transactions should be carefully noted. In the first signification the borrower agrees to return the specific thing loaned. He is only liable for negligence or the absence of due care. In the second case (loan of money) there is only an agreement to return an equivalent sum. The relation of debtor and creditor is created, and a failure to pay causes the debt to bear interest.

Bor'rowstounness', or **Boness',** a seaport-town of Scotland, in Linlithgowshire, on a low peninsula in the Frith of Forth, 17 miles W. N. W. of Edinburgh. It has a safe harbor, and manufactures of soap, salt, malt, vitriol, and earthenware. Here are coal-mines which extend under the bed of the Forth. Limestone and ironstone are found in the parish, which is traversed by the Roman wall of Antoninus.

Borsa, a town of Hungary, in the county of Marmaros, 50 miles S. E. of Szigeth. Pop. in 1880, 5528.

Borsip'pa [Gr. Βόρσιππα], an ancient city, which according to Strabo was in Babylonia, but there has been much doubt as to its exact situation. Stephanus calls it a city of the Chaldæans. It was probably situated near Babylon. Strabo states that it was sacred to Apollo and Diana. Some modern writers believe that Borsippa is represented by the remarkable mound called Birs-Nimrood, about 5 miles S. W. of Hillah, the site of Babylon proper. (See BABYLON and BABEL.)

Bor'sod, a county of Hungary, is bounded on the N. by the counties of Torna and Gömör, on the E. by Aba-Ujvar and Szabolcs, and on the S. and W. by Heves. Area, 1370 square miles. The county consists chiefly of vineyards and wooded hills, except in the S. E., which is a plain traversed by several small rivers, while the Theiss forms the eastern boundary. The chief products are fruit, hemp, tobacco, and wine, that of Miskolcz being the best in Hungary. Copper, iron, and coal are found in the mountains. Chief town, Miskolcz. Pop. in 1880, 194,647.

Bory de Saint-Vincent (JEAN BAPTISTE GEORGE MARIE), BARON, an eminent French naturalist and traveller, born at Agen in 1780. He explored the island of Mauritius about 1800, and published a "Voyage among the African Islands" (3 vols., 1804). He afterwards served as a captain in the army at Austerlitz and other battles, and became an exile in 1815. With the aid of Van Mons he edited at Brussels the "Annales des Sciences Physiques," 8 vols. He had the chief command of a scientific expedition which the French government sent to Algeria in 1839. Died Dec. 22, 1846. (See HÉRICART DE THURY, "Notice sur le Baron Bory de Saint-Vincent," 1848.)

Bos (gen. *bovis*), the Latin for an "ox" or "cow," is the systematic name for the genus of ruminant animals which comprises the ox, buffalo, etc. (See BOVIDÆ and OX.)

Bos, Bosch, or **Bosco** (HIEROM), a Dutch painter and engraver, born at Bois-le-Duc about 1470. Among his favorite subjects were spectres, demons, and incantations. He also painted some scriptural pieces. His picture of the "Crucifixion" is in the Escurial, in Spain. Died about 1530.

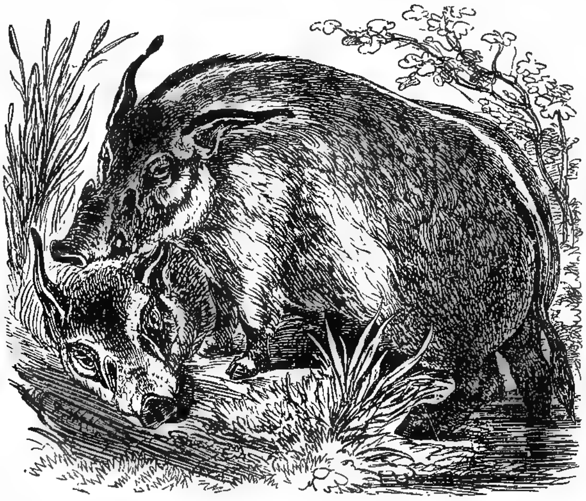
Bo'sa, a seaport-town of the island of Sardinia, is on the W. coast, at the mouth of the Termo, in the province of Cagliari, 30 miles S. of Sassari. Its harbor is safe, but admits only small vessels. It is the seat of a bishop, and has a cathedral, an old castle, and several churches. Wine, oil, and grain are exported. Pop. 6706.

Boscan (JUAN), born about the end of the fifteenth century, was a Spanish poet who introduced Italian measures into Spanish literature. He seems to have spent some years in military service. His poems were published in 1543. The best is the "Allegory." Died in 1540.

Boscawen (EDWARD), an English admiral, a son of Viscount Falmouth, was born Aug. 19, 1711. He served with distinction under Anson at Cape Finisterre, May, 1747, and commanded an expedition to the East Indies in 1748. He became a vice-admiral of the blue in 1756, was sent to North America, and gained several victories over the French in 1758. In Aug., 1759, he defeated the French fleet in the Bay of Lagos. He received for this service an annual pension of £3000. Died Jan. 10, 1761. (See Campbell, "Lives of the British Admirals.")

Bosch-Bok [Dutch for "bush-buck"], the *Tragelaphus sylvaticus*, a South African antelope, which is almost always found in thick underbrush which is not easily penetrated by man. When surprised in the open country it is easily caught, and is prized for its fine venison. It is about four or five feet long, and has a voice like the barking of a dog. Several other African antelopes have this name.

Bosch-vark [Dutch for "bush-pig"], a wild hog of Southern and Western Africa, in size and in habits much resembling the common hog. It has long pointed ears, a long tail, and is of a dull red color, with white marks. It goes in herds, and the stroke of the boar's tusks is much dreaded. It is the *Potamochœrus Africanus*.



Bosch-Vark, or Guinea Hog.

Bos′cobel, city, Grant co., Wis. (see map of Wisconsin, ref. 7–C, for location of county), on R. R. and Wisconsin River, 70 miles W. of Madison. Pop. in 1870, 1509; in 1880, 1428; in 1885, 1398.

Bos′covich (Ruggiero Giuseppe), F. R. S., an astronomer and natural philosopher, born at Ragusa, in Dalmatia, May 18, 1701. He entered the order of Jesuits in 1725, and became professor of mathematics and philosophy in the Roman College in 1740. He was one of the first on the Continent who adopted the Newtonian philosophy. His Latin poem "On the Eclipses of the Sun and Moon" (1764) was much admired. He wrote various scientific works, among which we notice "Philosophiæ Naturalis Theoria" (1758) and "Opera Pertinentia ad Opticam et Astronomiam" (5 vols., 1785). The latter is a collection of treatises on optics and astronomy. He died at Milan Feb. 12, 1787. (See Fabroni, "Vitæ Italorum doctrina excellentium;" Ricca, "Elogio storico dell' Abate R. G. Boscovich," 1789.)

Bo′sio (François Joseph), Baron, an eminent sculptor, born at Monaco Mar. 19, 1767. He worked in Paris, and was patronized by Napoleon I., for whom he executed busts of Josephine and her daughter Hortense; also the bas-reliefs of the column of the Place Vendôme. Among his masterpieces are the "Hyacinth" in the Luxembourg, "Cupid Darting Arrows," and the "Nymph Salmacis." His works are remarkable for grace and harmony. He was a member of the French Institute. Died July 29, 1845.

Bos′na-Serai′, or **Sarajevo** (anc. *Tiberiopolis*), a town of Bosnia (since 1878 a province of Austria-Hungary), is beautifully situated on the Migliazza, 115 miles S. W. of Belgrade. It is an important centre of commerce, and is the dépôt of the caravan trade between Salonica and Yánina. It has 150 mosques and churches, the domes, minarets, and spires of which give it an Oriental aspect. Here is a palace built by Mahomet II. The town is defended by a citadel, and has manufactures of cutlery, jewelry, woollen goods, and leather. A large part of the town was destroyed by fire Aug. 8, 1879. Pop. about 45,000.

Bos′nia, inhabited by a Slavonic tribe akin to the Servians, formerly an independent kingdom, from 1522 to 1878 a province of Turkey, and since that time a province or state of Austria-Hungary, is bounded on the N. by the river Save, on the E. by the Drin, on the S. by Albania, and on the W. by Dalmatia. Area, 16,417 square miles, or, with Herzegovina and Novi-Bazar, 24,247 square miles. The surface is for the most part mountainous, and the Dinaric Alps extend along the western border. Some peaks of this range rise about 7000 feet above the level of the sea. The largest rivers, besides the Save, are the Bosna, the Verbas, the Narenta, and the Drin (or Drina). The mountain-slopes are covered with forests of oak, beech, chestnut, and other trees. The soil of the plains and valleys is fertile, and produces good crops of maize, wheat, hemp, and various fruits. Bosnia is rich in coal, iron, lead, and other metals, but the mines are not worked to a great extent. This province has few manufactures except firearms, sabres, and knives. The population is a mixture of Bosnians, Croats, Morlaks, Turks, Illyrians, Jews, gypsies, etc., the majority being of the Slavic race. Capital, Bosna-Serai; other important towns, Mostar and Banaluka. Pop. in 1879, 862,202, and of Herzegovina and Novi-Bazar, which are generally associated with it, 349,970, making a total of 1,212,172, of which 448,613 are Mohammedans (not Turks, but Bosniacs, or of Slavonic race), 496,761 Bosniacs of the Greek Orthodox Church, 209,391 Roman Catholics, 3426 Jews, etc.

History.—Very interesting, but too full of incidents to be given here. Settled by Slavs in the fifth or sixth century, it was under the sway of the Byzantine empire for several centuries; at one time a powerful kingdom, it was, both before and after, alternately the prey of Hungary, Servia, the German empire, or the popes; its inhabitants, largely Protestants, repelled the attempts of each to convert them, and maintained their own faith amid terrible persecutions, till at last, in sheer despair, they surrendered to the Turks in 1463 to 1483, and their children were made Mohammedans by force. In the late Russo-Turkish war of 1877–78 they opposed Turkey, and were finally annexed to Austria. (See "Through Bosnia and the Herzegovina," by A. J. Evans.)

Bos′phorus, or **Bos′porus** [Gr. βόσπορος, *i. e.* the "ox-passage," because cattle could swim it], the ancient name of the strait which connects the Black Sea (Pontus Euxinus) with the Sea of Mármora (Propontis), and forms part of the boundary between Europe and Asia. It is about 16 miles long, and varies in width from half a mile to two miles. The Bosphorus is deep, and flows between high shores and cliffs, which present much picturesque scenery, the beauty of which is enhanced by many ancient ruins. Constantinople stands at the S. W. end of the Bosphorus, which is sometimes called the Strait of Constantinople. It was also called the Thracian Bosphorus, to distinguish it from the Cimmerian Bosphorus, the modern name of which is the Strait of Yenikale.

Bos′phorus, Cimme′rian [Gr. βόσπορος Κιμμέριος], the ancient name of the Strait of Yenikale (or Strait of Kaffa), which connects the Black Sea with the Sea of Azov (Palus Mæotis). The width of the narrowest part is about 3½ miles. On the W. side of it was a Milesian colony and the city of Panticapæum, which was the capital of a kingdom founded by the Archæanactidæ in 480 B. C. This kingdom endured several centuries under various dynasties, whose dominions were on both sides of the strait.

Bosque River, Texas, rises in Erath co., flows southeastward through Bosque co., and enters the Brazos at or near Waco. Its length is estimated at 100 miles.

Bosquet (Pierre François Joseph), a French general, born at Pau Nov. 8, 1810. He served in many campaigns in Algeria, became a general of brigade in 1848, and a general of division in 1853. In the Crimean war he commanded a division at Alma, and rendered important services at Inkermann 1854, for which he received the thanks of the British Parliament. He was disabled by a wound at the siege of Sebastopol, Sept., 1855, but was, on account of his great merits, made a senator and marshal of France in 1856; he took, however, no part in politics. Died Feb. 5, 1861.

Bossage, a French word used in architecture, denotes a stone in a building which is left projecting and rough, to be finally wrought into a sculptural decoration; also rustic work, consisting of stones which advance beyond the nave or level of the building.

Bossi (Luigi), an Italian antiquary and historian, born at Milan Feb. 28, 1785. He was appointed prefect of the archives of the kingdom of Italy by Napoleon. Among his numerous works are a "History of Italy" (19 vols., 1819–23) and an "Introduction to the Study of the Arts of

Design." Died April 10, 1835. (See G. B. Carta, "Cenni biografici intorno al Cavaliere L. Bossi," 1835.)

Bossuet (Jacques Bénigne), D. D., a celebrated French pulpit orator and theologian, born at Dijon Sept. 27, 1627. He entered in 1642 the College of Navarre in Paris, where he studied Greek, Latin, philosophy, and theology. In 1652 he was ordained a priest, received the degree of doctor, and became canon of Metz. Having become renowned as a pulpit orator, he was appointed to preach the Advent sermons before the king and court in 1661. In the ensuing years he preached in many churches of Paris, and converted Marshal Turenne to the Catholic communion. He was appointed bishop of Condon in 1669, preceptor to the dauphin in 1670, and bishop of Meaux in 1681. For the dauphin he wrote a "Discourse on Universal History" (1681), which denotes a new stage in the study of the philosophy of history. He was also the author of four articles which were adopted by an assembly of French clergy in 1682, and which secured the liberties of the Gallican Church against papal aggression. Against the Protestants he wrote his eloquent "Exposition of the Doctrines of the Catholic Church on Subjects of Controversy" (1671), but his principal polemical work against the Protestants is his "History of the Variations of the Protestant Churches" ("Histoire des Variations des Églises Protestants," 2 vols., 1688). He was involved in a controversy with Fénelon, whom he censured for his defence of Madame Guyon and her quietism, and whom he treated in an arrogant and supercilious way without understanding him. He died April 12, 1704. Among his most admired compositions are funeral orations on the prince of Condé (1687), on the duchess of Orleans (1670), and other eminent persons. A good edition of his complete works was published at Paris in 59 vols., 1825. (See D'Alembert, "Eloge de Bossuet;" M. de Bausset, "Histoire de Bossuet," 4 vols., 1814.)

Bossut (Charles), a French geometer, born near Lyons Aug. 11, 1730, was a friend of Fontenelle. He was admitted into the Academy of Sciences in 1768. Among his works are a "Treatise on Mechanics and Dynamics" (1763), a "Complete Course of Mathematics" (7 vols., 1795–1801), and an "Essay on the General History of Mathematics" (2 vols., 1802). He published an edition of Pascal's works. Died Jan. 14, 1814. (See Delambre, "Éloge de Bossut.")

Boston′, Al (*i. e.* the "garden"), a town of Asiatic Turkey, pashalic of Marash, is in a plain and on the river Sihun, near the northern base of Mount Taurus, 32 miles N. N. W. of Marash. It has several mosques, and a trade in wheat. Pop. about 8000. Here the Egyptian sultan Bibars defeated the united Turks and Mongolians in a great battle on April 16, 1277.

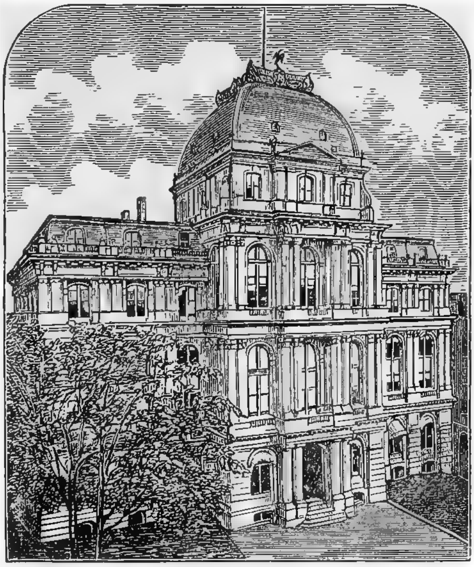
Bos′ton, an ancient borough and seaport of England, in Lincolnshire, is on both sides of the river Witham. It is on the Great Northern Railway, 107 miles by rail N. of London. Vessels of 300 tons can ascend the river to this place, which is supposed to be identical with Icanhoe, where Saint Botolph founded an abbey in 654 A. D. About 1200, Boston was one of the chief seaports of England. Here is the parish church of St. Botolph, built in 1309, 245 feet long, with a tower 290 feet high, surmounted by a lantern which is visible nearly forty miles at sea. Boston has manufactures of canvas, iron, brass, ropes, hats, leather, etc. Pop. in 1881, 14,932.

Boston, an important R. R. and commercial centre, the capital of Massachusetts, in Suffolk co. (see map of Massachusetts, ref. 2–I, for location), situated at the W. extremity of Massachusetts Bay, about 450 miles by R. R. N. E. of Washington, and 232 miles N. E. of New York: the State-house is in lat. 42° 21′ 27.6″ N., lon. 71° 3′ 30″ W. It was founded in 1630 by Puritan colonists from England under the lead of John Winthrop and Thomas Dudley.

Original Site.—The site was originally a small pear-shaped peninsula, in its extreme length less than 2 miles, and its greatest breadth a little more than 1, bounded N. and W. by the Charles River, expanded into a broad estuary in its N. W. sweep into the deep water of the harbor. It was hung to the mainland at Roxbury by a slender stem or neck a mile in length, so low and narrow between tide-washed flats that it was often submerged. The water on the N. of this isthmus was an inlet of the Charles nearly a mile wide, called Back Bay, and that on the S. was an inlet of the harbor, named South Bay. This site was deeply indented by coves and bordered by salt-marshes, and its surface was abrupt, irregular, and hilly. Such essentially were the natural features of Boston of 100 years ago, with its narrow, crooked streets, nooks, and its detached buildings, only four being of stone, of which King's Chapel alone remains. At the time of the Revolution it was the richest and most populous city in the U. S., yet it contained only 2000 buildings and less than 20,000 inhabitants.

Modern Changes.—While the original site still preserves to a great extent its irregularity of surface, every part has been graded, the steep eminences having been reduced or wholly removed. The highest remaining eminence, Beacon Hill, crowned by the State-house, is about 110 feet high. The coves, inlets, and marshes of the northerly borders have been converted into solid land covered with buildings and fringed with wharves and docks. On the opposite side the broad bays and flats have been reclaimed and covered with streets and squares, so that what was the narrowest and most disagreeable has become the widest and fairest portion of the primitive site, and thus the original 783 acres of solid land comprised in the peninsula have become 1829. This constitutes what is now Boston proper. In the mean time, additional territory has been acquired, mostly in recent years, by annexing adjoining suburban cities and towns, until now the aggregate area of the city, with all its districts, is 23,661 acres ($36\frac{7}{10}$ square miles)—more than 30 times as great as the original area. The territorial acquisitions called districts are as follows: East Boston, South Boston, Roxbury, Dorchester, Charlestown, West Roxbury, and Brighton.

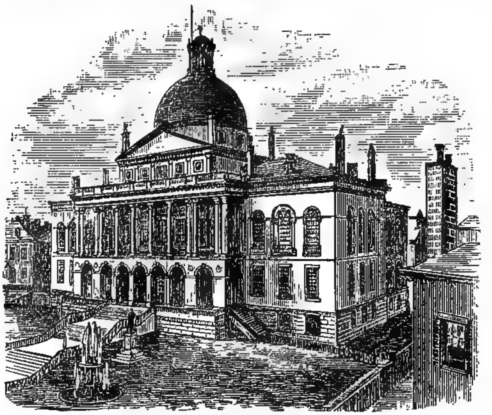
Streets and Buildings.—The broad water-courses around Boston proper are spanned by causeways or bridges, East Boston only, that the harbor may be open to the navy-yard in Charlestown, being reached by ferry. Washington street, extending from the Boston and Maine R. R. station to Roxbury, has always been the main thoroughfare. Beacon street has many of the finest dwellings of Boston. State street is the financial street. Commonwealth avenue, 250 feet wide, with a mall in the centre, extending upward of a mile and a half through the Back Bay section, is rapidly becoming one of the finest boulevards of the world.



The City Hall.

The street railways afford conveyance to almost every part of the city and its vicinity. The nine R. Rs. radiating from Boston connect it not only with all parts of New England, but with the far South, West, and East. In the centre of Boston proper are the Common and the adjacent Public Garden, constituting a park of 70 acres. These and other public places are adorned with many statues, of which the most noted is the fine equestrian statue of Washington on the Public Garden.

Public Free Schools.—The system of public free schools has long been the special pride of the city. This well-organized and liberally-supported system comprises primary, grammar, high, Latin, normal, and special schools, in which 54,323 pupils are taught by 1276 teachers. The 188 school-houses, containing 1088 school-rooms, are valued by the assessors at $8,377,500. The finest and largest school edifice in America, consisting of two connected school-houses, for the Latin and English high schools for boys, has recently been erected, costing, with the site, $741,949.16. The total school expenses for 1880–81 were $1,775,037. The instruction in all grades is gratuitous, the system being wholly supported by money drawn from the general tax levy of the city, and under the control of a board composed of the mayor, who is president, and 24 members chosen by the citizens for three years. The supervision is exercised by a superintendent and six supervisors. In the number and extent of its libraries Boston stands at the head of American cities. The chief of these is the Boston Public Library, opened in 1854, which is wholly free, and is supported out of the city treasury at an annual expense of $125,000. With its eight branches in the districts, it contains 400,000 volumes. Its executive force consists of one hundred and fifty persons; its building cost, in 1848, $365,000, and a new one is about to be built. The literary, scientific, benevolent, and secret societies are numerous and well sustained. Of the higher institutions for instruction are the Massachusetts Institute of Technology, the Boston College (Roman Catholic), the Boston University (Methodist), and the Harvard Medical School.


State Capitol (Boston, Mass.).

Commerce and Finance.—Boston has been from the first a commercial city, and has commercial relations with every part of the globe. Its advantageous situation upon a harbor deep, secure, unobstructed by sand-bars or ice, and containing nearly 60 square miles of anchorage, was early appreciated by the people, and the shipping interests were rapidly extended. There are now 10 or more different steamship lines to Europe, and numerous coastwise steamers. Boston is the principal mart of the country for the sale of shoes, leather, and wool, and it is the buying, selling, and financial centre of most of the manufacturing establishments of New England. The first bank in America was established here in 1686, and the first savings institution in 1816. There were in 1881 in the city 61 national banks, with a cash capital of $52,300,000, and a surplus amounting to $11,703,936. At the clearing-house about $12,000,000 change hands daily. The valuation of taxable property in 1800 was $15,095,700, and the tax levy $80,000; in 1880 the valuation was $639,462,495, and the tax levy $9,913,951. The total net debt, Apr. 30, 1881, was $26,005,620; the valuation of the personal and real property owned by the city, exclusive of the means for paying the debt, May 1, 1881, was $41,197,656. The works for the water supply are elaborate and extensive; Cochituate Lake works were completed in 1848. The growth of the city requiring an additional supply, in 1872 the Sudbury River works were begun, on a larger scale, and are now finished. The annexation of Charlestown brought with it the Mystic Lake works. The cost of construction of these combined works was upward of $18,000,000, and the gross expenditure on their account about double this amount.

Manufactures.—The census of 1880 reports 3665 manufacturing establishments, embracing a great variety of articles; capital, $47,348,384; hands employed, 59,213; wages paid, $24,924,009; value of products, $130,531,993.

History.—Boston remained for nearly two centuries under the simple form of a town government by all the citizens assembled in "town-meeting." The city charter was granted in 1822. The present government is composed of a mayor, 12 aldermen, and a common council of 72 members, annually elected. There are commissioners for fire, water, health, streets, and police, and boards for various other departments of the public service. In and near Boston were enacted the first scenes of the drama of the Revolution. From this place the British army went out to open the war at Lexington and Concord, and to fight the battle of Bunker Hill, the site of which is now within the city limits, and was forced by Washington to evacuate Mar. 17, 1776. On the evening of Nov. 9, 1872, the great Boston fire broke out, and destroyed the most substantial business portion of the city, sweeping over 65 acres, covered mostly with wholesale warehouses, nearly all being of brick or granite, involving a loss of over $80,000,000. In a little more than two years afterward the whole "burnt district," with widened and improved thoroughfares, was again covered with solid business edifices. Pop. in 1800, 24,937; in 1820, 43,298; in 1850, 136,881; in 1870, 250,526; in 1880, 362,839; in 1885, 390,406. JOHN D. PHILBRICK.

Boston, capital of Bowie co., Tex. (see map of Texas, ref. 2–K, for location of county), 65 miles N. of Marshall. It has a good high school and a female academy. Pop. in 1870, 273; in 1880, 257.

Boston School System. See SCHOOL SYSTEM OF BOSTON, by HON. JOHN D. PHILBRICK, LL.D., J. U. D.

Boston University, chartered by the legislature of Massachusetts in 1869, is in organization and in its affiliations unique. Membership in it can be acquired only by promotion to an academic or professional degree. Students in attendance in any of its schools or colleges are only candidates for membership. On admission to a degree in any department, the candidate becomes a member of the convocation, which body representatively participates in the government. There are three departments admission to which does not presuppose a preliminary collegiate education, and these are called the Colleges of Liberal Arts, Music, and Agriculture respectively. There are three for students who have completed a course in the liberal arts—viz. the Schools of Theology, Law, and Medicine. All these colleges and schools have separate faculties and separate administrations. There is also a department of general post-graduate study in language, philosophy, and science, known as the School of All Sciences. The university council consists of the president and registrar of the university, together with the deans of all the colleges and schools. The university senate consists of all members of the university council, together with all regular professors in the six different faculties. The corporation consists of not less than ten nor more than thirty trustees, each elected for a term of five years. Property to the amount of $1,000,000 is held by this body. The three original corporators were Isaac Rich, Esq., the Hon. Lee Claflin, and the Hon. Jacob Sleeper, all of whom had held responsible positions in the government of one or more of the older New England colleges, and the last of whom had served as a State-appointed overseer of Harvard University for twelve years. The governor of the commonwealth who officially approved and signed the charter was a son of the second of the original corporators. Sixty-four free scholarships in the College of Liberal Arts have recently been established in honor of Isaac Rich, Esq., first founder and chief benefactor of the university. The place of the College of Agriculture is supplied by the Massachusetts Agricultural College, at Amherst, Mass. By virtue of a special arrangement, the faculties of the National University, at Athens, and of the Royal University, at Rome, are so associated with the School of All Sciences that students in the latter can receive instruction in those universities without charge, and on returning and passing the requisite examination be promoted to advanced degrees in Boston University. It is worthy of remark that this institution was the first university in the world to be organized from the start and throughout without respect to sex. It was also the first in America to present in theology, law, and medicine uniform graded courses of three years' duration, and to require, in order to graduation, the completion of these courses. WILLIAM F. WARREN.

Bos'tra, or **Bots'rah,** sometimes called **Boz'rah,** formerly a great city of Arabia, now in ruins, in an oasis of the Syrian desert, about 75 miles S. of Damascus, and about 40 miles E. of the Jordan. It was in the southern part of the district of Auranitis, the modern Hauran, of which it was the capital in the Middle Ages. It was beautified by Trajan, who made it the capital of the Roman province of Arabia about 105 A. D. The Roman emperor Philip gave it the title of *Metropolis,* probably because it was his native place. It was described as a great and populous city about 300 A. D. The important ruins of Bostra are described by Burckhardt in his "Travels," and Robinson in his "Biblical Researches," vol. iii. *Bostra,* though sometimes called *Bozrah,* must not be confounded with the Idumean city of that name. (See BOZRAH.)

Bos'well (JAMES) **of Auchinleck,** a famous Scottish biographer, born at Edinburgh Oct. 29, 1740. He studied law, and in 1763 became acquainted with Dr. Johnson; in 1773 was chosen a member of the literary club established by the latter in London. He diligently noted and recorded the sayings, opinions, and actions of Dr. Johnson, of whom he was an intimate associate. His "Life of Samuel Johnson" (2 vols., 1791) is a remarkable, and in many respects an admirable, biography. Died May 19, 1795. (See MACAULAY'S review of Boswell's "Life of Johnson" in the "Edinburgh Review" for 1831.)

Bos'wellia (named in honor of John Boswell, a physician), a genus of trees of the order Amyridaceæ, natives of India, Persia, and Arabia. The flowers have five petals and a crenelated granular disk. The fruit is a triangular capsule with three valves, three cells, and one seed in each cell. The number of known species is small. The *Boswellia thurifera* (or *serrata*) is a large tree with pinnate leaves, each of which has about ten pairs of hairy, serrate leaflets and one odd leaflet. It has small pink flowers in axillary racemes. This tree yields the fragrant resin called *olibanum*, which is believed to be identical with the frankincense of the ancients. (See Olibanum.)

Bos′worth, a market-town of England, in Leicestershire, on an eminence 10 miles W. of Leicester. On a moor near this town was fought in Aug., 1485, the battle of Bosworth, or Bosworth Field, in which Richard III. was defeated and killed. This battle terminated the civil war of the Roses, and raised Henry VII. to the throne.

Bosworth (Joseph), D. D., F. R. S., an English philologist, born in Derbyshire in 1789. He graduated at Leyden, and received the degree of D. D. at Trinity College, Cambridge. In 1817 he became vicar of Horwood Parva, in Buckinghamshire. He devoted much time to the study of Anglo-Saxon, and published a "Dictionary of the Anglo-Saxon Language" (1838), which is indispensable to the thorough student of English. He resided ten years (1830–40) in Holland as British chaplain. Died May, 1876.

Böszörmeny, a town of Hungary, in the county of Szabolcz, 16 miles N. N. W. of Debreczin. Pop. 19,208.

Botanic Gardens are collections of growing plants, made for the purpose of instruction or for scientific observation. Of late, they have also been very serviceable in introducing useful and ornamental plants from foreign countries. The Kew Gardens in England and the Jardin des Plantes in France are among the most celebrated botanical gardens in the world. In the U. S., the garden connected with the Department of Agriculture at Washington promises to become highly useful in bringing new plants into cultivation. There is also a successful botanic garden connected with Harvard College at Cambridge, Mass. The Missouri Botanic Garden at St. Louis was founded by Henry Shaw.

Bot′any [from the Gr. βοτάνη, a "plant;" Fr. *botanique;* Ger. *Bota′nik*] is the natural history of the vegetable kingdom—*i. e.*, the science that treats of plants. For the present purpose there is no need to draw out the distinctions between the two kingdoms of organic nature, animal and vegetable, for their ordinary representatives would never be confounded. But the task, when attempted, is by no means a light one; indeed, a complete definition, discriminating the lowest forms of plants from the lowest animals, is still a desideratum, if not an impossibility. (See on this subject the article Plant.) Probably the best general definition of plants, and that which brings prominently into view their nature and office, is this: they are those beings which derive their sustenance from the mineral kingdom, namely, from the earth and air. They only are capable of converting earth and air into nourishment. Plants create the food upon which animals live. Their office in the economy of nature is to transform lifeless mineral materials into living matter, or into matter capable of supporting or composing the corporeal structure of a living being. Animals take that which plants have prepared for them, transform it more or less, incorporate it into structures which manifest powers and vitality of a higher order; but they originate no organic matter.

The several departments of botany relate to the different kinds of inquiry which may be made respecting plants. They all fall under two primary divisions—namely, *structural* or *biological botany*, and *systematic botany*, with certain subsidiary inquiries.

I. *Structural or Biological Botany* includes all inquiries into the organic structure, life, growth, action, and propagation of plants. The structure and the functions may be regarded separately, although practically they are best treated in connection. As to the first, pure *structural botany* is sometimes denominated *organography*—*i.e.*, the study of the organs or members of plants. The study of the organs as compared with each other—as, for instance, of the different forms which leaf, stem, etc. may exhibit in the same plant or in different plants—has taken the name of *morphology* (the doctrine of forms or shapes)—a department or mode of treatment of the subject which in modern times has greatly enhanced the interest of botany. The morphological study of abnormal parts or monstrosities takes the name of *teratology*. The organs of plants in the most general sense are their obvious parts or members, such as leaf, stem, and root, flower, fruit, and seed. But each of these is made up of parts, and the parts themselves are complex: the minuter parts or organic elements of plants, which compose the obvious members, are in the stricter sense the plants' organs. Their investigation takes the name of *vegetable anatomy*, or *histology*. The study of the actions of these organs, whether of the obvious members or of their minute components (which, indeed, are the parts that act), is the province of *physiological botany* or *vegetable physiology*. These are the principal departments of structural and biological botany. The leading facts and the leading ideas which the botanist of the present day has to consider under these several divisions, so far as they may be clearly stated in a very brief compass, are as follows:

1. *Structural Botany* proper, including *Morphology*.—The natural history both of the vegetable and animal kingdoms in modern times is studied upon a morphological basis. The minds which have dominated and shaped vegetable morphology are those of Linnæus, Goethe, Robert Brown, and De Candolle, to which several more recent names might be added.

As a proper representative of an animal would be some species of the highest grade, rather than a polyp or an infusory animalcule, so for the plant the higher grade must be taken as a pattern. The following exposition therefore takes into account, in the first instance, ordinary plants only, such as our herbs, shrubs, and trees. These spring from seed; they take root; they develop a stem, on which they display leaves; and they develop flowers, the end of which is the production of seed. The root avoids the light, grows downward, fixes the plant to the soil, and ordinarily ramifies in it. The stem rises into the light, develops leaves at definite points of its surface, is at its summit capable of extending farther and farther, until finally it bears a blossom or a cluster of blossoms, which end it. Stems take root; if they did not do so, our power of multiplying plants would be very much diminished. Some stems will strike root into the ground freely and surely whenever placed in favorable condition for it—namely, when screened from light and supplied with moisture and a fitting temperature. Most stems can be made to do so; hence propagation by laying, by slips or cuttings, etc. A stem consists of a series of what, in a loose way—although as to many plants (reeds, grasses, etc.) a very natural and correct way—of speaking, may be called joints; there is a point or portion from which leaves (one or more) are or may be developed; this is a *node*. Between one node and another above or below it—a space of variable length, according to the amount of growth—no leaves can be produced; this intervening naked portion is an *internode*. A stem is made up of a series of nodes and internodes. The apex of a stem is theoretically supposed to be, and generally actually is, so long as it lives, a *bud;* that is, a growing point, consisting actually and potentially of nodes and internodes. The growth of the stem, as to length, is by the development of the internodes in succession, beginning with the lowest and oldest; this growth separating the nodes more or less according to the amount of lengthening, and so spacing apart the leaves they bear. This growth of the stem, accordingly, consists—1, of the formation of new parts at the apex of the old; 2, of the lengthening of the successive internodes. The length any internode may attain is very variable, but each one when it begins to grow usually acquires the length it may attain rather rapidly, and when its tissues are matured is incapable of any farther extension in length, leaving the stem to be carried up by the development in their turn of the younger internodes above it. Stems usually grow and rest by stages. The bud is the undeveloped apex of a stem, whether in a growing or resting state. Winter-buds, as they are termed, are formed in summer or autumn, remain quiescent through the winter until the coming spring, and then develop. The larger and best-developed ones are provided with scales, which their nodes bear in place of leaves, and they sometimes contain, already formed, all the nodes, internodes, and leaves they are to develop the coming season, already discernible, although rudimentary. From such buds there are all gradations down to those which are hardly or not at all apparent until they begin to grow.

Branching takes place by the production of side-buds, and these, as a rule, are produced only on the nodes; that is, as each joint of the stem, when formed, ends with a bud (the terminal bud) which is to carry on the stem yet higher, so it also produces or may produce side or lateral buds also. There is a definite place on the node for such buds to arise (*i. e.*, in the angle formed by the leaf with the stem, on the upper side): this angle is called the *axil* (arm-pit), and buds springing from thence are said to be axillary. Axillary buds develop into branches. As a rule, there is only one to each leaf.

Arrangement of Leaves (*Phyllotaxy*) *and Branches.*—That of the latter depends upon the former. Leaves are symmetrically disposed upon the stem. A plant, no less than an animal, is symmetrical. Leaves are either single on each node—*i. e.*, they follow one after another (are *alternate*)—or else there is a pair, or more than a pair, upon each node. When a pair only, they stand always upon exactly opposite sides of the stem (are said to be *opposite*); when three, four, or any other number, they divide the circle equally—that is, they stand as far apart from each other as possible in the circle. A circle of three or more leaves, etc. is called a *whorl* or *verticil;* such leaves are said to be *whorled.* Evidently, opposite leaves present merely the simplest case of whorled leaves, a whorl of two leaves. The pairs or whorls of leaves follow each other in a fixed order; each pair stands over the intervals of the pair next below, and the leaves of the whorl of three or other number correspond to the intervals of those of the whorl above and below. In the alternate arrangement the single leaves succeed one another in a definite order, maintaining a complete symmetry. Each leaf projects from the stem at a fixed angle with that which precedes and that which follows it, which is uniform for the species, but different in different species. In the simplest case the second leaf is on exactly the opposite side of the stem from the first—of course higher up; the third leaf on the opposite side from the second, and therefore vertically over the first; so the leaves are in two vertical ranks; the angular divergence—*i. e.*, the angle which successive leaves make—is one-half the circumference of the stem. Other plants have the angular divergence one-third—*i. e.*, the second leaf is placed one-third round the stem; the third is one-third round from that, completing a cycle of three, and bringing the fourth over the first, the fifth over the second, and so on—that is, disposing the leaves in three vertical ranks. A line traced on the stem through the base or attachment of the successive leaves forms a spiral; each turn, from one leaf round to the one above which is placed directly over it, is termed a *cycle.* Alternate leaves are never in four ranks, but they are very commonly in five. In that case the angular divergence, or portion of the circle between any two successive leaves, is two-fifths of the circumference, and the spiral line ascends through two whole turns round the stem in completing the five vertical ranks of leaves, and bringing the sixth over the first. These several modes of arrangement may be designated by the fractions $\frac{1}{2}$, $\frac{1}{3}$, $\frac{2}{5}$, which measure the angular divergence of the successive leaves in the spiral. The denominators likewise express the number of vertical ranks, and the numerators the number of turns round the stem in completing a cycle. An obvious relation of these fractions to each other is, that the sum of the numerators of the first two fractions is the numerator of the third, and the sum of the denominators is the denominator of the third fraction. Now, the indication thus suggested is carried out in fact when alternate leaves occur in more than five vertical ranks; for the next higher number of vertical ranks is eight, and their angular divergence is three-eighths of the circumference; and the next is in thirteen vertical ranks, with a divergence of five-thirteenths of the circumference, and so on; that is, the actual arrangements are expressed by the series of fractions, $\frac{1}{2}$, $\frac{1}{3}$, $\frac{2}{5}$, $\frac{3}{8}$, $\frac{5}{13}$, $\frac{8}{21}$, and so on. The subject is capable of very interesting mathematical development. These are all modes of equable distribution of foliage on an axis; and the meaning of them appears in some degree evident when it is understood that the work of vegetation is done by the foliage under the light of the sun; so that there is an advantage in having as large an amount of foliage as possible within a given space, and most fully displayed to the light. The study of the arrangement of leaves is termed *phyllotaxy*, which is the Greek for leaf-arrangement.

Metamorphoses of Leaves and Stems.—The most fertile ideas in morphological botany are those which, indistinctly sketched by Linnæus and afterwards by Wolff, were first well developed by the poet-philosopher Goethe, and since perfected by various minds. These ideas are best expressed in the following propositions: Every plant of the higher grade (high enough to exemplify the plan of vegetation) is built up of a succession of joints of stem and leaves, of which the embryo just developed from the seed, with its primary stemlet and seed-leaves (*cotyledons*, one, two, or rarely more, as the case may be), is the archetype and the parent. All subsequent development consists of repetitions of this. The primary stemlet, at the outset of germination, sends out a root from its lower end, which is often the origin of the whole root of the plant; but any succeeding joint of the stem may equally send out roots, and commonly does so when favorably situated—*i. e.*, when supplied with moisture and excluded from light. The successive joints of stem, with the leaves they bear and any roots they may send downward, build up the plant, as it were, in a series of generations, the greater part of which are capable of independent propagation (as cuttings, layers, etc.), or else they make a part of the common life and structure of the vegetable. A plant, therefore, is to be likened to a coral structure or to other compound polyps which construct a polypidom, rather than to an animal of the higher grade and complete individuality, such as a horse or a man. But the plant constitutes a sort of corporate whole: it may be likened to an organized community, in which "all members have not the same office," but some are turned to one account, some to another. The morphological botanist's view is, that, root excepted, the plant's organs are all constituted of stem and leaf, and all on the plan which is displayed by the plantlet at the beginning of its growth. The cotyledons, which compose the principal bulk of any large embryo, and which develop in germination into the seed-leaves in the convolvulus, gourd, and the like, and do the work of leaves upon being raised above the ground by the lengthening of the stemlet (or first internode) beneath them, are equally discerned in those of the bean, although so much thicker, hardly turning green, and never becoming foliaceous: here the seed-leaves are made a storehouse of nourishment: in a pea and an acorn they are still more gorged, so as to be hemispherical, and never attempt any foliaceous development, but simply feed abundantly the bud between them (*plumule*), so that the succeeding joints of stem and their leaves develop the more rapidly and vigorously. So, again, where winter-buds are formed, their scales represent leaves relegated to the function of protection. Lilac buds in their development show this well, in the gradual and complete transition from the outermost bud-scales, which fall off unchanged, to the ordinary leaves. In the scales of bulbs the botanist sees leaves, or the bases of leaves which are foliaceous above ground, converted into reservoirs of nourishing matter, and when this is exhausted the thinned and dried outermost scales serve for protection. Leaves of barberry develop as spines; those of pea, cobæa, and the like, convert a part of their leaflets into tendrils for climbing, while those of maurandia, lophospermum, etc. make their leaf-stalks, and those of clematis their partial leaf-stalks, serve as tendrils for climbing, the blade of the leaf remaining unchanged as foliage. In other cases (probably in gourds and squashes) a whole leaf becomes tendril.

Equally may stem or branches assume any of these forms and functions. Tendrils of the grapevine and of the passion-flower are stems or branches: so are thorns of hawthorn, pear, honey-locust, etc.; the green rind of the stem of cactuses, or flattened leaflike expansions in many of them and in various other plants, take the function of foliage; tubers (such as potatoes), root-stocks (as of iris, sweet-flag, ginger, etc.), are portions of stem used as reservoirs of nourishment, just as the thickened roots are in radish, turnip, carrot, etc.

Returning to leaves and to the ultimate development in the blossom as the inflorescence is approached, manifest leaves not rarely exchange the green of vegetation for the brighter hues and delicate texture of floral-leaves, as in painted-cup, calla, Poinsettia, etc. And in the leaves of the flower themselves every one recognizes the appropriateness of the term when the outer circle (*calyx*) is green, as is commonly the case, and hardly less so for the inner circle (*corolla*), although its members (*petals*) are of delicate texture and of other hues than green. The evidence of gradual transition from leaves outside of the flower (*bracts*), through those of the calyx to those of the corolla, does not always stop there. In water-lilies and some other flowers the inner petals pass by degrees into stamens, and so supply one of the clews which lead the botanist to his inference that even the interior organs of the flower equally answer to leaves. Cultivated flowers confirm this inference when by becoming "double" (to use the florist's term) they turn, some the stamens only, some both stamens and pistils, into floral-leaves or petals, or, in some monstrosities, turn them all into a rosette of green leaves. Finally, the arrangement of the parts of the flower, of whatever shape or character, conforms to that of leaves on a stem; *i. e.*, they follow the laws of phyllotaxy, already described—are either in circles, and the members of the successive circles alternating with each other (decussating) after the manner of whorls of leaves, or in cycles according to the spiral or alternate arrangement of leaves. And the arrangement of the blossoms themselves upon the stem, or in their clusters, conforms precisely to that of buds: flowers, like leaf-buds, are terminal or axillary. A flower is, as all lines of evidence go to prove, a sort of bud with its leaves developed and the internodes undeveloped or nearly so—with its leaves developed in peculiar forms, not always greatly different from foliage in the outer parts, but very different in form and in office as respects the inner and essential organs. In the language of morphology, leaves, sepals, petals, stamens, etc. are *homologous* organs, just as the fore leg of a dog, the wing of a bat or bird, the flipper of the whale, etc. are homologous with the arm of a man.

The Parts of the Flower need to be briefly specified before its morphology can be completed. Here, again, the botanist places before his mind a pattern flower—one complete in its parts and free from complications or disguises. A complete flower of this sort has two kinds of organs—1, *Envelopes* or leafy parts, "the leaves of the blossom," and these in two circles; the outer circle is the *calyx*, oftener than otherwise green and leaflike; the leaves or pieces of the calyx are named *sepals;* the inner, of delicate texture, and almost always of other color than green, is the *corolla;* its pieces or leaves are petals. 2, *Essential organs* within the last; these are of two sorts, and at least in two circles; the exterior sort are the *stamens*, the interior, occupying the centre, are *pistils.* These two essential organs conspire to the production of seed. The stamens are the fertilizing organs. Each consists of a *filament*, usually a slender body which may be likened to the stalk of a leaf; it is the stalk of the other and only essential part—namely, the *anther.* The anther is a two-celled sac, commonly opening at maturity by a slit from top to bottom of each cell or compartment of the sac. In an anther the botanist thinks he discovers the blade of the leaf in a peculiar guise; in the two cells or compartments, standing side by side, he sees the right and left half of the blade; in the solid part that usually connects them, the midrib of the blade; and the interior, instead of the green pulp of foliage, contains a powdery matter, commonly of yellow color, composed of minute grains. This powder is named *pollen;* its production is the essential thing; it is discharged by the opening of the anther, and its office is to fertilize the pistil, or rather the important contents of the pistil. A pistil, complete and simple, consists of three parts—1, the *ovary* at the base, the cell or closed cavity of which contains one or more *ovules*, the bodies which after fertilization become seeds; 2, the *style*, a column or narrowed prolongation of the summit of the ovary; 3, the *stigma*, which is sometimes a knob at the apex of the style, sometimes a mere point, or a line running down one side of it; it is always destitute of the epidermis or skin which covers the rest of the plant, and has either a roughened or a glutinous or a moist surface, to which pollen may adhere. The ovary is an essential part, as it contains the ovules or future seeds; the stigma also, for the application of the pollen to it is requisite to the maturation of the ovules into seeds; the style is sometimes wanting, as the stigma may as well be borne upon the apex of the ovary. A simple pistil is conceived by the botanist to answer to a leaf with its edges brought together and united so as to form a closed sac (the ovary), the outer surface of which is the lower surface of the leaf, the lining its upper surface; and the ovules are borne on some part of the line (*suture*) which represents the united edges of the leaf, or on some enlargement of this line (*placenta*). The style is a prolongation of the apex of this ideal leaf, with margins, as we may suppose, rolled in; the stigma answers to some portion of leaf-margin or apex denuded, and sometimes enlarged for the readier lodgment of pollen.

To this idea and type of a flower, which is simply and completely realized in some, and incompletely so in others, the botanist refers all flowers he meets with; and he explains all deviations from it, and all disguises of it, in accordance with the laws that govern the arrangement, combinations, etc. of stem and leaves. For example: when the calyx or corolla occurs as a cup or tube, he sees in it a congenital coalescence, or union by their adjacent edges, of the leaves of a whorl or cycle; when these parts cohere below with the surface of the ovary, he recognizes an adnation of contiguous whorls. When the petals, stamens, or other parts are numerous, this augmentation means that additional whorls or cycles (as the case may be) of metamorphosed leaves of that order have developed. When these organs are fewer than the numerical plan of the flower indicates, the botanist perceives that some of the members of a cycle have failed to be produced—are *suppressed*, as he would say—and he generally may detect either the rudiments or vestiges of the missing organs, or the vacant places which they should occupy—*i. e.*, which the symmetry of the blossom calls for.

There is not only a general plan of flowers, but a particular plan for those of each natural order, and a still more special plan for the flowers of the same genus or kind; and so one flower of a group helps to interpret the others—the more regular and complete ones throw light upon the irregular, incomplete, or unsymmetrical ones, by which the botanist sees through their disguises.

So in the fruit, which is the ovary and its contents matured, the morphological botanist sees either single leaves or whorls of leaves, either separate or combined, either free from other parts or congenitally united with them, either still retaining or resuming somewhat of foliaceous character, as in a legume or pea-pod, or hardened, as in a nut, or thickened and softened throughout, as in a berry, or with an inner stratum hardened to form the stone, and the outer stratum softened to form the sapid pulp or flesh of a peach or cherry. In an apple it is seen that the principal edible portion of the fruit consists of calyx; in a strawberry, of axis or the end of flower-stalk upon which the ovaries were borne; and so on.

The pistils, or the carpels of which a pistil is composed, end the morphological series, and in the seed—or rather in the embryo formed in the seed—the series begins anew. Some would see in the ovule, and consequently in the seed, a bud, developed usually on the margin of the carpellary leaf, and point to bryophyllum and other plants, whose leaves are apt to develop leaf-buds upon their edges. In that view the kernel of the ovule answers to axis, and its coats to leaves. The other, and perhaps the better, view is, that ovules are special appendages or transformed lobes of leaves consecrated to the reproduction of the species.

The lower grades of plants would require to have their structure and morphology separately explained, for which space is lacking; they will be treated under the heads, Ferns, Mosses, Lichens, Fungi, Algæ (Seaweed), etc. Suffice it to say, that the general plan of vegetation, by stem, and leaves symmetrically arranged upon it, prevails in the higher orders of the lower grade of plants, such as ferns and mosses; that stem and leaves begin to be fused into a common foliaceous expansion in liverworts; that all distinction of this sort vanishes in lichens and algæ, and still more in fungi, which in all their multifarious diversity have nothing which in any sense answers to foliage, root, etc.

As to organs of reproduction, the greatest simplification of the flower occurs in coniferous plants (pines, cypress, yew, etc.) and in the allied Cycas family. In these the female flower is reduced to the pistillary leaf or carpel, and that is open; style and stigma are done away with, and the pollen falls directly upon the mouth of the ovules to fertilize them. Sometimes, as in yew, the whole apparatus is reduced to a naked ovule. Such are termed *gymnospermous* plants—*i. e.*, naked-seeded; and in contradistinction those of the ordinary sort with ovules in a closed ovary, and therefore seeds in a pericarp (inside a fruit), are *angiospermous.* But what distinguishes completely the lower grade of plants from the higher is a total change of type as to reproduction. From ferns downward, flowers (and their result, seeds) disappear. Their reproductive organs are analogous to flowers and seeds, but not homologous with them—not of the same type. In common language we say that while ordinary plants are flowering, those of the lower grade are flowerless. Linnæus gave the technical term of *phænogamous* or *phanerogamous* to plants which produce flowers (stamens and pistils), and *cryptogamous* to those (such as ferns, mosses, lichens, algæ, and fungi) which, as the appellation denotes, have no obvious stamens and pistils. His name implied that there were organs answering in function to stamens and pistils, although concealed at least from his view. And the correctness of his surmise is now confirmed. Cryptogamous plants possess organs which act as stamens and pistils, as microscopical researches have shown. The result, however, is not a seed containing an embryo, but a much more simple body, called a spore, which by germination grows into a new plant. The apparatus for producing spores differs so widely in different orders of cryptogamous plants that it must be separately studied in each. To understand them requires a knowledge of

II. *Vegetable Anatomy* or *Histology.*—The space here devoted to morphological botany demands the curtailment of the other departments. The history of vegetable anatomy is that of microscopical research. The leading facts are, that plants are built up of parts or integers, all essentially of one nature, however diverse in form, of which a good general idea may be obtained by likening the integers to the bricks of an edifice, supposing the bricks to be hollow and various in shape. These organic components of plants are called *cells.* They consist of a wall of solid vegetable matter, circumscribing a closed cavity, which, while the cell is alive, contains some living vegetable matter, either solid or liquid. Or, going back to the beginning, a vegetable cell (not very appropriately so named) is or was a mass of plastic vegetable matter, mostly of minute size, which encases itself with a wall or shell, this wall remaining permanent, although the living parts within may have disappeared. A plant, such as an oak tree, began its existence, in an ovule of the parent, as a single cell of this sort. The whole subsequent growth came from this; the capital fact being that the living vegetable cell has the power of multiplication. As it grows it is capable of dividing into two, and these again into two, and so on. There are plants (chiefly aquatic) of the simplest possible structure, which consist of but one cell; for as the cell multiplies by successive divisions into two, these separate and thus become so many individuals. There are plants which consist of a single row of such cells developing in a chain, and remaining adherent at least for a time; or of a plane of cells, dividing as they grow in two directions. But in all the higher plants the cells build up a structure composed mostly of distinct organs (stem, leaves, roots); and the cells themselves develop in various shapes, some round or polygonal, some lengthened into tubes, some with thin and delicate walls (as in the pith and green bark), some with thicker or even very thick walls (as in wood, in the stone of a cherry, etc.). Woody fibres, bast of bark, ducts, and all the anatomical elements of a tree or herb, consist entirely of cells or of combinations of them, all of the same type and origin, however diverse in form, texture, etc. These are variously combined, arranged, and modified, composing the particular anatomy of roots, stems, and leaves. In the stems of flowering plants the distribution of the woody portion (wood-cells with ducts, etc.) is upon two plans—one, that of common wood, which is in concentric layers around a pith and within a separable bark, and a new layer is every year added outside of that of the year before; this is the *exogenous* stem, or outside-grower: the other, that of palms and the like, has no annual layers, but the wood is in separate bundles, interspersed in the pithy or cellular part, without apparent order, throughout the whole diameter, but more accumulated towards the circumference; as the newer wood or new bundles were thought to be added towards the centre, this stem was named *endogenous*—*i. e.*, an inside-grower.

In the leaves, the arrangement of the woody portion forming their framework (ribs, veins, nerves, etc.) which supports the green pulp or cellular portion, equally follows two plans. In one, the leaves are *reticulated* or *netted-veined*—*i. e.*, the finer divisions of the framework branch off from a central rib, or from one or more pairs of lateral ribs also, and their subdivisions, or some of them, unite (anastomose or inosculate) with other divisions to form a network of veins; this occurs in plants with exogenous stems, and only those, with some exceptions. In the other plan, which is characteristic of plants with endogenous stems, but not absolutely so, the leaves are *parallel-veined*—*i. e.*, the framework is composed of simple and parallel veins (formerly called nerves), proceeding unbranched from the base of the blade to the apex, or else from a midrib to the margins. These differences are turned to much account in descriptive botany.

III. *Physiological Botany*, or *Vegetable Physiology*, which is concerned with the actions or functions of plants considered as organisms, is a wide subject, which may be treated under an independent head. The portion which relates to nutrition connects itself with vegetable chemistry. The action of the roots in absorbing, of the stem in conveying, and of the leaves in digesting or assimilating, the materials upon which vegetables live, the use of assimilated matter in growth, the expenditure of some of it in doing work, are leading topics. The most fundamental idea in all vegetable physiology is, that plants create all organic matter, and consequently provide all the food upon which animals live. The function of vegetation is the assimilation of mineral matter—earth, air, and water, chiefly the two latter—into organic matter, which is alone capable of composing the living structure of vegetables and animals. Animals appropriate this, but produce none. Plants do this all-important work only in their green parts and under the light of the sun. Under the solar radiance they decompose carbonic acid and water, with the liberation of oxygen gas (therefore purifying or renovating the atmosphere for the breathing of animals); and they transform what they retain into permanent plant-structure—that is, into cell-walls, or else into equivalent substance of which cell-walls may be made (such as starch, sugar, and the like). They also convert these same mineral elements, along with some form of combined nitrogen (ammonia, nitrates, etc.), into proteine or protoplasm, which makes up the vitally-active part of living plant-cells, and is the source of, and essentially identical with, the flesh of animals.

And here a most important idea, of recent conception and demonstration, is brought into view—namely, that vegetable matter, produced under the influence of the sun, whether as plant-fabric (wood, etc.) or as prepared material of which fabric may be made (starch, sugar, oil, fibrine, etc.), as also the flesh or other fabric of animals derived from these, is to be regarded as matter in a state of energy; and energy is the power to do work. This, which the animal derives from the food supplied by the vegetable, the vegetable has stored up in the matter which the sun's rays, acting upon the living plant, have brought into this state of energy.

In the function of reproduction, the mode in which the pollen acts in fertilizing the ovules and originating the embryo in the seed; the arrangements through which these minute powdery grains are transferred from the anthers in which they originate to the stigma upon which they are to act, and by a growth from thence to the ovule, or, in some cases, the immediate application of pollen to the ovule; the maturation of fruit and seed; the arrangement for the dispersion of the latter; their germination,—these are some of the leading inquiries. Lastly, the vital manifestations as displayed in the movements or changes of direction which plants (no less really than animals) execute—some of them in connection with vegetation and growth, some subservient to reproductive functions—form extremely interesting subjects of physiological inquiry.

IV. *Systematic Botany* comprises all inquiries relative to plants as consisting of *kinds* variously related to one another—*i. e.*, as manifesting resemblances and differences in various degrees. Plants are thus considered as constituting a systematic whole or *vegetable kingdom*. Commonwealth would have been a truer term, for the vegetable creation does not culminate in a head or actual archetype, as does the animal realm in man. There are high and low plants in grade, but no highest and no lowest. The principal departments of this great branch of botanical science are—1, *Taxonomy*, and 2, *Phytography*, or *Descriptive Botany*.

1. *Taxonomy* is the study of the principles of classification, and of the grounds upon which divisions expressive of the diverse grades of resemblance manifested among plants may be made and defined. The fundamental facts in nature upon which classification in natural history is based are these two: 1st. Plants and animals occur in kinds, and are reproduced true to their essential characteristics, from generation to generation; in other words, progeny is like parent. 2d. The numerous kinds exhibit unequal and very various degrees of resemblance, some being very similar, others widely dissimilar. Upon the first rests the idea of *species;* upon the second, that of genera, orders, classes, etc. Species is the unit in natural history. Individuals occur as links in the chain of generations which have come down from the immemorial past: this "perennial succession of individuals," this *ensemble* of individuals proceeding from a common stock, constitutes a species. Genera, orders, classes, and the like are assemblages of species, of various degrees of likeness, according to the grade. Those species which are most alike are of one genus; for example, red oak, white oak, scarlet oak, live oak, etc. are so many species of the oak genus. Those which concur in a more general resemblance, as being on the same plan of structure in all their important organs, with whatever difference in details, represent an order or family (these terms being synonymous in botany); *e. g.*, the oak genus, with the chestnut, beech, hazel, etc., are of one order. Those which have only a more general resemblance are of one class. Proceeding synthetically, from the species upward, these are *groups*, successively more and more comprehensive. Proceeding analytically from the vegetable kingdom as a whole, distinguishable into parts, they are *divisions*. The sequence of subordination, from general to particular, in all natural history, invariably is—*Class, Order, Genus, Species.*

This sufficed for the earlier naturalists; but in modern times the vast increase in the number of known species, and a more intimate knowledge of their structure, have called for the recognition of more numerous grades. The term *tribe* has been intercalated above genus, and sub-class, sub-order, sub-tribe, sub-genus next under class, order, etc.; the extended scaffolding to be used or not, according as diversities in structure and the numbers of forms to be classified may require.

Although *species* is the recognized unit in natural history classification, no species is represented by absolutely identical individuals. The differences may be slight, apparently casual and evanescent; or they may be more remarkable, inexplicable by any known causes or conditions, and more enduring. Some species are much disposed to vary; some maintain a general uniformity. Even the branches from the same stem may vary, and when variations or "sports" of this character arise, they incline to be perpetuated in the offshoots. Bud variations, however, are not common; the offshoot for the most part strictly reproduces the parent stock. Most varieties originate from seed. Here the result of all observation leads to the conclusion that there are two opposed tendencies in every sexual reproduction: 1. That of the progeny to be like the parent or parents in all respects: this ordinarily obtains such full mastery as to have established the fundamental proposition that the species reproduces itself; which, more strictly analyzed, means that individuals reproduce their like. 2. The second is the tendency to be unlike the parents by varying in some minor particulars, to strike out something new and peculiar. The law of inheritance generally prevails, but the tendency to individualize manifests itself strongly now and then in certain and minor particulars, and sets up a variety. Unimportant as this may be in wild plants, and in any single step, it becomes of the highest practical consequence in horticulture, agriculture, and stock-breeding, in which all depends upon favoring, strengthening, and preserving varieties. Varieties of recent origination are seldom directly perpetuable by seed, although they are so by buds (offshoots, layering, grafting, etc.); the tendency of the offspring to inherit the peculiarities of the parent being likely to be overborne by the ancestral tendency—*i. e.*, the disposition to take after grandparents, great-grandparents, etc. Also, in uncontrolled nature, the cross-breeding with individuals of the unvaried stock is almost sure to obliterate the incipient variation. The variation is preserved and led on, under man's care, by close-breeding in the first instance, and by selecting for seed only those of the progeny that inherit most of the peculiarity; then again selecting from the best of these, and so on for a few generations. In this way the force of *atavism*, or taking after ancestors, is weakened or evaded; for the new generation is far more likely to take after its immediate parents, grandparents, and great-grandparents when all are similar, than after a remoter ancestry, the parental and the grandparental (or atavic) forces now acting in the same line. In this way varieties, which at first would come true only by bud-propagation, are developed into *races*, or varieties of greater fixity, which come true from seed. Races in plants are naturally most important in annuals and biennials, which are capable of perpetuation only by seed. There are perhaps no annuals or biennials in cultivation which refuse to diverge into races.

Moreover, nearly related species may often, but not in all cases, be cross fertilized, and so their peculiarities mixed in the progeny, which takes after both parents; this gives rise to *hybrids*. These are of transient existence, except when perpetuated from buds—first, because they are commonly sterile *per se;* secondly, because they are liable to be fertilized by the pollen of one or the other parent, and so brought back to that type; thirdly, because even when fertile *per se*, the progeny in a generation or two returns, some to one and some to the other parental type by a disseverance of the mixed characters, one part inheriting only the peculiarities of the male, the other only those of the female, parent of the hybrid.

Races and varieties, of whatever sort or degree of fixity, have been regarded as of economical importance only, but merely perplexing to the systematist. Recently, however, they have assumed a new interest in the eyes of the philosophical naturalist through the investigations and reasonings of Mr. Darwin, which tend to the conclusion that varieties are incipient species, and cognate species only varieties of greater divergence or fixity—offshoots of higher antiquity from a common stock. To many of the leading naturalists of the present day, even those who do not recognize the agency of "natural selection" as the operative cause, the terms relationship, affinity, consanguinity, and the like, by which the resemblance of one species or one genus to another has always been denoted, are no longer regarded as metaphors, but rather as unconscious expressions of the idea that the resemblances are a consequence of community of descent.

The Methods of Classification, by which the principles of taxonomy have been applied to the systematic arrangement of the species of plants, may here be considered only so far as concerns—1. The system which gave the great impulse to botany in the later half of the eighteenth century, and prevailed through the earlier part of the nineteenth; 2. The system which has now taken its place, and under which the science is attaining a truly philosophical development. The first, the artificial sexual system of Linnæus, was entirely the work of this pre-eminent naturalist; to the second, the natural system, he made early and important contributions, and commended the work to his successors. The two great ends of a classification of the vegetable kingdom are—1, to exhibit the relationships which subsist among plants, and bind them into a systematic whole; therefore to arrange them in such order, and under such successive grades, that each species and each group of species shall stand next to those which it most resembles in all or in the most important respects—*i. e.*, in a system which shall express (so far as we can discover and express in terms) the plan of nature, or, more worthily, the plan of the Creator in the vegetable world; 2, to enable a learner readily to ascertain the name, place in the system, and an account of all that is known of any particular species. These two ends should be subserved by one and the same classification. In the last century this was not practicable. So Linnæus contrived the system which bears his name as a temporary but much-needed expedient to subserve the latter purpose. He named it an *artificial system*, because in its classes and orders it did not attempt to express all or the more important relationships of plants, but only those which could most conveniently be used for a practical purpose. He named it the *sexual system*, because he founded it upon the stamens and pistils, of which he had just completed the proof that they were the sexual apparatus; and he saw, with instinctive sagacity, that agreement or similarity in the organs and method of reproduction would furnish the best characters for classification. Linnæus accordingly arranged the vegetable kingdom under twenty-four classes, characterized mainly by the stamens, as follows:

- **PLANTS** having
  - stamens and pistils manifest,
    - both found in the same flower,
      - the stamens separate from the pistils,
        - unconnected with each other, and
          - of equal length:
            - Stamens 1........................ 1. MONANDRIA.
            - " 2........................ 2. DIANDRIA.
            - " 3........................ 3. TRIANDRIA.
            - " 4........................ 4. TETRANDRIA.
            - " 5........................ 5. PENTANDRIA.
            - " 6........................ 6. HEXANDRIA.
            - " 7........................ 7. HEPTANDRIA.
            - " 8........................ 8. OCTANDRIA.
            - " 9........................ 9. ENNEANDRIA.
            - " 10........................ 10. DECANDRIA.
            - " 11–19........................ 11. DODECANDRIA.
            - " 20 or more, adherent to the calyx.......... 12. ICOSANDRIA.
            - " 20 or more, not adherent to the calyx........ 13. POLYANDRIA.
          - of unequal length:
            - two long and two short stamens........................ 14. DIDYNAMIA.
            - four long and two short stamens........................ 15. TETRADYNAMIA.
        - connected with each other
          - by their filaments in a single set........................ 16. MONADELPHIA.
          - by their filaments in two sets........................ 17. DIADELPHIA.
          - by their filaments in more than two sets................ 18. POLYADELPHIA.
          - by their anthers............... 19. SYNGENESIA.
      - the stamens adherent to the pistil........ .... 20. GYNANDRIA.
    - in separate flowers..
      - in the same individuals..... 21. MONŒCIA.
      - in different individuals..... 22. DIŒCIA.
      - some of the flowers perfect, others separated, in the same, or two or three different individuals .... 23. POLYGAMIA.
  - the stamens and pistils (concealed) represented only by analogues .... 24. CRYPTOGAMIA.

The orders were founded upon some considerations respecting the pistils, their number, or the number of their styles in compound pistils—*e. g.*, *Monogynia*, with one, *Digynia*, with two, and so on; and upon divers other considerations in the other classes, which there is not space here to specify. The interest of this artificial classification is now only historical, except that it has firmly established many names and terms in the science with which the botanist has to be familiar.

The *natural system*, of which the endeavor is to arrange all plants according to their true relationships, has now been so far perfected that it is, on the whole, as easy for practical as it is indispensable for all thoroughly scientific use. Its first development as a complete system was by the Jussieus, uncle and nephew, in the last century. Towards its perfection many have contributed in the present century: the two names most eminently and intimately associated with it are those of Robert Brown and A. P. De Candolle. It recognizes, first of all, two great series of plants, a higher and a lower grade; the higher comprising the whole twenty-three Linnæan artificial classes (above presented); that is, all plants which are sexually propagated through stamens and pistils (in other words, bear flowers), which result in seeds, of which the essential thing is that they contain an embryo, as stated in another part of this article. These are *phænogamous*, or more popularly *flowering plants*. The lower series, comprising the Linnæan class *cryptogamia*, has sexual propagation effected through organs which are only analogous in functions to stamens and pistils, resulting (as already explained) in *spores*, instead of seeds: these are *cryptogamous* or *flowerless plants*. The primary divisions or classes of the two series can here be presented only in the following tabular form:

Ser. I. Flowering or Phænogamous Plants, with	Exogenous growth and a dicotyledonous embryo.		Class I. Exogens, or Dicotyledons.
		Seeds in a pericarp.	Subclass 1. *Angiosperms.*
		Seeds naked.	" 2. *Gymnosperms.*
	Endogenous growth and a monocotyledonous embryo.		" II. Endogens, Monocotyledons.
Ser. II. Flowerless or Cryptogamous Plants, with	a distinct axis, or stem and foliage, containing	woody and vascular tissue.	Class III. Acrogens.
		cellular tissue only.	" IV. Anophytes.
	no distinction of stem and foliage, but all confounded in a thallus.		" V. Thallophytes.

Under these come the *natural orders* or *families* (between one and two hundred in number when most comprehensively treated); under these *sub-orders, tribes*, etc., whenever such have to be recognized; and finally the *genera* and *species*.

V. *Phytography*, or *Special Descriptive Botany*, is the carrying out of the principles of classification in the actual arrangement and characterization of these great divisions, of the orders under them, of the genera and species, etc.; and the application of names to each according to certain fixed rules. This introduces *Glossology* (a better word than the mongrel one, because half Latin and half Greek, *terminology*), which prescribes the system upon which substantive names are given to the organs and parts of plants, and adjective terms to their modifications and forms, making a technical language through which plants and their several parts may be compared and described with an exactness and brevity not otherwise possible. Also *Nomenclature*, which prescribes the rules for giving names to the plants themselves and to the groups which they compose.

The *binomial system* of nomenclature—which was one of the happiest hits of Linnæus, and of a value which those only can rightly estimate who are aware of the inconveniences suffered by the ante-Linnæan botanists in their endeavors to get on without it—has established for each plant a double name—namely, that of its genus and that of its species. A genus bears a name of one word, a substantive—*e. g.*, *Quercus*, the oak genus, *Lilium*, the lily genus. Genera and generic names, in the modern sense, date back as far as Tournefort (A. D. 1700). The specific name was the invention of Linnæus (say 1750), who first distinguished the phrase or descriptive character of a species from its name, making the latter consist of a single word, preferably an adjective; *e. g.*, *Quercus alba*, for white oak, *Quercus rubra*, for red oak. The generic name answers to our surname, as Brown or Jones: the specific to the baptismal name, as John and James. If a *variety* has to be designated, its name will be appended to that of the species—*e. g.*, *Quercus coccinea* (scarlet oak), variety *tinctoria*, for the quercitron oak. Names of groups higher than genera are in the nominative plural, and are mostly formed by an extension of the name of a principal genus. For instance, *Rosa*, the rose genus, gives its name *Roseæ* to the rose tribe, and of *Rosaceæ* to the rose family. This is a short expression for *Plantæ Rosaceæ*—*i. e.*, rosaceous plants.

Agricultural Botany, Medical Botany, and the like, signify so much of systematic botany as applies to agriculture, medicine, etc.

Palæontological or *Fossil Botany* is the systematic and structural botany, as far as it can be made out from fossil remains, of the vegetation of former ages. Its lessons, although fragmentary, are of the highest interest, as showing that a vegetation predominantly of the lower grades alone existed in the earlier geological eras; that gymnospermous plants long preceded angiospermous exogens; that the latter were apparently not introduced until the cretaceous period; and that our existing genera largely originated in tertiary times, and were then represented by species, some of them peculiar, but many much resembling, and some obviously identical with, those of the present day. So that it may be inferred that the actual flora of the United States originated in the cretaceous and tertiary periods, and has come down to the present day with change indeed, but with a continuity of type which argues genetic transmission. (See Fossil Botany.)

Geographical Botany—the study of the relations of plants to the earth, considered in reference to the natural distribution of the species over its surface, and the causes of that distribution—connects the science of botany with physical geography and climatology; also with geology as it proceeds; and it becomes apparent that the present distribution of species is only to be explained, or clearly conceived, by a study of the changes which the earth's surface and its climates have undergone since the types of the actual vegetation came into existence. So that geographical and fossil botany are co-related as modern is to ancient history.

Asa Gray.

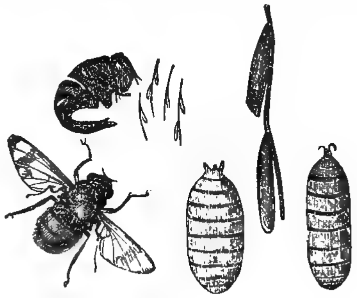
Bot'any Bay, a bay of Australia, in New South Wales, which was discovered by Capt. Cook in 1770, and received its name from Joseph Banks, the botanist of the expedition, with reference to the great number of new plants found there. It is 5 miles S. of Sydney, in lat. 34° 2′ S., and lon. 151° 13′ E. A colony of British convicts was planted here in 1787, and was removed to Port Jackson in 1788, but the penal colony long continued to retain the name of Botany Bay. The transportation of criminals to New South Wales was discontinued in 1840, on account of the often-repeated protests of the colonists.

Botero (Giovanni), surnamed Benisius, born at Bene, Piedmont, in 1540, was an Italian ecclesiastic and writer, secretary to Saint Carlo Borromeo, and became in 1599 tutor to Charles Emmanuel's children. He wrote a noted political treatise, "Della Ragione di Stato." Died in 1617.

Botetourt (Norbonne **Berkeley**), Lord, was born in England about 1734. He was appointed royal governor of Virginia in 1768, and dissolved the assembly of burgesses in 1769 because they passed a remonstrance against some acts of the British Parliament Died Oct. 15, 1770.

Botetourt Springs, a post-village of Roanoke co., Va. (see map of Virginia, ref. 6–E, for location of county), is the seat of Hollins Institute, a flourishing school for ladies, and has a mild and pleasant saline spring known as "Johnson's Spring."

Bot-Fly, a name given to various dipterous insects of the family Œstridæ, but in the U. S. generally applied to the horse bot-fly, *Gastrophilus equi*. The fly lays her eggs upon the hairs of the horse, and after laying her eggs almost immediately dies. The eggs, conveyed to the horse's stomach, are hatched, and the larvæ are provided with mouth-hooks by which they hang on to the coats of the stomach. In about a year's time they are discharged with the excrement, and in one month they are changed into perfect flies. When very numerous there is reason to believe that bots are very injurious to the horse; but there is some dispute among horse-breeders as to the extent of the injury done by them.



Bot-fly.

Both (Jan), a Flemish painter, was born at Utrecht in 1610. He was a pupil of Bloemaert, and worked in Italy. He excelled in landscapes, and represented the atmospheric effects of Italy with much fidelity. Died in 1651.

Bo'thie [Gaelic *bothag*, a "hut"], the name applied in Scotland to a sort of barrack or large temporary structure for the lodging of farm-laborers, stone-cutters, and others. There are also bothies where women are lodged. The bothie system is considered by the best classes in Scotland as a national disgrace, for the moral results of the plan have been deplorable.

Both'nia [Sw. *Botten*], a name formerly given to a country of Northern Europe, which belonged to Sweden, and was situated on both sides of the Gulf of Bothnia. The eastern portion is now comprised in Finland, and the western forms the Swedish provinces of Piteå and Umeå.

Bothnia, Gulf of, the northern portion of the Baltic Sea, extends from Torneå southward to the island of Aland, and is about 400 miles long. Its width varies from 60 to 130 miles. It is bounded on the E. by Finland and on the W. by Sweden. Its greatest depth is about fifty fathoms. The navigation of it is rendered difficult by many small islands and sand-banks near the shores. The gulf is usually frozen in winter, so that sledges can cross it.

Bothrioceph'alus [from the Gr. βοθρίον, a "little pit," and κεφαλή, the "head," named from the depressions on each side of its head], a genus of cestoid intestinal worms, once supposed to be identical with the *Tænia*, or common tapeworm. It inhabits the bodies of the salmon, stickleback, and other fishes, as well as human beings. Two species occur in man, *Bothriocephalus latus* and *Bothriocephalus cordatus*. The former is common only in Russia, Sweden, Norway, Lapland, Finland, Poland, and Switzerland. It is from six to twenty feet in length, composed of numerous flat and wide segments, and an elongated, compressed, obtuse head. The mouth is small, with a longitudinal depression extending from it on each side. Like the *Tænia*, it is hermaphrodite, and besides discharging ova multiplies by segmentation, the fragments or *proglottides* being discharged with the fæces of the animal in which it lives. Probably this parasite is introduced into the human body not only from fish eaten as food, but in drinking water from lakes and rivers. Near the Gulf of Bothnia scarcely a family is free from it, but a few leagues from the coast and main water-courses it almost disappears. *Bothriocephalus cordatus* has been found to inhabit the human intestines only in North Greenland. In that country it is quite common in dogs. It is about a foot in length, and receives its name from the cordate or heart-shaped head. (*Cobbold, Proceedings of the Zoological Society*, London, 1862.) The means of destroying or expelling the "broad tapeworm," as this parasite is sometimes called, are the same as in the case of *Tænia*. (See TAPEWORM.)

Both'well, a small village of Bothwell parish, Lanarkshire, Scotland, is situated near the river Clyde, about 8½ miles S. E. of Glasgow. In the vicinity are the ruins of Bothwell castle. The Covenanters were utterly routed by the troops of the duke of Monmouth June 22, 1679, at Bothwell Bridge. Pop. of parish about 9000.

Bothwell, a post-town of Zone township, Bothwell co., Ontario (Canada), on the Great Western Railway, 23 miles S. W. of Chatham. It has numerous petroleum-wells, and a trade in cattle, grain, and lumber, the latter being extensively manufactured here. Pop. in 1881, 965.

Bothwell (JAMES **Hepburn**), EARL OF, born about 1526, inherited the title and large estate of his father in 1556. In 1562 he was imprisoned for a conspiracy to seize the queen's person, but he escaped to France, after which he was outlawed. He returned in 1565, and became an enemy of Regent Murray and a favorite adviser of Queen Mary. The murder of Lord Darnley (1567) is generally imputed to him. He was indicted for this crime, but as he came to court with 4000 followers, he was acquitted. In April, 1567, many nobles signed a bond or document in which they commended Bothwell as a fit husband to the queen, whom he carried to Dunbar Castle. He married her in May of the same year. A strong party soon took arms against Bothwell, who fled to Denmark, where he was imprisoned. Died in 1576. (See BURTON, "History of Scotland," vol. iv.; ROBERTSON, "History of Scotland," and the dramas of SWINBURNE and BJÖRNSTJERNE BJÖRNSON.)

Botocu'does, or **Aymo'res,** a native tribe of Brazil. They live in the forests on the Rio Doce, along the boundary of the provinces of Espirito Santo and Minas Geraes, and are said to resemble the Chinese. They are brave but treacherous, and have caused the government considerable trouble. They number about 4000, and are rapidly dying out. They pierce the lower lip and insert a block of wood in the hole.

Botoshan', or **Bootosha'ni,** a town in Roumania, on the Schiska, 60 miles N. W. of Jassy, carries on a considerable trade with Germany in cattle, wine, wool, tobacco, etc. Pop. in 1879, 39,941.

Bo Tree, or **Pee'pul,** the *Ficus religiosa* or sacred fig tree of Hindostan and Ceylon, a species of tree which is greatly venerated by the followers of Vishnu (who was born under this tree), and especially by the Booddhists. It is a large tree, whose sap abounds in caoutchouc, and which yields a small edible fig, not much valued. Great amounts of lac are gathered from its branches, for it is one of the favorite abodes of the lac insect. The famous bo tree of Anarajapoora in Ceylon is believed, on apparently good grounds, to have been planted in 288 B. C.

Botrych'ium [from the Gr. βότρυς, a "bunch of grapes," the name referring to the appearance of the fruitful fronds], a genus of ferns, having the spore-cases distinct, sub-globose, clustered, and on one side of a pinnated rachis, 2-valved, without any elastic ring and opening transversely. The *Botrychium Virginicum* is remarkable for its wide geographical distribution. It abounds in the U. S. and in the Himalaya Mountains, and is found in Norway, Australia, Mexico, and many other countries. It is boiled and eaten in some countries.

Botryoi'dal [from the Gr. βότρυς, a "bunch of grapes," and εἶδος, a "form"], a term used in mineralogy, and applied to substances the surface of which consists of a group of clustered globular prominences which resemble grapes in form. Examples of such formation are often seen in chalcedony and hæmatite.

Botrytis. See MILDEW.

Bot'ta (ANNE CHARLOTTE LYNCH), an American poetess, born at Bennington, Vt. She was married to Vincenzo Botta in 1855. She published a volume of poems in 1849 and a "Hand-book of Universal Literature" in 1860.

Botta (CARLO GIUSEPPE GUGLIELMO), M. D., an eminent Italian historian, born at San Giorgio, in Piedmont, Nov. 6, 1766. He studied medicine, and served as surgeon in the French army in 1795–96. In 1803 he was elected to the French legislative body. He published in 1809 a "History of the American War of Independence," and in 1825 a "History of the Nations of Italy from Constantine to Napoleon," 3 vols. His most important works are a "History of Italy from 1789 to 1814" ("Storia d'Italia dal 1789 al 1814," 4 vols., 1824), and his "Continuation of Guicciardini's History of Italy to 1789" (10 vols., 1832). He died in Paris Aug. 10, 1837. (See F. BECCHI, "Elogia storico di C. Botta," 1839.)

Botta (PAUL ÉMILE), a distinguished archæologist and traveller, a son of the preceding, was born in 1794. He entered the service of Mehemet Ali of Egypt as a physician about 1830, and became French consul at Alexandria. Having visited Arabia in 1837, he published in French a "Narrative of a Journey to Yemen, etc." (1844). He was next sent as consul to Mosul, and in 1843 began to excavate the mound at Khorsâbâd on the Tigris for monuments of ancient Assyria, and there discovered a palace with statues and cuneiform inscriptions. With the aid of Letronne, Burnouf, and the artist Flandrin, he published a magnificent work entitled "Monuments of Nineveh, discovered and described by M. Botta, with designs by Flandrin" (5 vols. folio, 1847–50).

Botta (VINCENZO), PH. D., born near Turin, Italy, Nov. 11, 1818, became professor of philosophy at Cuneo, and afterwards at Turin; a member of the parliament in 1849; in 1850 inspected the educational system of Germany, and in 1853 that of the U. S., and became professor of Italian literature in the University of the City of New York. Among his works are a "Life of Cavour," "Dante as Philosopher, Patriot, and Poet," and a history of modern philosophy in Italy.

Bött'ger, written **Bött'cher,** or **Böt'tiger** (JOHANN FRIEDRICH), a German alchemist noted as the inventor of Meissen porcelain, was born at Schleiz Feb. 4, 1682. He spent much time and money in the search for the philosopher's stone. Died Mar. 13, 1719.

Botticel'li (SANDRO), an early Italian painter of the Tuscan school (1447–1515), was the most eminent of the scholars of Filippo Lippi. He was the first who treated mythological subjects, and excelled his predecessors in movement and drapery.

Böt'tiger, or **Boettiger** (KARL AUGUST), a German archæologist and *littérateur*, born at Reichenbach, in Saxony, June 8, 1760. He published many antiquarian treatises. Died Nov. 17, 1835. A collection of his essays, called "Kleine Schriften," appeared in 3 vols., 1838.

Bottineau, capital of Bottineau co., Dak. (see map of Dakota, ref. 1–D, for location of county). P. not in census.

Bot'tle [Fr. *bouteille;* Sp. *botilla*, the diminutive of *bota*, a "leather bag for carrying liquids"], a vessel for holding liquids, usually made of glass or earthenware. The bottles mentioned in the Bible were made of the skins of animals, and such vessels are still used for carrying water in Asia and Africa. In Spain, wine-bottles made of goats' skins are used at the present time. The glass used in the manufacture of common bottles is of a coarse quality. The process by which they are formed is briefly as follows: A long iron tube is dipped into the melted glass, a portion of which adheres to the end of the tube. After this material is partially cooled, the glass-blower puts the end of the tube, with the portion of the glass adhering, into a mould, and blows into the tube, which he holds in a vertical position. It is then passed from the hands of the blower, and is finished by several other workmen.

Bottle Gourd (*Lagenaria*), a genus of plants of the order Cucurbitaceæ, is nearly allied to the genus *Cucurbita*, in which it was formerly included. The *Lagenaria vulgaris*, or common bottle gourd, is a native of India, but is cultivated in many warm climates. It is a climbing annual, having white flowers, and a large bottle-shaped fruit with a hard rind, which is called a *calabash*, and is used for holding or dipping water. This fruit is sometimes several feet long. Some varieties of *Lagenaria* have an edible pulp, which is an important article of food to the poorer Arabs.

Bottle-nose Whale, sometimes called **Bottlehead** (*Hyperaodon bidens*), a cetaceous mammal of the family Physeteridæ. It inhabits the North Atlantic and sometimes ascends rivers. It seldom exceeds twenty feet in length. The name of BOTTLE-NOSE WHALE is sometimes applied to another mammal, the *Delphinus Tursio*, a dolphin which inhabits the North Sea.

Bottom Heat, a term applied in horticulture to the temperature communicated to certain soils, either by fermenting and decomposing substances placed underneath them, for which purpose leaves, fresh dung, and the refuse bark of the tanyard are often used, or by means of flues or hot-water apparatus. The system is applied to the cultivation of pineapples, grapes, melons, cucumbers, and other plants grown in hot-houses, pits, or frames. It is one of the most important agents in the artificial cultivation of tender plants of whatever kind, whether flower or fruit-bearing.

Bot′tomry [from *bottom*, a part of the ship being put for the whole], the act of lending money on the pledge of a ship or on the bottom of a ship. It may be considered under the following divisions: 1, the nature of the contract; 2, its form; 3, by whom made; 4, the mode of its enforcement.

1. *The Nature of the Contract.*—It is a maritime contract, and in the nature of a wager. The substance of the contract is, that if the ship returns the loan is to be repaid with interest. If it is lost in the course of navigation, the debt is discharged, though the borrower may have abundant means for repayment. The principal of the loan being thus put at risk, the case does not come within the operation of the usury laws. Large interest is sometimes exacted —15 or 20 per cent., or even a larger rate. The proper court, however, has power, in extreme cases of excessive interest, to grant relief. Should the ship deviate from her voyage and be lost, the lender would not take that risk upon himself, but the borrower would still be liable. So if the ship be lost by the wrongful act of the borrower or the master, instead of the perils of the sea. It has been decided that the doctrine of constructive loss which applies in insurance law does not extend to a bottomry loan. This loan is not within the act of Congress, which requires mortgages and conveyances of vessels to be registered for the purpose of giving notice to subsequent grantors or to creditors. Should the ship return, the loan becomes due, and the principal and maritime interest together form a new principal, on which ordinary interest will be calculated until payment. A bottomry loan is strictly on the ship. A corresponding loan on the cargo is termed *respondentia.* It is governed by rules closely resembling those applicable to bottomry. A bottomry loan has this marked peculiarity, applicable, however, to other maritime liens: that where there are two or more in succession, the latest may have the preference, as it may be the price of the safety of the ship. In liens created regularly upon property on land it is a well-known general rule that the earliest has the preference.

2. *The Form of the Transaction.*—There is usually executed a bottomry bond. This is not, however, absolutely essential. The courts do not look so much at the technical forms as at the intent of the parties. Even if there were a sale intended as a security for a loan, evidence to show the true nature of the transaction could be adduced, and it would be enforced accordingly.

3. *By Whom Given.*—A bottomry bond may be executed either by the owner or the master of the ship in the owner's absence. The owner can execute it, in general, whenever he sees fit, so long as the transaction is in its nature maritime. A master of a ship, on the other hand, is governed by special rules. His leading duty is to navigate the ship, not to pledge nor to sell it. These latter powers are conferred upon him in extraordinary emergencies, where the exigencies require it. The lender must be prepared to show that the case is one which justifies the loan, such as stress of weather, necessity of repairs, and the like. Due measures must be taken to communicate with the owner where such communication is feasible. At the present time the telegraph must be resorted to where it is accessible. The power of the master may in like manner in extraordinary cases extend to a pledge, or even a sale, of the cargo. The general test of his authority in all these cases is that he must exercise the diligence of a prudent owner, and that there must be an apparent necessity for the pledge or sale.

4. *Enforcement.*—A bottomry bond is enforceable in a court of admiralty—in this country in the district courts of the U. S. A proceeding is instituted against the ship, or, in technical language, *in rem.* If necessary, the ship may be sold, and the claim paid out of its proceeds. The borrower is also personally responsible. The lien of seamen for subsequent wages is superior to that of the bottomry lender. Should the latter, in order to preserve his own claim, discharge that of the seamen, he could have a lien upon the proceeds of the ship for his reimbursement, as well as a personal claim against the owners; or, in other words, he would be allowed to stand in the place of the seamen.

It may be added that if a ship, having incurred a bottomry loan, does not set out on her intended voyage, the property will not have incurred any maritime risk, and consequently the maritime interest cannot be exacted, but only ordinary interest. T. W. DWIGHT.

Botts (JOHN MINOR), an American statesman, born at Dumfries, Prince William co., Va., Sept. 16, 1802. He was elected to Congress as a Whig in 1839, and re-elected several times. In 1844 he supported Mr. Clay for the presidency. He opposed the repeal of the Missouri Compromise in 1854, was a firm adherent of the Union during the civil war, and afterwards favored the Republican party. He wrote "The Great Rebellion" (1866). Died Jan. 8, 1869.

Bot′zen, or **Bozen** [It. *Bolzano*], a trading town of the Austrian Tyrol, at the junction of the river Talf with the Eisach, 33 miles by rail N. N. E. of Trent. It is situated in a hilly or mountainous district, is well built, and contains a gymnasium, a Gothic cathedral, and a castle; also manufactures of silk, linen, hosiery, etc. It has four annual fairs, and is an entrepôt of the trade between Italy, Germany, and Switzerland. Pop. in 1880, 10,641.

Bouchardat (APOLLINAIRE), a French pharmaceutist, born about 1810, commenced young the study of medicine and pharmacy at Paris, and became professor of hygiene in 1852. His most important works are "Recherches sur la Vegetation" (1846), and elementary treatises on applied chemistry, physical science, materia medica, therapeutics, agricultural economy, and several original treatises on wine and wine-culture.

Bou′cher (JONATHAN), an English philologist, born in Cumberland in 1738. He removed to Virginia in 1756, became rector of a parish church, and was a royalist in the Revolution. He returned to England in 1775, and compiled a "Glossary of Archaic and Provincial Words." Died April 27, 1804.

Boucher de Perthes (JACQUES), a French archæologist and naturalist, born at Rethel Sept. 10, 1788. His principal works are "The Creation" (5 vols., 1839–41) and "Celtic and Antediluvian Antiquities" (1847). He is regarded as the founder of the science of archæo-geology. Died Aug. 9, 1868.

Boucherie (AUGUSTE), a French chemist, born in Sept., 1801, invented a method of preserving wood. He employed sulphate of copper.

Bouches-du-Rhône, a department in the S. E. part of France, was formerly included in Provence. Its area is 1971 square miles. It is bounded on the N. by the Durance, which separates it from Vaucluse, on the E. by Var, on the S. by the Mediterranean, and on the W. by Gard. It is intersected by the Rhone, which enters the sea by several mouths, and forms a delta called the "Ile de la Camargue." The surface in the E. part is hilly, and is elsewhere diversified by plains, heaths, forests, and saline lakes. The grapevine and olive flourish here, and large numbers of silkworms and sheep are raised in this department. Among its public works are several canals, a railway connecting Marseilles with Lyons, and an aqueduct, fifty miles long, from the Durance to Marseilles, which is the capital. It has manufactures of cloth, hats, perfumes, wine, brandy, soap, olive oil, and chemical products. It is divided into 3 arrondissements, 27 cantons, and 107 communes. Pop. in 1881, 589,028.

Bouchette (JOSEPH) was born in Canada in 1774. In 1790 he entered the surveyor-general's office for British America, and afterwards served in the volunteers and in the navy of the lakes. In 1804 he became surveyor-general. He served against the U. S. in the war of 1812. As surveyor-general he was afterwards employed in establishing the southern boundary of Canada. He published (1816) a topographical and geographical description of Canada, "The British Dominions in North America" (1831), and a "Topographical Dictionary of Lower Canada" (1832). Died at Montreal April 9, 1841.

Boucicault (Dion) was born in Dublin, Ireland, Dec. 26, 1822, and was educated by his guardian, Dr. Dionysius Lardner, and at the London University. His first successful play was "London Assurance," which he wrote in conjunction with John Brougham, and which was acted in 1841 at Covent Garden, London. He was married to Miss Agnes Robertson, came to America in 1853, and remained till 1860, when he returned to London, and brought out, at the Adelphi Theatre, his first, and still famous, Irish play, "The Colleen Bawn." This is founded on Gerald Griffin's novel of "The Collegians." In 1861 was produced at the same theatre his play of "The Octoroon," which vigorously illustrated, and by implication denounced, the evils of slavery in the Southern U. S. He remained in England till 1872, and during these twelve years he furnished to the London stage the following plays: 1862, "Dot," "The Life of an Actress," "The Phantom," "The Relief of Lucknow;" 1863, "The Trial of Effie Deans;" 1864, "The Streets of London;" 1865, "Arrah-Na-Pogue," "Rip Van Winkle," "The Parish Clerk" (the latter, written for Joseph Jefferson, was not acted in London); 1866, "The Flying Scud," "Hunted Down," "The Long Strike;" 1867, "How She Loves Him!" "Foul Play" (written in collaboration with the novelist Charles Reade); 1868, "After Dark;" 1869, "Lost at Sea," "Formosa," "Presumptive Evidence;" 1870, "The Rapparee," "Jezebel;" 1871, "Elsie," "Kerry;" 1872, "Babil and Bijou." In the autumn of 1872 he appeared at Booth's Theatre, New York, as Shaun in "Arrah-Na-Pogue." In 1873 he produced, at Booth's Theatre, his beautiful Irish play of "Daddy O'Dowd;" at Wallack's Theatre, his "Mora" and his "Mimi;" and at the Union Square Theatre, his "Led Astray." On Dec. 25, 1873, he opened, in conjunction with Mr. William Stuart, the New Park Theatre, on Broadway, near Twenty-second street, New York. Among his earlier works, prior to his first visit to America, were "Old Heads and Young Hearts," "The Irish Heiress," "The Willow Copse," "The Corsican Brothers," "Faust and Marguerite," and "The Vampire." The dramas of Boucicault are seldom, if ever, original in plot, but they are often original, and sometimes superlatively good, in action, treatment of incidents, and brightness of dialogue. His melodramas excel those of the earlier school—which they have superseded—in vitality of subject, lifelike character, human interest, and pointed colloquy. The elevation of this class of stage literature is directly traceable to his influence. He has also been the means of great improvement and elevation to the Irish drama, having replaced the "ranting, roaring Irishman," with stuffed stick and black bottle, by genuine men of the Emerald Isle, such as Diogenes in "How She Loves Him!" Johnny Reilly in "The Long Strike," Myles-na-Coppaleen, Shaun the Post, Kerry, and Daddy O'Dowd. As an actor, Mr. Boucicault's best successes have been won in personating eccentric characters, such as Mantilini, and rustic old Irishmen, such as Daddy O'Dowd. He will be remembered, however, for his Grinaldi and his Vampire. He will also be remembered for having made dramatic authorship a remunerative profession to dramatic authors in England. This he did by asserting, maintaining, and finally establishing the principle that among theatrical attractions the play should be made predominant, and should be suitably recompensed. The change in practice that ensued may be inferred from the fact that whereas, in the earlier part of his career, Mr. Boucicault received but £60 for his "Corsican Brothers," he obtained, in 1866, for his "Flying Scud," £6500. Boucicault was educated as an architect and civil engineer. As a manager he established a theatre in Washington, D. C., in 1858; reconstructed the Metropolitan Theatre, New York, and converted it into the Winter Garden in 1859; and remodelled Astley's Circus and built the Westminster Theatre—both in London—in 1862. He is the author of numerous newspaper essays and letters on dramatic subjects, and of an unpublished work on the stage and kindred themes, called "The Master of the Revels."

William Winter, *of the "N. Y. Tribune."*

Bouck (William C.), born in Schoharie co., N. Y., in 1786, became co. sheriff 1812; member of Assembly 1813, 1815, and 1817; State senator 1820; governor 1842–44; member of Constitutional Convention 1846; assistant treasurer in New York City 1846–49. Died Apr. 19, 1859.

Bou'dinot (Elias), LL.D., an American patriot, born in Philadelphia May 2, 1740. He practised law in New Jersey, and supported the popular cause in the Revolution. He was chosen a delegate to the Continental Congress in 1777, was a member of Congress (1789–95), and was director of the Mint at Philadelphia from 1796 to 1805. In 1816 he became the first president of the American Bible Society. He wrote several works, and gave large sums of money for charitable purposes. His wife was a sister of Richard Stockton. He died Oct. 24, 1821.

Boudoir, a small cabinet or private apartment, usually near the bed-chamber, designed as a place of retirement for the mistress of the house, who sometimes receives there her intimate friends. Boudoirs became fashionable in France in the reign of Louis XIV.

Bouflers, de (Louis François), Duke, a famous French general, born Jan. 10, 1644. He served under Turenne and Catinat, distinguished himself at Steenkerke in 1692, and became a marshal of France in 1693. He commanded at Namur when it was besieged by William III. of England in 1695, and defended Lille with success in 1708 against Prince Eugène. He commanded a wing at Malplaquet (1709), from which he made a masterly retreat. Died Aug. 20, 1711. (See "Vie du Maréchal de Bouflers," Lille, 1852.)

Bougainville, de (Louis Antoine), a famous French navigator, born in Paris Nov. 11, 1729. He was aide-de-camp to Montcalm in America in 1756, and served with distinction in Germany in 1761. He performed a voyage round the world in 1767–69, and discovered several islands in the South Sea, being the first Frenchman who circumnavigated the globe, and he published in 1771 a narrative of that voyage. During the American Revolution he had a high command in several naval battles between the French and English. Died Aug. 31, 1811.

Bought Note, a memorandum given by a broker who effects a sale to the purchaser, in which he is notified that the property therein described has been bought for him of the seller, the price and terms being stated. A similar memorandum given to the seller is called the sold note. According to some authorities, the bought note is given to the seller, and the sold note to the buyer. As a general rule, the notes must correspond, or there will be no contract.

Bough'ton (George H.), a painter of great merit, born in Norfolk, England, in 1836, removed to Albany, N. Y. After a few years' residence in America, he returned to England. His works, chiefly landscapes and genre pictures, are marked by delicacy of execution and tenderness of sentiment.

Bougie, boo'zhee' [a French word signifying a "wax candle," so called because sometimes made of waxed linen], a slender surgical instrument designed to be introduced into the male urethra. It is usually made of gum-elastic or gutta-percha, but may be made of other flexible substances. Bougies are often medicated, but more commonly they are designed to act mechanically upon a contracted passage. Bougies are sometimes made of a larger size for the rectum or for the œsophagus.

Bouguer (Pierre), a French mathematician and natural philosopher, born in Brittany Feb. 16, 1698. He published in 1729 an "Essay on Optics and the Gradation of Light," and was associated in 1736 with La Condamine in an expedition to Peru for the purpose of measuring a degree of the meridian, in which they spent several years. He published the results of this operation in an important work entitled "Theory of the Figure of the Earth" (1749). He wrote other works, and invented the heliometer. Died Aug. 15, 1758.

Bouguereau (Adolphe William). See Appendix.

Bouillon, de (Godefroi). See Godfrey of Bouillon.

Boul'der, or **Bowlder,** a large mass or fragment of rock lying on or near the surface of the ground, and found at a distance from the place of its origin and from the formation to which it belongs. Boulders are usually rounded by attrition. In many cases they have been transported hundreds of miles by the action of icebergs or glaciers. Large masses of Scandinavian rocks are scattered over the plains of Denmark and Northern Germany. The pedestal of the statue of Peter the Great at St. Petersburg was hewn out of an erratic granite boulder forty-two feet long, twenty-seven feet broad, and twenty-one feet high. In the Western States occur many granite boulders which probably came from Canada. They abound along the coast of New England, where they are so large as to form a prominent feature in the landscape. The famous Plymouth Rock is a boulder of syenite. (See Drift.)

Boul'der, a city and R. R. centre, capital of Boulder co., Col. (see map of Colorado, ref. 2–E, for location of county), situated at the east base of the Rocky Mountains, on both sides of Boulder Creek, which flows through the famous Boulder Cañon, the Yosemite of Colorado. The State University is located here. Boulder has flouring-mills, smelting and sampling works, excellent public schools, and a complete system of waterworks; is the centre of both the agricultural and mining interests of the county, the great telluride belt of mines being only 6 to 8 miles distant, the free gold-mines only 8 to 14 miles, and the famous silver-mines of Caribou only 22 miles away. Coal and iron mines abound in the valley within 4 to 6 miles. This is a favorite resort for tourists and invalids. Pop. in 1870, 343; in 1880, 3069; in 1885, 3112.

Boulder Clay. See GEOLOGY, by PROF. J. W. DAWSON, LL.D., F. R. S.

Bou'le [Gr. Βουλή, a "council"], the name of the ancient Athenian senate, instituted by Solon as a check on the *ecclesia* (ἐκκλησία), which was an assembly of the whole people. The boule was at first composed of 400 members, but Cleisthenes increased the number to 500 when he divided the Athenians into ten tribes. The number was subsequently raised to 600. All freeborn Athenian citizens above thirty years of age were eligible to this council.

Boulevard', a French word corresponding to the English "bulwark" or "rampart," and directly derived from the Danish *bulværk*, denoting a kind of fortification introduced in France by the Normans after their conquest of Normandy. In France and Germany these defensive works have been generally levelled and converted into public promenades or avenues lined with trees. The Inner Boulevards of Paris form a magnificent central thoroughfare, lined on each side by a double row of trees, under which is a wide and elevated pathway, and bordered by elegant shops and mansions, the whole presenting a scene of gayety and splendor which no other capital can equal.

Boulogne, a town of France, department of the Seine, is on the right bank of the river Seine, 5 miles W. of Paris, from which it is separated by the BOIS DE BOULOGNE (which see). A fine stone bridge connects it with the ruined palace of St. Cloud. It is surrounded by beautiful scenery. Pop. 17,343.

Boulogne, or **Boulogne-sur-Mer,** a seaport of France, department of Pas-de-Calais, is on the English Channel, at the mouth of the Lianne, 158 miles by rail N. N. W. of Paris and 27 miles by rail S. W. of Calais; lat. 50° 44′ N., lon. 1° 37′ E. The railway which connects Calais with Amiens passes through it. It is divided into two parts—the upper and lower town, from the former of which the English coast is visible. The upper town has beautiful promenades, an old Gothic cathedral, a hôtel de ville, and an episcopal palace. The lower town is newer, more regular, and more populous. It contains a hospital, a theatre, a museum, a public library, and an exchange. Boulogne derives much of its prosperity from English residents and visitors, who are very numerous. Steamers ply twice a day between this port and Folkestone. The harbor will admit large vessels during high water. Here are manufactures of linen and woollen goods, sailcloth, cordage, bottles, etc. It occupies the site of the ancient *Gesoriacum*, which after the time of Constantine the Great was called *Bononia Oceanensis.* Several centuries later the name was changed to *Bolonia.* At this place Napoleon assembled in 1804 an army of 180,000 men and a flotilla of 2400 transports for the invasion of England. To commemorate this design, which, however, was never executed, a column 164 feet high was erected. Pop. in 1881, 44,842.

Boulogne (ÉTIENNE ANTOINE), an eloquent French prelate, born Dec. 26, 1747, edited during the Revolution the "Annales religieuses," which was several times suppressed and revived with altered title. Under the empire he, as bishop of Troyes, was imprisoned with two other bishops for declaring that the emperor had no authority to confine a bishop without the approval of the pope. He was made an archbishop in 1822. His works appeared in 1826–28, 8 vols. Died May 13, 1825.

Boul'ton (MATTHEW), an English inventor, born at Birmingham Sept. 3, 1728. He was noted for his energy and enterprise as a manufacturer, and he became a friend and partner of James Watt. He established at Soho, near Birmingham, a manufactory of steam-engines in 1765. Boulton invented an improved apparatus for coining money and a new mode of inlaying steel. He was a man of generous disposition. Died Aug. 17, 1809. (See "Life of M. Boulton," Birmingham, 1809, and HENRY HOWE, "Eminent American and European Mechanics," 1847.)

Bou-Maza (SI MOHAMMED BEN ABDALLAH, *surnamed*), an Arab chief, born about 1820, followed for three years the austere life of a dervish, and then, proclaiming that he was an emissary of Heaven, he stirred up the Kabyles, the warlike inhabitants of Dahra in Algiers, preached extermination to Christians, and waged war upon the allies of France, Hadj-Achmed and Sidi-Darribi. He surrendered after a protracted conflict with Gen. Herbillon, Jan. 13, 1847, and was conveyed to Paris. He afterwards entered the service of the Porte, and attained the rank of colonel.

Bound, or **Bound'ary,** a limit; the line which includes the whole of any object or space; also a leap, a spring, a rebound. The term "boundary" is applied to the limit line of demarcation which separates one state or country from another, and which is sometimes an imaginary line, sometimes a river, sea, or other natural barrier. In the mensuration and description of real estate, "bound" is used to denote the utmost limits of land by which the same is known and can be described, being in this sense synonymous with abuttals.

Bound, or **Bownd** (NICOLAS), D. D., a clergyman of the Church of England at Norton, in Suffolk, who died in 1607. He published in 1595 (enlarged edition in 1606) his famous work, "Sabbathum Veteris et Novi Testamenti," in which the Puritan doctrine of the Lord's Day was for the first time broadly and prominently asserted.

Bound Bai'liff, in England, is a sheriff's officer whose duty it is to discover and arrest debtors. (See BAILIFF.)

Bound Brook, R. R. junction, of Bridgewater township, Somerset co., N. J. (see map of New Jersey, ref. 3-C, for location of county), 31 miles W. S. W. of New York. It is pleasantly situated on the Raritan River and the Delaware and Raritan Canal. It has several churches and important manufactures, and its trade in lumber is very extensive. Pop. in 1870, 556; in 1880, 934.

Boun'ty [from the Fr. *bonté*, "goodness," "kindness"], a premium given by government to foster some branch of industry, or encourage enterprises which are believed to be of national importance and conducive to the public interests. The British government formerly gave bounties to encourage the herring-fisheries and the exportation of grain and Irish linen, and for other purposes. The modern political economists reject this factitious method of fostering commerce, agriculture, etc., and argue that it promotes a misdirection of capital, talent, and industry. The impolicy of giving bounties for such purposes appears to be now generally admitted. They are often given, particularly in new countries, for the destruction of ferocious animals, as wolves, bears, etc. Some of the U. S. give bounties for tree-planting. Subsidies to steamship companies and land grants to railways are common in the U. S.

A bounty in money is also often given to induce men to enlist in the army and navy. The amount of this money varies according to the exigency and the difficulty of obtaining recruits. In 1812 the British government offered a nominal bounty of £23 17*s.* 6*d.*, but this was subject to large deductions and drawbacks. The bounty given in Great Britain at present is about one pound sterling. In the American civil war the recruits of the Union army received in some cases a bounty of $500 or more. Many of these recruits deserted soon after they had received the bounty; these were called "bounty-jumpers."

Bouquetin, or **Ibex of the Alps** (*Capra ibex*), [Ger. *Steinbock*], a species of wild goat formerly found on the Alps, and which ascends to the limit of perpetual snow. It is larger than the common goat, and has large horns which curve backward. The horns of the male are sometimes twenty inches long or more. It has no beard except a few hairs in winter. The color of the hair is mostly brown. This animal feeds on shrubs, lichens, and the scanty herbage which is found on the confines of vegetation. It has an extraordinary power of bounding from crag to crag, and of climbing precipices which are almost perpendicular. The bouquetin can be tamed if it is taken young, and it will breed with the common goat. The bouquetin is now extinct in the Alps, except possibly near Cormayeur. There are still probably 40 or 50 on the mountains S. of the Dora Baltea. The bouquetin is preserved as royal game.

Bourbaki (CHARLES DENIS SAUTER), a French general, born April 22, 1816, took part in the wars in the Crimea and in Italy, and in the German-French war of 1870 he commanded the imperial guards before Metz. After the deposition of Napoleon he organized the Army of the North, then commanded in the E. of France, unsuccessfully; attempted suicide, and gave up the command to Clinchant, who crossed the Swiss frontier with 84,000 men, Feb. 1, 1871.

Bourbon, called also **Ile de la Réunion,** or **Ile Bonaparte,** an island and French Colony in the Indian Ocean, belongs to the Mascarene group, and is about 100 miles S. W. of Mauritius; lat. 20° 51′ 43″ S., lon. 55° 30′ 16″ E. It is 38 miles long, 28 miles wide, and has an area of 956 square miles. Pop. in 1878, 178,310. It is volcanic, and is traversed by a mountain-chain the direction of which is N. and S. This mountain-range, of which one peak rises 10,000 feet above the sea, divides the island into two portions, differing in climate and productions. The Piton de Fournaise, 7200 feet high, is an active volcano, the eruptions of which occur on an average at least twice a year. The soil in some parts is very fertile, and the scenery is generally extremely beautiful. The climate was formerly healthy, but Europeans now suffer much from typhoid fever and dysentery. The mean annual temperature is about 77° F. It is often visited by terrific hurricanes, which demolish houses and tear up trees by the roots. The chief articles of export are sugar, coffee, and dyewoods. Maize, rice, and tobacco are also cultivated. The island has no good harbors, and the coast is consequently dangerous. In one year (1843–44) eleven large vessels were wrecked here. Capital, St. Denis. This island was discovered in 1545 by the Portuguese, and was occupied by the French in 1649.

Bourbon, on R. R., Marshall co., Ind. (see map of Indiana, ref. 2–E, for location of county), 53 miles from Fort Wayne, and 95 from Chicago. It contains an academy, graded school, wagon and furniture manufactories, a large flouring-mill, several extensive boot and shoe manufactories, and various other mechanical enterprises. The surrounding country is very fertile, abounding in valuable timber, such as walnut, poplar, oak, maple, beech, etc. It is the seat of Salem College. Pop. in 1870, 874; in 1880, 1056.

Bourbon, the name of a celebrated French royal family which reigned over France from 1589 to 1792, and from 1815 to 1848. A prince of the Bourbon dynasty also obtained the throne of Spain in 1700, and another that of Naples and Sicily in 1735. The Bourbons derive their name from the castle of Bourbon, which was built in the thirteenth century, and was situated in the old province of Bourbonnais, 16 miles W. of Moulins. The heiress of the seignory was married in 1272 to Robert, a younger son of King Louis IX. The seignory was erected into a duchy, and Louis, a son of Robert, became about 1327 the first duke of Bourbon. He died in 1341, and was succeeded by his son Pierre, who was killed at Poitiers in 1356. Louis, a son of Pierre, became the third duke of Bourbon. He was one of the most powerful vassals of the crown of France, and made large additions to the duchy by his marriages. Died in 1410. His son Jean, born in 1381, was the fourth duke. He was taken prisoner by the English at Agincourt, and detained until his death (1434). He was succeeded by his son Charles, born in 1401. He died in 1456, leaving a son Jean, who became the sixth duke of Bourbon and constable of France. (See Bourbon, de, Charles.)

Among the collateral branches of the Bourbon family were those of Vendôme, Condé, Montpensier, Orléans, Conti, and Soissons. Antoine de Bourbon, duke of Vendôme, became by marriage king of Navarre. His son, Henry of Navarre, was the first French king of the house of Bourbon, and began to reign as Henry IV. in 1589. He had two sons, Louis XIII. and Gaston, duke of Orleans; a daughter, Elizabeth, who was married to Philip IV. of Spain, and Henrietta, who became the queen of Charles I. of England. Louis XIII., who died in 1643, left two sons, Louis XIV. and Philip, duke of Orleans, who was the ancestor of King Louis Philippe. The dauphin, the eldest son of Louis XIV., died in 1711, leaving three sons—1, Louis, duke of Burgundy; 2, Philip, duke of Anjou, who became king of Spain as Philip V.; 3, Charles, duke of Berry. Louis of Burgundy, who died in 1712, was the father of Louis XV., who succeeded his great-grandfather, Louis XIV., in 1715. Louis XV. had one son, Louis, who died before his father, leaving three sons, who all reigned successively—namely, Louis XVI., Louis XVIII., and Charles X. Louis XVI. left one son, who by the royalists was recognized as Louis XVII., but perished as a child during the French Revolution. As the circumstances of his death remained unknown, many adventurers claimed to be Louis XVII. Louis XVIII. had no issue. Charles X. had two sons—Louis Antoine, who died without issue in 1844, and Charles Ferdinand, duke of Berry. His only son, Henri, duke of Bordeaux, styled Count de Chambord, was the heir to the throne, according to the Legitimists, who gave him the title of Henry V. (See Chambord.)

The House of Orleans is called the younger branch of the royal family of Bourbon, and is descended from Philip of Orleans, a younger brother of Louis XIV. His son Philip was regent of France during the minority of Louis XV., and left a son, Louis Philippe, duke of Orleans. This last was the grandfather of the duke of Orleans who figured in the Revolution as Citizen Egalité. His eldest son, Louis Philippe, became king of the French in 1830. This king had five sons—the duke of Orleans, the duke of Nemours, the prince de Joinville, the duke of Aumale, and the duke of Montpensier. The count of Paris, the son of the eldest of these five, is regarded as the heir to the throne by the Orleanist party.

Philip, duke of Anjou, who was placed on the throne of Spain in 1700, was the founder of a Spanish dynasty, which reigned in Spain until the dethronement of Queen Isabella in 1868, and regained the crown in 1875 by Alfonso XII. He was also the ancestor of the Bourbon dynasties of Naples and Parma. Francis II., who was dethroned in Sept., 1860, was the last Bourbon monarch of Naples (or the Two Sicilies). The Bourbons have also ceased to reign in Parma, which was annexed to the kingdom of Italy in 1860. Louise of Bourbon, a daughter of the duke of Berry and sister to the count of Chambord, born in 1819, died in 1864, was married in 1845 at Frohsdorf to Charles III. of Parma, who descended from the Spanish line of the Bourbons. Charles III. was violently reactionary in his policy, and was assassinated March 26, 1854. Louise immediately assumed the regency in the name of her minor son, Robert I., and she developed extraordinary energy and made great personal sacrifices in order to gain the confidence of the Italians and bring back order and peace. She was not altogether unsuccessful in her endeavors, but the tendency of the time pointed another way. (See Achaintre, "Histoire Chronologique et Généalogique de la Maison Royale de Bourbon," 2 vols., 1825; Coxe, "Memoirs of the Kings of Spain of the House of Bourbon," 3 vols., 1813.)

Bourbon, de (Charles), Duc, usually styled Constable Bourbon (Connétable de Bourbon), a famous French general, born Feb. 17, 1489, was a son of Gilbert Bourbon, count of Montpensier. He married the heiress of the duke of Bourbon—Suzanne, a daughter of Pierre de Bourbon, who died in 1503—and became the owner of the vast estates of both branches of the Bourbons. But his brilliant military successes aroused the jealousy of Louis XII., who refused to make him commander-in-chief. Francis I., however, followed another policy. Charles was appointed constable of France in 1515, and was one of the generals who gained the victory at Marignano in that year. He was very popular with the soldiers and with the court, but his popularity became his fall. The mother of Francis I. was enamored of him, but her overtures having been rejected, she became his enemy. At her instigation, the estates which he had acquired by marriage were seized by the king after the death of Suzanne. Other insults were heaped upon him. In the campaign against Charles V. the command of the vanguard was given to the duc de Alençon. His official salaries and the sums he had borrowed for his war expenses were not paid, and he, the richest man in France, was actually reduced to beggary. Bourbon deeply resented this injury, renounced his allegiance to the king of France in 1523, and became the ally of the emperor Charles V., for whose service he raised about 6000 Germans. He contributed largely to the victory which the imperial army gained over the French at Pavia in 1525. It appears that he was distrusted by Charles V., who neglected to pay Bourbon's German mercenaries, and these consequently became mutinous. He resolved to quit the service of Charles V., and in order to satisfy his troops with spoils of conquest he conducted a daring enterprise against Rome, in which he displayed great military talents. His army took Rome by assault May 5, 1527, but he was killed as he mounted the wall by a pistol-shot, fired, it is said, by Benvenuto Cellini. (See Robertson, "History of Charles V.;" Brantôme, "Vies des grands Capitaines.") The Constable Bourbon is a prominent character in Byron's drama "The Deformed Transformed."

Bourbon-Vendée, or **Napoleon Vendée,** a town of France, capital of the department of La Vendée, on the river Yon, 48 miles by rail S. of Nantes. It has a college, a normal school, town-hall, and hospital. Pop. 8710.

Bourdaloue (Louis), an excellent French pulpit orator, born at Bourges Aug. 20, 1632. He entered the order of Jesuits in 1648, and became professor of rhetoric and philosophy. In 1669 he removed to Paris, where he preached for many years, and was often heard by Louis XIV., who expressed a high opinion of his sermons. He was distinguished for the dignity of his manner, the wisdom of his thoughts, and the earnestness of his piety. His style of eloquence was less inflated and more simple than that which then prevailed in France. He was a general favorite with the common people, as well as the learned and higher classes. Died in Paris May 13, 1704. His sermons were published in 16 vols., 1707–34. Several other editions have also been published. For it must be noticed that the merits of Bourdaloue are not simply rhetorical or devotional, but also theological; his discourses contain a whole course of theology. (See Prigny, "Vie de Bourdaloue," 1705; Villenave, "Notice sur Bourdaloue," 1812; J. Labouderie, "Notice sur Bourdaloue," 1825.)

Bourdon [a French word signifying "staff"], in music, is applied to the humming sound produced by blowing through a long hollow staff. Hence the name of the apparatus in organs, stringed instruments, etc. by which the deep sound is made.

Bourgelat (Claude), a French physician and writer, noted as the founder of veterinary schools in France, was born at Lyons Mar. 17, 1712. He wrote on materia medica, farriery, contagious diseases, etc. In 1762 he founded a veterinary school at Lyons. Died Jan. 3, 1779.

Bourg-en-Bresse, a town of France, capital of the department of Ain, is pleasantly situated on the Reyssouse, 57 miles by rail N. N. E. of Lyons. Several railways connect it with Lyons, Mâcon, and Besançon. It is well built, has a college, a museum, a large hospital, and a public library of about 20,000 volumes. Here are manufactures of linens, cotton stuffs, hosiery, etc. Pop. in 1881, 18,233.

Bourgeois, a French word signifying a citizen or resident of a city; a commoner, as distinguished from a nobleman; a civilian, as distinguished from a soldier. A citizen of the state or republic is called *citoyen.*

Bourgeois, the name of a type used in printing. It is one size larger than brevier, and one size smaller than long primer. (See Type.)

Bourgeoisie, a French term, which is also much used in English, defined in dictionaries as "citizens," "citizenship," "commonalty." It is applied to the great middle class of French society, composed mostly of merchants, manufacturers, master mechanics, lawyers, etc., who live in towns and cities. They are inferior in rank to the aristocracy, and superior to the peasantry and to the *prolétaires* of the towns.

Bourges (anc. *Avaricum*, afterwards *Bituriges*), a city of France, near its centre, capital of the department of Cher, is situated in a fertile plain at the confluence of the Auron and the Eure, 146 miles by rail S. of Paris. It is connected by railway with Paris, Orleans, Moulins, and other cities. It was enclosed by ramparts, which have been converted into promenades or boulevards bordered with chestnut and walnut trees. The streets are crooked and the houses mostly antique. Bourges has a college, a normal school, a public library of about 25,000 volumes, a fine hôtel de ville, and a magnificent Gothic cathedral, which is considered one of the finest in Europe. It is the see of an archbishop. This town was formerly the seat of a celebrated university founded in 1463 and suppressed in 1789. It has manufactures of cutlery, woollen stuffs, etc. *Avaricum*, which occupied this site, was a very ancient town, and was the capital of Celtic Gaul about 500 B. C. It was the chief town of the Bituriges in the time of Julius Cæsar, who besieged and took it in 52 B. C., after which it became the capital of the Roman province of Aquitania. During the Middle Ages seven councils of the Church were held here, and in 1438 the Pragmatic Sanction of the Gallican Church was established here. Pop. in 1881, 40,217.

Bourg'oing, de (Jean François), Baron, an accomplished and amiable French diplomatist, born Nov. 20, 1748, was ambassador at different courts. During a nine years' residence in Spain he wrote a thorough book upon it, "Nouveau voyage en Espagne, etc." Died July 20, 1811.

Bourignon (Antoinette), a Flemish visionary religionist, born at Lille Jan. 13, 1616, entered a convent in her youth, and professed that she had received special revelations. Having left the convent and renounced Catholicism, she travelled in foreign countries, wrote several religious works, and gained many converts to her sect, especially in Scotland. She was an eloquent speaker and writer. Died Oct. 30, 1680. (See a "Life of Antoinette Bourignon," prefixed to her works, 21 vols., 1676–84.)

Bourmont, de (Louis Auguste Victor), Comte de Ghaisne, a French general, born in Anjou Sept. 2, 1773, was a royalist in the Revolution. He fought against the republic in 1794–96, and entered the service of Napoleon about 1809. Having served with distinction in Russia, he was raised to the rank of lieutenant-general in 1814. During the Hundred Days, 1815, he deserted Louis XVIII. and Napoleon by turns. He became minister of war in 1829, and commander-in-chief of the army sent against Algiers in 1830. He conquered Algiers, and was rewarded in July, 1830, with the bâton of a marshal of France. Being devoted to Charles X., he was deprived of his command by the revolution of 1830, and went into exile. Died Oct. 27, 1846. (See De Lansac, "Notice sur le Comte de Bourmont," 1847.)

Bourne (Hugh), an English preacher, born in Staffordshire April 3, 1772, was one of the founders of the sect of Primitive Methodists. He was "cut off" from the Wesleyan connection in 1808 for holding camp-meetings, before which he was a zealous layman of that denomination. His new sect was organized in 1810. He visited Ireland and the U. S. Died Oct. 11, 1852.

Bourne (Vincent), an English scholar and elegant Latin poet, was born about 1698. He was an usher of Westminster School. He wrote several short original Latin poems, which are remarkably graceful, and produced Latin versions of English ballads, which are wonderfully felicitous. Cowper translated some of his original Latin poems. Died Dec. 2, 1747.

Bour'nonite, or **Endellionite,** a triple sulphide of copper, antimony, and lead, is composed of 41.8 per cent. of lead, 26 of antimony, 19.4 of sulphur, and 12.8 of copper. It occurs in crystals and massive.

Bournouse, or **Bornouse,** bor-noos', the Arabic name of a garment worn in Algeria and other parts of Northern Africa. It is a large woollen mantle, worn above the other clothing of the natives, and has a hood which is used to cover the head in rainy weather. It has been adopted by the Spaniards, who call it *albornoz.*

Bourrienne, de (Louis Antoine Fauvelet), a French diplomatist, born at Sens July 9, 1769. He was a fellow-student and friend of Bonaparte at the school of Brienne. They met at Paris in 1792, and renewed their intimacy. In 1796 Bourrienne became private secretary to General Bonaparte, whom he followed to Egypt. In 1804 he was sent as minister to Hamburg, but he was accused of peculation, and was recalled in 1811. Having deserted Napoleon in 1814, he was appointed minister of state by Louis XVIII. in 1815. He published an interesting work entitled "Memoirs of Bourrienne" (10 vols., 1829–31), which is an important contribution to the history of Napoleon. Died Feb. 7, 1834. (See Boulay de la Meurthe, "Bourrienne et ses Erreurs," 2 vols., 1830.)

Bourse. See Exchange.

Boussingault (Jean Baptiste Joseph Dieudonné), a French chemist, born in Paris Feb. 2, 1802, became a member of the Institute in 1839. He was an officer under Bolivar in South America in his youth. He co-operated with Dumas in experiments to determine the composition of the atmosphere. In 1844 he published a valuable work, "Treatise on Rural Economy" (2 vols.). He was a moderate republican member of the National Assembly in 1848.

Boussu-sur-Haine, a town in Belgium, on the Haine, in the province of Hainaut. It has machine-works and breweries. Pop. 6638.

Boustrophe'don [from the Gr. βοῦς, an "ox," and στρέφω, to "turn"], a word used to describe a mode of writing practised by the ancient Greeks until about 450 B. C., —namely, in alternate lines from right to left and from left to right, as fields are ploughed in furrows, having an alternate direction.

Bou'terwek (Friedrich), a German philosopher and critic, born near Goslar, in Hanover, April 15, 1766. He wrote several poems and a romance called "Count Donamar" (3 vols., 1791). He became extraordinary professor of philosophy at Göttingen in 1797, and ordinary professor in 1802. He published several works on philosophy and a "Treatise on Æsthetics" (1806). His reputation is founded on his excellent "History of Modern Poetry and Eloquence" (12 vols., 1801–19). Died Aug. 9, 1828. (See J. F. Blumenbach, "Memoria F. Bouterwekii," 1832.)

Bouton (Nathaniel), D. D., born in Norwalk, Conn., in 1799, settled as pastor of the Congregational church in Concord, N. H., Mar. 23, 1825, where he preached for forty years; received the honorary appointment of State historian of New Hampshire, and was corresponding secretary of New Hampshire Historical Society and one of its most prominent members. Among his principal works are "History of Concord, New Hampshire" (1856) and "Provincial Records" (of New Hampshire). Died June 6, 1878.

Bout'well (George Sewall), LL.D., an American lawyer and statesman, born in Brookline, Mass., Jan. 28, 1818. His education was partly obtained in the public schools and by a course of thorough private study. He taught school in his youth, was admitted to the bar at the age of twenty-eight, and in 1851 and 1852 was chosen governor of Massachusetts. He was long a member of the Massachusetts board of education, of which he was secretary for five years. He organized the internal revenue department of the U. S. government, and in 1862 became its first commissioner. He was a member of Congress from Massachusetts 1863–69, and secretary of the treasury 1869–73, under President Grant. In 1873 he was chosen U. S. Senator from Massachusetts for term ending 1877, in place of Hon. Henry Wilson, Vice-President of the U. S.

Bouvar'dia (named in honor of Bouvard, physician of Louis XIII.), a genus of plants of the natural order Cinchonaceæ, is allied to the trees from which Peruvian bark is obtained. The corolla is tubular, 4-lobed, and has four stamens included in it. The fruit is a capsule, 2-celled. The species of this genus are natives of Mexico. The *Bou-*

vardia triphylla is cultivated in gardens for its beautiful scarlet flowers.

Bouvet (François Joseph Francisque), a French publicist, born Aug. 15, 1799, has supported by his writings the liberal party. He was editor of the "Revue Independante" and "Reveil de l'Ain," in which he developed his ideas concerning universal peace. He has written "Du Principe de l'autorité en France, et de la limite des pouvoirs; conciliation des partis" (1839), "Du Pape" (1863), and "Le problème européen."

Bouvier' (Hannah M.), born in Philadelphia in 1811, the only daughter of Judge John Bouvier, published "Familiar Astronomy" (1857), a work which won the praise of Sir John Herschel, Lord Rosse, Hind, Airy, and many other eminent astronomers of Europe and the U. S.

Bouvier (John), a jurist and writer, born in the French department of Gard in 1787. He emigrated to the U. S. in 1802, and practised law in Philadelphia. In 1838 he became a judge of the criminal court of that city. He published a "Law Dictionary" (1839) and "Institutes of American Law" (4 vols., 1851). Died Nov. 18, 1851.

Bovia'num, an ancient city of Italy, founded by the Samnites on or near the site of the modern Bojano, was surrounded by high mountains. According to Livy, it was a wealthy and powerful city. It was besieged and taken by the Romans in 311 B. C. In the second Punic war it was several times head-quarters of the Roman army. During the Social war it was capital of the confederates.

Bov'idæ [from the Lat. *bos*, gen. *bo'vis*, an "ox"], a family of ruminating animals, comprises the ox, bison, buffalo, yak, zebu, etc. The Bovidæ are all large and gregarious animals, and they generally have unbranched horns. This family is usually regarded as equal in extent to the Linnæan genus *Bos*. Indigenous species of Bovidæ are found in Asia, Africa, Europe, and North America. They are all valuable to man for their flesh, tallow, hides, horns, etc., and several species besides the ox have been domesticated. (See Arnee, Bison, Buffalo, Ox, Urus, Yak, and Zebu. See Appendix.)

Bovi'no (anc. *Vibinum*). a fortified town of Italy, in the province of Foggia, 14 miles S. S. W. of Foggia. It has a cathedral and several churches. The imperialists defeated the Spaniards here in 1734. Pop. 7544.

Bow [Lat. *arcus*], a weapon used in war and hunting to propel arrows, is made of wood or other elastic substance, and is bent by a string fastened to each end. It is generally used by savages, but among civilized nations its use as a military weapon has been superseded by firearms. (See Arbalest, Archer, Arrow.)

Bow'dich (Thomas Edward), an English linguist and traveller, born at Bristol in 1790. Having visited Ashantee in 1816, he published a "Mission to Ashantee" (1819). He undertook an exploring expedition into the interior of Africa in 1822, but he died of fever on the river Gambia near its mouth Jan. 10, 1824.

Bowditch (Henry Pickering), M. D. See Appendix.

Bow'ditch (Nathaniel), LL.D., F. R. S., an eminent American mathematician, born at Salem, Mass., Mar. 26, 1773. He made several long voyages as an officer or supercargo of a merchant-vessel, and learned Greek and Latin without a teacher. He published a valuable work called "The Practical Navigator," and a good translation of Laplace's "Mécanique Céleste," with an ample commentary (4 vols. 4to, 1829–38). This was highly commended by the English "Quarterly Review" for July, 1832. He was a fellow of the Royal Society of London, and a member of a large number of the learned societies of Europe and America. Died Mar. 16, 1838. (See a "Memoir of N. Bowditch," by his son, N. I. Bowditch, 1839.)

Bowditch (Nathaniel Ingersoll), born at Salem, Mass., Jan. 17, 1805, graduated at Harvard in 1822. He was called to the bar in Boston in 1825, but became a conveyancer, acquiring great reputation for accuracy and industry. He wrote much for periodicals, and published a "Memoir of N. Bowditch" (1840), a "History of the Massachusetts General Hospital" (1851), and "Suffolk Surnames." Died April 16, 1861.

Bowdoin (James), LL.D., an American governor, born at Boston Aug. 8, 1727, graduated at Harvard in 1745. He was president of the convention which in 1778 formed the constitution of Massachusetts, was chosen governor of that State in 1785, and again in 1786. He suppressed Shay's rebellion in 1786. Died Nov. 6, 1790.

Bowdoin (James), a son of the preceding, was born in Boston Sept. 22, 1752. He graduated at Harvard in 1771. He was sent in 1805 on a mission to Spain, to procure the cession of Florida to the U. S., and to obtain indemnity for injuries to American commerce. He was a benefactor of Bowdoin College. Died Oct. 11, 1811.

Bowdoin (bō'den) **College,** the oldest college in Maine, was founded in 1802 at Brunswick, Cumberland co., on the Androscoggin River, about 4 miles from the Atlantic Ocean. It was named in honor of James Bowdoin, governor of Massachusetts, whose son James gave to the college 1000 acres of land, over £1000 sterling, and a valuable library and collection of paintings. The college was also liberally endowed by the State. The college library has about 17,500 volumes, and the other libraries connected with the college have nearly as many more. Connected with this flourishing college is a medical school, founded in 1820. Much attention is paid to physical education; instruction is also given in military science.

Bowen (Francis), LL.D., an American writer, born at Charlestown, Mass., Sept. 8, 1811, graduated at Harvard in 1833. He edited the "North American Review" about eleven years (1843–54), and became in 1853 professor of natural religion, moral philosophy, etc. at Harvard University. He has been an ardent defender of the philosophical views of Locke and Berkeley, and a warm opponent of those of Kant, Fichte, and Cousin. Among his works are Lives of Baron Steuben, James Otis, and Benjamin Lincoln in Sparks's "American Biography," and a treatise on Political Economy.

Bowen (Rt. Rev. Nathaniel), D. D., born in Boston, Mass., June 29, 1779, graduated at Charleston College, S. C., in 1794, held pastorates in Protestant Episcopal churches at Providence, R. I., Charleston, S. C., and New York City. In 1818 he was consecrated bishop of South Carolina. Died Aug. 25, 1839. He wrote "Christian Consolation" (1831), "Private Prayers" (1837), and two volumes of his sermons were published.

Bow'er, a shady recess; a shelter or arbor in a garden, formed of boughs of trees overarched or intertwined; also a private apartment in ancient castles or mansions, used by ladies as a parlor and a sleeping-chamber.

Bower, in certain games of cards, is the name of the knave or jack of trumps; this word comes from the Ger. *Bauer*, a "clown" or "peasant."

Bower (Archibald), a Scottish writer of Roman Catholic parentage, was born at Dundee in 1686, joined the Jesuits, became a Protestant, rejoined the Jesuits, and again became a Protestant. His "History of the Popes," in seven quarto volumes (1748–66), is characterized by great partisan bitterness. He died in 1766.

Bower-bird, a name given to certain Australian birds of the bird of paradise family, remarkable for making bower-like erections, adorning them with gay feathers, rags, bones, shells, and other brightly-colored objects. These bowers are not nests. The use made of them by the birds is imperfectly understood; their structure has been carefully examined, and specimens of them deposited in the British Museum. The bowers of the satin bower-bird (*Ptilonorhynchus holosericeus*) are built on the ground. The base is an extensive platform of sticks, on the centre of which the bower is built of flexible twigs. It is chiefly at and near the entrance that the shells, feathers, etc. are placed. The bowers of the spotted bower-bird (*Chlamydera maculata*) are longer and more avenue-like than those of the satin bower-bird; they are placed upon the ground, and beautifully lined with grasses.

Bow'ers (Theodore S.), an American officer, born in Pennsylvania about 1832. A printer by trade, he subsequently edited a paper in Illinois, but laying aside his pen he entered the service in Oct., 1861, as a private in the 48th Illinois volunteers, was promoted to be first lieutenant Mar., 1862, made aide-de-camp to Gen. Grant April, 1862, and appointed captain and aide-de-camp Nov., 1862, judge-advocate, with the rank of major, Feb., 1863, and, after the surrender of Vicksburg, assistant adjutant-general of volunteers, with the rank of lieutenant-colonel. On the 29th of July, 1864, he was commissioned a captain and assistant quartermaster in the regular army, and later, Jan., 1865, a major and assistant adjutant-general. He served continuously, in the field and afterwards at Washington, on the staff of Gen. Grant, from April, 1862, to Mar. 6, 1866, when he was accidentally killed by being thrown under a train at Garrison's Station, N. Y. Brevet lieutenant-colonel, colonel, and brigadier-general U. S. A. for gallant and meritorious services during the war.

G. C. Simmons.

Bowie (A.) was born and educated in South Carolina, but spent the greater part of his life in Talladega, Ala., where for six years he presided on the chancery bench. In 1845 he retired from public life, retaining only his position as a trustee of the State University. He was a distinguished member of the Baptist Church. In politics he was allied with the State Rights Democracy. In society he excelled by his great conversational powers.

Bowie Knife, an American weapon, common in the Southern U. S., invented by Col. Bowie of Tex. It is a sharp-pointed knife with a single edge, and is usually carried in a sheath. The blade is sometimes ten inches long.

Bowles (Francis Tiffany). See Appendix.

Bowles (Samuel), an American journalist, born at Springfield, Mass., Feb. 9, 1826. From 1844 to 1878 he was principal conductor of the "Springfield Republican," one of the most successful journals in the U. S. He published "Across the Continent" (1865), "The Switzerland of America" (1869), and other works. Died at Springfield, Mass., Jan. 16, 1878. (See his "Life and Times," by George S. Merriam, 1885.)—His son, of the same name, succeeded him as editor of the "Springfield Republican."

Bow-line of a ship is a rope fastened near the middle of the perpendicular edge of the square sails by three or four subordinate ropes called bridles. It serves to tighten the edge of the sail during an unfavorable wind.

Bowling Alley, a long narrow structure made for playing the game of skittles, commonly called in America Ninepins or Tenpins (which see).

Bowling Green, Clay co., Ind. (see map of Indiana, ref. 8–C, for location of county), on Eel River, 60 miles W. S. W. of Indianapolis. Pop. in 1870, 606; in 1880, 572.

Bowling Green, capital of Warren co., Ky. (see map of Kentucky, ref. 5–F, for location of county), on R. R. and Barren River, 113 miles S. by W. of Louisville and 72 miles from Nashville. It is at the head of navigation, and has an active trade in pork, tobacco, etc. Here are several mills and factories. Small steamboats navigate the river. Pop. in 1870, 4574; in 1880, 5114.

Bowling Green, on R. R., capital of Pike co., Mo. (see map of Missouri, ref. 3–I, for location of county), 12 miles S. W. of Louisiana. Pop. in 1870, 599; in 1880, 1067.

Bowling Green, R. R. junction, capital of Wood co., O. (see map of Ohio, ref. 2–D, for location of county). Pop. in 1870, 906; in 1880, 1539.

Bowling Green, capital of Caroline co., Va. (see map of Virginia, ref. 5–H, for location of county), 45 miles N. of Richmond. Pop in 1880, 426.

Bowman (Alexander H.), an American officer, born May 15, 1803, at Wilkesbarre, Pa., graduated at West Point in 1825, lieutenant-colonel of engineers Mar. 3, 1863. He served as assistant professor at the Military Academy 1825–26, in building defences and improving rivers and harbors on the Gulf of Mexico 1826–34, in constructing Memphis and St. Francis military road 1834–39, improvement of Cumberland and Tennessee rivers 1834–38, defences of Charleston harbor, S. C., 1838–53, as instructor of practical military engineering at the Military Academy 1851–52, in charge of improvement of Charleston harbor 1852–53, chief engineer U. S. treasury department and treasury building extension 1853–61, member of lighthouse board 1857–59, superintendent of Military Academy 1861–64, and member of engineer boards 1847–65. Died Nov. 11, 1865, at Wilkesbarre, Pa., aged sixty-two.

George W. Cullum.

Bowman (Thomas), D. D., born in Berwick, Pa., in 1819, graduated at Dickinson College in 1837. He became, in 1859, president of the Indiana Asbury University, which position he still held when he was elected a bishop of the Methodist Episcopal Church in 1872.

Bowman (Samuel), D. D., born at Wilkesbarre, Pa., May 21, 1800, studied law, but became a deacon of the Protestant Episcopal Church in 1823, and a priest in 1824. He was long settled in Lancaster, Pa. In 1847 he was chosen bishop of Indiana, but declined, and afterward refused the nomination for provisional bishop of New York. In 1858 he was chosen assistant bishop of Pennsylvania. He was greatly beloved by his people, and was very active in his parochial and episcopal duties. Died Aug. 3, 1861.

Bow'manville, a port of entry of Durham co., Ontario (Canada), in Darlington township, has an excellent harbor on Lake Ontario, and is on the Grand Trunk Railway, 43 miles N. E. of Toronto. It has good water-power, and manufactures of lumber, hoop skirts, furniture, and castings. It is daily visited by steamers during the season of navigation. Pop. in 1881, 3504.

Bow'ring (Sir John), an English author and linguist, was born at Exeter Oct. 17, 1792. He was an intimate friend of Jeremy Bentham, and was well versed in modern languages, especially the Slavonic. In 1825 he became editor of the "Westminster Review." He collected and translated into verse the ancient and popular poems of almost all the countries of Europe. In 1835 he was elected to Parliament, in 1854 became governor of Hong-Kong, China, and received the honor of knighthood. In 1859 he retired on a pension. Among his works is "The Kingdom and People of Siam" (2 vols., 1857). He wrote a description of his visit to the Philippine Islands (1860). He also wrote some excellent hymns. Died Nov. 23, 1872.

Bow'sprit, a large boom or spar which projects over the stem or bow of a ship. It serves to support the foremast, which is fastened to it by large stays or ropes; also to carry sail forward, as a means of counteracting the effect of the after sails and keeping the ship well balanced. In many cases the bowsprit rises at an angle of about 45°. It supports the jib and flying-jibbooms.

Bow'string Hemp, the fibre of the *Sanseviera Zeylanica,* a plant of the order Liliaceæ and tribe Hemerocalleæ, a native of the East Indies. The Hindoo name is *moorva.* This fibre, which is white, silky, and elastic, is used to make bowstrings. A similar fibre is obtained from the leaves of *Sanseviera Roxburghiana,* a perennial Indian plant which has leaves about three feet long, and from other Asiatic and African species.

Box (*Buxus*), a genus of evergreen shrubs or small trees of the natural order Euphorbiaceæ, with opposite leaves entire at the margins. It has male and female flowers growing on the same plant. The male flower is a perianth with four stamens, and the female flower is a perianth with an ovary surmounted by three styles. The most important species is the *Buxus sempervirens* (common box), which is a native of Europe and Asia, has oval, shining, and deep-green leaves, and is remarkable for its compact habit of growth. In Southern Europe it grows twenty feet high or more. A variety called dwarf box, which is only two or three feet high, is extensively cultivated in gardens, and is used to form edgings of flower-beds and gravel-walks, being reduced by clipping to the height of a few inches. The wood of the box, which is very hard, heavy, compact, and fine-grained, is the best of all materials for wood-engraving, and is highly prized by turners. It is also commonly used to make flutes and other wind instruments. It is of a pale yellow color, admits of a beautiful polish, and is not liable to be worm-eaten. Large quantities of boxwood are exported from Spain and Turkey.

Box Elder, or **Ash-leaved Maple,** a small tree of the order Sapindaceæ, the *Negundo aceroides,* which grows from Florida to Pennsylvania and westward, especially along the banks of streams. It is very beautiful, and is one of the characteristic trees of the far West. In Minnesota, Nebraska, etc., it is tapped, like the sugar-maple, for its sap, which affords sugar of good quality.

Box Elder, Utah. See Appendix.

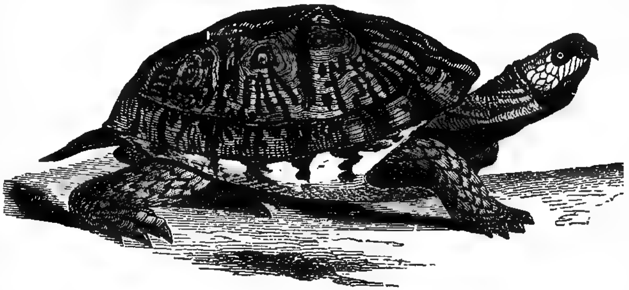
Box'hauling is a mode of turning a ship when the swell of the sea renders tacking impossible, or when the ship is so near the shore that there is not room for veering. The operation is effected by a peculiar management of the helm and the sails.

Boxing. See Pugilism.

Boxing the Compass, a nautical phrase, means an enumeration of the several points, half points, and quarter points of the mariner's compass in their proper order.

Box'tel, a village of Holland, in North Brabant, on the river Dommel, 6 miles S. of Bois-le-Duc. The river flows through the streets and affords passage for boats. Fine diaper is manufactured here. Pop. 4221.

Box-tortoise, or **Lock-tortoise,** popular names of the *Cistuda Virginica* and *Cistuda Blandingii,* tortoises of the U. S., characterized by the division of the plastron into two parts by a crosswise division, united, however, by a ligament which serves as a hinge on which the parts of the plastron turn, thus enabling the animal to shut himself entirely up in his shell. These tortoises are very timid and of gentle



Box-Tortoise.

disposition. Their legs are longer and their speed greater than is usual among tortoises.

Boya'ca, one of the U. S. of Colombia, is bounded on the N. E. and E. by Venezuela, on the S. and S. W. by Cundinamarca, and on the N. W. by Santander. Area, 32,800 square miles. While in the W. the state is exceedingly mountainous, the E. consists of a hot, dry plain. Copper and precious stones are found in the mountains. Capital, Tunja. Pop. 482,874.

Boyaca, a village of Colombia, in the department of its own name, is 5 miles S. W. of Tunja. Here Bolivar gained over the Spaniards, Aug. 7, 1819, a victory which secured the independence of Colombia.

Boy'ar [from a word signifying "battle"], a title given in ancient Russia to those who distinguished themselves in war. This afterwards came to be the title of the nobility, who under the grand duke of Moscow formed an aristocracy whose powers differed according to the character of the monarch, but which were so considerable that even Ivan the Terrible in his ukases added to the words "The czar has commanded," also "The boyars have approved." The last boyar died in 1750.

Boyau (a French word signifying "bowel" or "gut"), in military engineering, is a winding or serpentine trench, dug to form a path or communication between the different armed trenches of a siege-work, and to prevent them from being enfiladed.

Boy Bishop. During the Middle Ages the custom grew up of allowing the choristers of cathedrals to choose yearly one of their number to act the part of a bishop. The practice was permitted probably from the same motives which suffered the mummeries of the Abbot of Unreason (a graphic account of which may be found in Sir W. Scott's romance of "The Monastery"). If the boy bishop died within his short period of office, he was buried in his episcopal robes. A tomb with the effigy of a boy so clothed may be seen in Salisbury Cathedral.

Boyce (James Petigru), D. D., LL.D., born Jan. 11, 1827, at Charleston, S. C., graduated at Brown University in 1847, studied theology at Princeton, N. J., pastor of a Baptist church at Greenville, S. C., 1851–55, professor of theology in Furman University, Greenville, S. C., 1855–58, and then became professor of theology in the Southern Baptist Theological Seminary (formerly Greenville, S. C., now Louisville, Ky.). He has published several sermons, addresses, and articles, which have largely contributed to mould the opinions of the Southern Baptists, and holds, as president of the Southern Baptist Convention, a position of commanding influence.

Boy'cotting, a term coined in 1881, from Mr. Boycott, an agent in Ireland of Lord Erne's Lough Mask estate, who evicted a large number of his tenants. These and their neighbors refused all intercourse with him and his family, and would not work for him or trade with him, or allow others to do so. He could gather his crops only under military protection. The term is equivalent to social outlawry.

Boyd (Andrew Kennedy Hutchison), D. D., born in Nov., 1825, the son of the incumbent of Auchinleck, Ayr, was educated at King's College, London, and at Glasgow. He became rector of St. Andrew's. Under the name of "Country Parson" he has published contemplative essays and sermons.

Boyd (John Parker), an American general, born in Newburyport, Mass., Dec. 21, 1764, entered the U. S. army as ensign in 1786. A spirit of adventure led him to India in 1789, where he obtained a command in the Mahratta service, and rose to the rank of commander. He returned to the U. S. in 1808, and was commissioned colonel of the Fourth U. S. Infantry. In the war with Great Britain he was a brigadier-general, distinguished himself at Tippecanoe, at the capture of Fort George, Canada, and Chrysler's Field; disbanded in 1815. In 1830, President Jackson appointed him naval officer of the port of Boston, Mass. Died Oct. 4, 1830.

Boyd (Linn), an American statesman, born at Nashville, Tenn., Nov. 22, 1800, was a member of Congress from Kentucky for twenty years, being first elected in 1835. During his last term he served as Speaker of the House of Representatives. Died Dec. 18, 1859.

Boy'dell (John), an English engraver and patron of art, born Jan. 19, 1719, became a printseller in London, and amassed a large fortune. He promoted the improvement of British art by his liberal patronage of native engravers and painters. He employed Opie, Reynolds, Northcote, West, and other painters to illustrate Shakspeare's works. The result was the "Shakspeare Gallery," from which was engraved a volume of admirable plates (1803). He was lord mayor in 1790. Died Dec. 11, 1804.

Boy'den (Seth), born at Foxboro', Mass., Nov. 17, 1788, went into the leather manufacture in Newark, N. J., in 1813, began the making of patent leather in 1819, invented a process for making spelter and a machine for leather splitting. In 1826 he made the first malleable cast iron. He also discovered a process for making Russia sheet iron, invented an excellent doming-machine for hat bodies, and built the first successful locomotive with cylinders outside. It is also claimed that he produced the first daguerreotype in the U. S., but the claim is also made for others. Died Mar. 31, 1870.

Boyden (Uriah Atherton). See Appendix.

Boydsville, capital of Clay co., Ark. (see map of Arkansas, ref. 1–F, for location of county). Pop. in 1880, 115.

Boyd'ton, capital of Mecklenburg co., Va. (see map of Virginia, ref. 7–G, for location of county), contains tobacco warehouses, tobacco factory, furniture factory, etc. Pop. in 1870, 261; in 1880, 382.

Boyer (Alexis), a French surgeon, born Mar. 1, 1757, was the son of a tailor, and acquired his profession under great drawbacks. He was surgeon to Napoleon I. and chirurgical professor of the university. His main works are "Traité complet d'anatomie" (4 vols., 1797–99) and "Traité des maladies chirurgicales et des operations qui leur conviennent" (8 vols., 1814–22). Died Nov. 25, 1833.

Boyer (Jean Pierre), a president of Hayti, was born at Port-au-Prince Feb. 28, 1776, and was a mulatto. He entered the French army in his youth, and as an officer in the army of Pétion fought against Christophe. On the death of Pétion he was elected president of the republic in 1818. By partiality to the mulattoes and arbitrary measures he offended the negroes, who revolted in 1842 and expelled him from the island. He died in Paris July 9, 1850.

Boyland (George Halsted), M. D. See Appendix.

Boyle (John Alexander), a Methodist Episcopal preacher, born at Baltimore, Md., May 13, 1816, removed to Philadelphia in youth, entered the ministry in 1839, but was twice compelled by ill-health to relinquish his chosen profession. He became a lawyer, and afterwards an editor in Elk co., Pa. In 1861 he became a captain and afterwards a major of Pennsylvania volunteers, served with great honor in Virginia and Tennessee, and was killed at the battle of Chattanooga, Oct. 29, 1863.

Boyle (Robert), a celebrated experimental philosopher, born at Lismore, in Ireland, Jan. 25, 1626, was the seventh son of Richard, the first earl of Cork. He was educated at Eton and Geneva. He took no part in political contests, but devoted himself to the cultivation of science, especially chemistry and natural philosophy. He became a resident of Oxford in 1654, and was one of the founders of the Royal Society. To qualify himself to defend the Christian religion, he learned the Hebrew and Greek languages. He improved the air-pump, and made important discoveries in pneumatics. Among his works are a "Disquisition on Final Causes," a "Discourse of Things above Reason," "Excellency of Theology," and "Hydrostatical Paradoxes." He declined a peerage which was offered to him repeatedly. He was remarkable for his benevolence and charity. By his last will he endowed the Boyle Lectures (which see). He died in London Dec. 30, 1691. His complete works were published by Dr. Birch in 5 vols. fol., 1744.

Boyle Lectures were so called from Robert Boyle, who bequeathed an annual salary to be paid to some clergyman for preaching eight sermons in a year in order "to prove the truth of the Christian religion against Atheists, Deists, Pagans, Jews, and Mohammedans, not descending to any controversies among Christians themselves." The first person selected to preach the "Boyle Lectures" was the celebrated Richard Bentley (1691), who directed his arguments against Atheism. In 1739 three volumes of the lectures were published, and nearly 60 volumes since then. The "Boyle Lectures" are still maintained.

Boyle's Law is a statement of the fact that "the volume of a gas is inversely as the pressure;" that is to say, if we double the pressure upon a gas we reduce its volume to one-half; if we make the pressure three times what it was at first, the bulk of the gas is reduced to one-third. More commonly called Mariotte's Law (which see).

Boylston (Zabdiel), F. R. S., an American physician, born at Brookline, Mass., in 1680, was the first who practised inoculation for the smallpox in America. Died Mar. 1, 1766.

Boyne, the most important river in the E. of Ireland, rises in the Bog of Allen, flows north-eastward through Kildare, King's county, Meath, and Louth, and enters the Irish Sea after a course of 65 miles. Many ruins of monasteries and castles occur on its banks. An obelisk 150 feet high, nearly three miles from Drogheda, commemorates the great battle of the Boyne, in which William III. defeated James II., July 1, 1690.

Boynton (Edward C.), born in Vermont, graduated at West Point in 1846. He entered the artillery, was severely wounded at Churubusco, and was brevetted captain; was assistant professor of chemistry, etc. at West Point (1848–55), professor of chemistry, etc. in the University of Mississippi (1856–61), and was brevetted major in 1865. He published a "History of West Point" (1863) and a "History of the U. S. Navy." Resigned Dec. 1, 1872.

Boynton (James Stoddard), born in Henry co., Ga., May 7, 1833, practised law; served as colonel in the late civil war; resumed the profession of the law; was elected to the legislature and became president of the Senate, which office he held at the death of Gov. Alexander H. Stephens, Mar. 4, 1883; became acting governor of Georgia Mar. 5, 1883. His successor, Henry D. McDaniel, was elected April 24, 1883, and inaugurated May 9, 1883.

Bozeman, a city, capital of Gallatin co., Mon. (see map of Montana, ref. 4–D, for location of county), is on Northern Pacific R. R. and an affluent of Gallatin Fork of Missouri River, 98 miles S. S. E. of Helena and 65 miles N. of Yellowstone National Park. It has several banks, and its coal-mines supply the Northern Pacific R. R. from Billings, Mon., to Portland, Or.—over 1200 miles. It is the centre of an agricultural community whose products for 1883 were valued at $1,000,000; has grazing and stock interests yielding over $500,000 annually, and gold and silver mining interests, $200,000 per annum. Pop. in 1870, 168; in 1880, 894; in 1885 (estimated), 3000.

W. W. Alderson, Ed. "Avant Courier."

Boz'rah, an ancient city of Idumæa (Edom), often mentioned in the Bible. (See Genesis xxxvi.: Isaiah xxxiv. and liii.) It was situated to the S. E. of the Dead Sea, about halfway between the latter and Petra. Its site is probably occupied by the modern *Buseireh*, a poor village consisting of about fifty wretched huts. No ancient ruins are visible.

Boz'zaris, or **Bot'zaris** (Marco), a famous Greek patriot, born at Suli, in Albania, about 1790. He enlisted in the French army about 1808, and served several campaigns. When the Greeks took arms against the Turks in 1820, Bozzaris became the leader of a band of Suliotes, and gained several victories. He defended Missolonghi against the Turks in 1822. Aug. 20, 1823, he attacked and defeated a superior force at Carpenisi, near the ground where the battle of Platæa was fought, but he was killed in the action.

Bra, a town of Italy, province of Cuneo, on the river Stura, 38 miles S. S. E. of Turin. It has manufactures of silk and metal-foundries; also a trade in grain, cattle, and wine. Pop. 9125.

Brabançons, a class of mercenary soldiers chiefly from Brabant, whence they took their name. They served principally in the armies of England and France from the eleventh to the thirteenth centuries. They had little discipline, and were not much better than robbers.

Brabant', a former duchy of the Low Countries. In the sixth century it was conquered by the Franks. During the Middle Ages it changed masters very often, until in the fifteenth century it came to the House of Habsburg. Charles V. left it to his son, Philip II., under whom the province revolted, but only the northern part succeeded in gaining its independence, and joined the Netherlands in 1648, while South Brabant remained with the Spanish-Austrian line until 1714, when it passed into the possession of the imperial line of Austria. It was conquered by the French in 1794, and divided into two provinces, and in 1810 Napoleon also conquered the Dutch part of Brabant. In the treaty of Paris of 1814 Brabant became a part of the Netherlands, and was divided into the provinces of North Brabant, Antwerp, and South Brabant. In consequence of the Belgian revolution of 1830, Antwerp and South Brabant came to Belgium, while North Brabant remained with Holland. The inhabitants in the N. are Dutch, in the centre, Flemish, and in the S., Walloons. The boundary-line between the Germanic and French idioms runs S. of Brussels, past the villages of Braine l'Alleud, Waterloo, Wavre, and Sodoigne.

Brabant, North, a province of Holland, is bounded on the N. by the river Meuse (or Maas), Holland, and Gelderland, on the E. by Limburg, on the S. by Belgium, and on the W. by Zeeland. Area, 1980 square miles. Capital, Bois-le-Duc. It is drained by the Dommel, the Aa, and the Lintel. The surface is flat; the soil is generally fertile. The province is deficient in minerals and timber. Many cattle and sheep are raised here. It has manufactures of cotton, linen, and woollen goods. Pop. in 1880, 466,497.

Brabant, South, a province of Belgium, is bounded on the N. by Antwerp, on the E. by Limburg and Liege, on the S. by Namur and Hainaut, and on the W. by East Flanders. The area is 1268 square miles. Capital, Brussels. The principal rivers are the Dyle, Demer, and Senne. The surface is partly hilly and partly level; the soil is generally fertile and highly cultivated. This province contains extensive forests, mines of iron, and quarries of stone. It is intersected by several railways and canals. It has important manufactures of cotton and woollen fabrics, fine lace, hats, leather, jewelry, fine linens, ribbons, paper, machinery, etc. This is one of the most densely peopled districts in Europe. Pop. in 1880, 985,274.

Brace (Charles Loring), an American philanthropist and writer, born at Litchfield, Conn., June 19, 1826, graduated at Yale in 1846. Having travelled in Europe, he published "Hungary in 1851," "Home-Life in Germany" (1853), "Norse Folk," "Races of the Old World" (1863), "Gesta Christi" (1882), and other works. He was the principal founder of the Children's Aid Society of New York, which has placed 60,000 homeless children in rural homes.

Brace (Julia), a blind deaf-mute, was born near Hartford, Conn., in 1806. When she was four years old she lost by sickness both sight and hearing, and not long after forgot all the words she had previously learned. (See notice of her in Dunglison's "Physiology," vol. ii. p. 160.)

Bracelet [from *bras* (Lat. *brachium*), an "arm"], an ornament worn around the arm at or near the wrist. These ornaments have been worn by every nation, savage or civilized, from the earliest ages. They are mentioned in Genesis as worn by both women and men. The Medes and Persians were remarkable for their love of gold ornaments and jewelry. They wore bracelets, armlets, earrings, and pearl necklaces. The ancient Greek ladies wore bracelets and armlets of various materials and forms.

Bra'chial [from the Lat. *brachium*, the "arm"] **Ar'tery,** the main artery of the arm; a continuation of the axillary, as the latter is of the subclavian trunk. The brachial vessel lies upon the inside of the *humerus* or arm-bone, just back of the biceps muscle; near the elbow it passes forward and divides into the radial and ulnar arteries. Before this, it gives off four smaller branches. The position of the brachial artery makes it quite practicable to compress it firmly against the bone in case of serious bleeding from a wound of the arm, fore arm, or hand.

Brachiop'oda (plu.), [from the Gr. βραχίων, the "arm," and πούς, ποδός, the "foot," alluding to their two long fringed and coiled arms], or **Palliobranchia'ta,** a class of marine bivalve, molluscoid organisms which have symmetrical dorsal and ventral valves; the former of which (according to the general opinion of observers) is usually much the smaller, being free and imperforate, but according to E. S. Morse the so-called dorsal valve is really ventral. The valves articulate by two curved teeth developed from the border of the larger valve. Brachiopods are among the most ancient of fossil organisms, the *Lingula* being found from the Cambrian to the existing fauna. Brachiopods have also the greatest range of climate and depth. Morse considers them closely related to Vermes.

Brachis'tochrone [from the Gr. βράχιστος, "shortest," and χρόνος, "time"], the plane curve down which a material particle must fall in order to pass in the shortest possible time from the upper to the lower of two given points not in the same vertical line. It is the common cycloid. The problem of the brachistochrone is celebrated in the history of mathematics. It was first proposed by John Bernoulli in 1696, and was solved by Sir Isaac Newton and James Bernoulli. It is often called "the curve of quickest descent."

Brach'vogel (Emil Albert), a German novelist and dramatist, born at Breslau April 29, 1824. Among his principal works are the novels entitled "A New Falstaff" (1862), "Beaumarchais" (1864), "The German Michael" (1868), and "Narcissus," a drama. D. Nov. 27, 1878.

Brachycephalic. See Dolichocephalic.

Brachyp'teræ, or **Brachypteres** [from the Gr. βραχύς, "short," and πτερόν, a "wing"], that section of the web-footed birds in which the wings are so short and the feet so far back as to compel the birds to assume an erect posture when on land. They are aquatic, and excel in diving, so that the name divers is sometimes used as equivalent to Brachypteræ; but that name is also frequently applied to other birds, especially to the genus *Colymbus*. The auks, puffins, penguins, grebes, and guillemots are among the Brachypteræ.

Brachyu'ra [from the Gr. βραχύς, "short," and οὐρά, a "tail"], a tribe of decapodous crustaceans which takes its name from the post-abdominal segment, which is short and folded beneath the trunk. (See Crab.)

Brack'enridge (Henry M.), a judge and writer, born at Pittsburg, Pa., May 11, 1786. He held judgeships in Louisiana and Florida, and was U. S. commissioner to the South American republics (1817–19). Among his numerous writings are a "Voyage to South America" (1820) and "Recollections of Persons and Places in the West" (second edition, 1869). He was elected to Congress from Pennsylvania in 1840. Died Jan. 18, 1871.

Brackenridge (Hugh Henry), the father of the preceding, was born in Scotland in 1748. He emigrated to the U. S. in childhood, graduated at Princeton in 1771, and became a judge of the supreme court of Pennsylvania in 1799. He wrote a satirical work called "Modern Chivalry, or Adventures of Captain Farrago" (1792). Died June 25, 1816.

Brack'et. The term bracket is applied to a piece of wood or metal employed to support a shelf or gallery. Also one of two marks [ ] used in printing to enclose a word, remark, explanation, etc. When a word in a classical work is included in brackets it implies that the word so enclosed does not properly belong to the original text, but has been either introduced by a mistake of the copyist, or has been inserted to supply an omission, correction, or explanation.

Brack'ett (Albert Gallatin), an American officer, born in Cherry Valley, N. Y., Feb. 14, 1829. He served during the Mexican war as first lieutenant Fourth Indiana Volunteers, appointed captain Second U. S. Cavalry Mar., 1855, engaged principally on frontier duty and against hostile Indians in Texas prior to 1861, when, on Twiggs's surrender, he effected his escape, and was in command of cavalry at Blackburn's Ford, Va., July 18, 1861, commissioned colonel Ninth Illinois Volunteer Cavalry Aug., 1861, and served during the civil war in the Western and Southwestern armies. He was promoted to be major First Cavalry U. S. A. July 17, 1862, lieutenant-colonel Second Cavalry June 9, 1868, colonel Third Cavalry Mar. 20, 1879. Since the close of the war he has been in command of various departments, and actively engaged in operating against hostile Indians. He is author of "Lane's Brigade in Mexico" and "History of the U. S. Cavalry."

G. C. Simmons.

Brackett (Edwin E.), an American sculptor, born at Vassalborough, Me., Oct. 1, 1819. His works are principally portrait-busts.

Brackett (Walter M.), a brother of the preceding, born at Unity, Me., June 14, 1823. He has won a high reputation as a painter. His specialty is the painting of fish.

Brack'ettville, capital of Kinney co., Tex. (see map of Texas, ref. 5–F, for location of county), is in the S. W. part of the State, about 30 miles from the Rio Grande. Pop. in 1870, 232; in 1880, 1126.

Brack'lesham Beds, a group of fossiliferous strata, in the middle eocene formation, overlying the London clay series, in England. On the coast of Hampshire they are 500 feet thick.

Bract [from the Lat. *bractea*, a "thin plate"], a floral leaf or an altered leaf, placed at the base of a flower on the outside of the calyx. It is a leaf from the axil of which a flower or floral axis is produced, instead of an ordinary leaf-bud or branch, and is regarded as the first attempt made by the leaves to change into floral organs. The bract is sometimes large and brightly colored. In several species of *Arum* it constitutes the large enveloping-leaf called a spathe. An involucre is a collection of bracts arranged in a whorl.

Brac'ton, de (Henry), a distinguished English jurist and writer on law, lived during the reign of Henry III. His principal work, entitled "De Consuetudinibus et Legibus Angliæ," is a complete treatise on jurisprudence and legislation. He was an arch-deacon (1263–64), and a judge in eyre in 1265. Died probably in 1267.

Brad'burn (Samuel), the son of a soldier, was born at Gibraltar Oct. 5, 1751. He became a local Wesleyan preacher at Chester, England, in 1773, and an itinerant in 1784. He was very eloquent, and was throughout his life extremely popular and influential. Died July 24, 1816.

Brad'bury (William B.), composer of sacred music, born at York, Me., in 1816, and residing from 1836 till his death (Jan. 7, 1868) in or near New York. He published (sometimes in conjunction with other authors) numerous books for the use of choirs and Sunday-schools, the most celebrated of which are "The Shawm," "The Jubilee," "The Temple Choir," "The Cantata of Esther," "The Golden Chain," and "Fresh Laurels."

Braddock, Pa. See Appendix.

Braddock (Edward), an English general, born about 1715. He commanded in a war against the French and Indians in North America. As he was marching to attack Fort Duquesne he was surprised by the Indians near Pittsburg, and was defeated and mortally wounded. Died July 13, 1755.

Brad'don (Mary Elizabeth), a popular English novelist, born in London in 1837. Among her works are "Lady Audley's Secret" (1862), "Aurora Floyd," "Eleanor's Victory," "Henry Dunbar," and "Rupert Godwin."

Brad'ford, an important manufacturing town of England, in the West Riding of Yorkshire, is on a small branch of the Aire and on the Leeds Railway, 9 miles by rail W. of Leeds. It is situated at the meeting of three vales, and is built of stone. It returns two members to Parliament. Among the principal buildings are a handsome exchange, an elegant public hall, the parish church, erected in the reign of Henry VI., and a cloth-hall. The Saltaire alpaca and mohair mills, which are three miles from Bradford, are said to be the most splendid manufactories in England. Bradford is the chief seat in England of the manufacture of worsted fabrics, alpaca, mohair, etc. Broadcloths and cotton goods are also made here. Mines of coal and iron are worked in this vicinity. Baptist, independent, and Wesleyan colleges are near this city. Pop. in 1881, 180,459.

Bradford, R. R. junction, Essex co., Mass. (see map of Massachusetts, ref. 1-I, for location of county), on the S. bank of the Merrimack River, 32 miles N. of Boston. A bridge 680 feet in length and a viaduct for the railroad across the river connect it with Haverhill. It is the seat of Bradford Female Academy. Pop. of township in 1870, 2014; in 1880, 2643; in 1885, 3106.

Bradford, city and R. R. centre, McKean co., Pa. (see map of Pennsylvania, ref. 2–D, for location of county), is the centre of a petroleum region. Pop. in 1880, 9197.

Bradford, Bradford township, Orange co., Vt. (see map of Vermont, ref. 5–C, for location of county), on R. R. and the Connecticut River, 29 miles S. E. of Montpelier. It has an academy and manufactures of paper, casks, sash and blinds, machinery, woollen goods, etc. Pop. of township in 1870, 1492; in 1880, 1520.

Bradford (Rev. Alden), LL.D., was born in Duxbury, Mass., Nov. 19, 1765, and graduated at Harvard in 1786, and was a tutor there 1791–93; was successively a Congregational minister in Wiscasset (now in Maine), a clerk of the Massachusetts supreme court, a bookseller, secretary of State for Massachusetts (1812–24), and a journalist. He published numerous historical, biographical, and antiquarian books and papers. Died Oct. 26, 1843.

Bradford (Alexander Warfield), LL.D., born in Albany, N. Y., in 1815, graduated at Union College, became a prominent lawyer of New York, being especially well versed in the civil law. He was surrogate of New York 1848–51, and for a time one of the editors of the "Protestant Churchman." He published "American Antiquities" (1841) and several other volumes, mostly of legal reports. Died Nov. 5, 1867.

Bradford (Augustus W.), born in Maryland about 1805, studied law, and entered politics as a Whig. He was a firm Unionist; was a delegate to the Peace Congress 1861, and was chosen governor of Maryland, holding the office until 1866. He was largely influential in securing the new constitution of Maryland (1864), by which slavery was abolished. In July, 1864, his house was burned by Confederate raiders. He was surveyor of Baltimore under President Johnson, and declined a position in the custom-house offered to him by President Grant. Died Mar. 1, 1881.

Bradford, Earls of, and Viscounts Newport (1815, in the United Kingdom), Barons Bradford (1794, in Great Britain), and baronets (1660), a prominent family of Great Britain.—Orlando George Charles Bridgeman, the third earl, was born April 24, 1819, and succeeded his father in 1865. He was member of Parliament for South Shropshire 1842–65.

Bradford (John), an English Protestant martyr and a popular preacher, was born at Manchester about 1500. He became a chaplain to Edward VI., and after the accession of Mary was burned at the stake July 1, 1555. (See William Stevens, "Life of John Bradford," 1832.)

Bradford (Joseph M.), U. S. N., born Nov. 4, 1824, in Sumner co., Tenn., entered the navy as a midshipman Jan. 10, 1840, became a passed midshipman in 1846, a lieutenant in 1855, a lieutenant-commander in 1862, a commander in 1866, and a captain in 1871. From Nov., 1863, to June, 1865, he served as fleet-captain of the South Atlantic blockading squadron, during which period he was frequently in battle. Rear-Admiral Dahlgren, in his "general order" of June 16, 1865, speaking of the services of the officers of his staff, says: "First is Fleet-Captain Joseph M. Bradford. Perhaps no one but a commander-in-chief can rightly understand the many and never-ceasing cares imposed by the proper discharge of the duties of this office, especially in war and in a command so large as this has been, to say nothing of the abnegation of all opportunity of personal distinction which such a position demands. I shall never think but with great pleasure and satisfaction of the excellent service which this gentleman has rendered, and the never-failing energy and ability with which he has discharged his many onerous duties." Died at Norfolk, Va., April 14, 1872. FOXHALL A. PARKER.

Bradford (WILLIAM), one of the Pilgrim Fathers, was born in Yorkshire, England, in Mar., 1588. He emigrated to New England in the Mayflower in 1620, and was elected governor of Plymouth Colony in 1621. Having been re-elected annually, he held the office till his death except five years, when he declined the election. A patent or charter for the colony was granted in 1630 to William Bradford, his heirs and associates. Died May 9, 1657. He left a "History of Plymouth Colony," which was printed in 1856.

Bradford (WILLIAM), an American lawyer, born in Philadelphia Sept. 14, 1755, graduated at Princeton in 1772, served as an officer in the war of the Revolution. He was appointed attorney-general of the U. S. by Washington in 1794. Died Aug. 23, 1795.

Bradford (WILLIAM), a distinguished American painter, born in 1827 at New Bedford, Mass. His best pictures are scenes from the Northern Atlantic coast. He was formerly a merchant of Fairhaven, Mass. He is of Quaker stock, and became a resident of New York City.

Bradford (WILLIAM H.), a Presbyterian minister and journalist, was born in Aug., 1814, at Cooperstown, N. Y., studied law, and afterwards theology. After serving two years as pastor of a church at Berkshire, N. Y., he became assistant editor of the "New York Evangelist," acting a part of the time as its sole editor. Here he remained seventeen years. He was an accomplished writer and scholar. Died April 1, 1861.

Bradford Clay, the middle member of the upper division of the lower oolite, occurring at Bradford, near Bath, England. It extends only a few miles, and is never more than fifty or sixty feet thick. It is remarkable for the abundance of a peculiar fossil, the *Apiocrinites Parkinsonii*. The surface of the calcareous rock on which the clay rests is encrusted with a pavement formed by the bases of this crinoid.

Bradford, Great, a market-town of England, in the county of Wilts, on the river Avon, and on the Kennet and Avon Canal, 10 miles by rail E. S. E. of Bath. It has a fine old church, and manufactures of broadcloth, kerseymeres, and india-rubber goods. Pop. in 1881, 4935.

Brad'ish (LUTHER), LL.D., was born in Cummington, Mass., Sept. 15, 1783, and graduated at Williams in 1804. He studied law, and was employed as a government agent in affairs relating to Levantine commerce. He settled in Franklin co., N. Y., became prominent in State politics, was lieutenant-governor (1829–43), and under Fillmore was assistant U. S. treasurer at New York. He was prominent in religious, educational, and other charitable and benevolent enterprises. Died Aug. 30, 1863.

Brad'laugh (CHARLES), an eminent English atheist and republican, was born in Hoxton, London, Sept. 26, 1833. Owing to the extreme poverty of his parents, he ceased attending school before he was eleven years old. He developed an early taste for politics, for at the age of fifteen he appeared as an orator before street audiences during the political turmoils of 1847–48. The origin of his atheistical opinions dates from the same period. Studying to fit himself for a Sunday-school exhibition before the bishop of London, he became skeptical, and declared his inability to reconcile the Thirty-nine Articles with the Four Gospels. His father, influenced by the clergy, gave him three days in which to alter his opinions, on penalty of losing his situation. He accepted the penalty, and quitted the situation and his home for ever. For a year he earned an inadequate support by selling coals on commission, and then, becoming slightly involved in debt, he enlisted in the service of the East India Company, where he remained until a small legacy enabled him to purchase his discharge. He now secured a clerkship in a solicitor's office in London, and entered at once upon his life-career of a political and atheistical writer and speaker. In 1858–59, he gained considerable notoriety by editing a journal called the "Investigator," which was soon suspended for want of capital. He was now well known under the appropriate name of "Iconoclast," which he signed to all of his writings, and was met with the fiercest opposition on all sides. A year later the journal which he now edits, the "National Reformer," was established, and in the conduct of this his reputation for ability was greatly increased. By persistently attacking every opponent he could reach with his voice or pen, his fame as a debater and popular orator steadily grew until he reached the high position of political power which he now occupies. Systematic attempts were made to suppress his journal, but their only effect was to increase its circulation. His sympathies for the oppressed were not confined to his own country. When Italy was fighting for freedom he raised by his own exertions one hundred guineas and sent them to Garibaldi. He visited Ireland, conferred with the advocates of "home rule," and raised his voice in their justification. In 1868 he was a candidate for Parliament in Northampton, and after a canvass of extraordinary excitement with five opponents he succeeded in polling 1086 votes in a constituency of over 9300. In the following year an attempt was made by the Gladstone ministry to suppress his journal because he refused to have it licensed. He argued his own case, and won a brilliant victory. Since then he has pursued his course unmolested. The "Reformer" claims a circulation of 7000. Like himself, in politics it is republican, in religion atheistic, in social economy Malthusian, after the standard of the late John Stuart Mill. Mr. Bradlaugh's republicanism is simply an advanced type of that to which thousands of his countrymen are irresistibly advancing. It assumes that the "right to deal with the throne is inalienably vested in the English people, to be exercised by them through their representatives in Parliament;" argues that the House of Brunswick occupies it only from the acts of Settlement and Union, and seeks the repeal of those acts after the abdication or demise of the present monarch. It aspires to a commonwealth after the American model, to be attained as peaceably as possible. Mr. Bradlaugh's personal popularity is very great. Sir Charles Dilke said of him in 1873 that he had the largest personal following of any man in England. In the autumn of 1873, Mr. Bradlaugh visited the U. S., and delivered lectures in most of the prominent cities. His reception in all cases was hearty and cordial—notably so in New York and Boston. At his lecture in the latter city Wendell Phillips presided, and introduced him to an immense audience, and Charles Sumner and William Lloyd Garrison sat upon the platform. His subjects were "Republicanism in England," "The Irish Question," and "English Workingmen." Elected to Parliament in 1880, he was refused admittance because, as an atheist, he could not take the oath. After much haggling, he finally cut short the affair by applying for the "stewardship of Her Majesty's Chiltern Hundreds," the common means by which an English citizen rids himself of the duty of representing an electoral district.

J. B. BISHOP, *of the "N. Y. Tribune."*

Brad'lee (CALEB DAVIS), a Unitarian minister and author, born at Boston, Mass., Feb. 24, 1831, graduated at Harvard in 1852, was pastor of the Allen street church, Cambridge, Mass., 1854–57, and became in 1864 pastor of the church of the Good Samaritan in Boston. He has published occasional sermons and many contributions to periodical literature, and is a member of various literary and historical associations.

Bradley (EDWARD), better known as "Cuthbert Bede," an Englist novelist and humorist, born in 1827, was educated at Durham University, entered the Anglican ministry, and received a number of church preferments. He is the author of many volumes of prose and verse, chiefly novels, of which his first venture, "Verdant Green," is the best known. He has contributed largely to periodical literature.

Bradley (JAMES), D.D., F. R. S., an eminent English astronomer, born at Sherborne, in Gloucestershire, in 1692, excelled as an observer and as a theorist. He graduated at Oxford, was ordained as a priest, and obtained several livings, but resigned them when he became Savilian professor of astronomy at Oxford in 1721. In 1727 he announced the important discovery of the aberration of light, which serves to demonstrate the earth's motion around the sun. In 1741 he was appointed astronomer-royal, and began to make observations at Greenwich. His next discovery was that the inclination of the earth's axis to the ecliptic is not constant, a fact which explained the precession of the equinoxes and the nutation of the earth's axis. This discovery forms an important epoch in astronomy. He died July 13, 1762, leaving in manuscript thirteen volumes of observations, which were published in 1798–1805. (See "Biographia Britannica.")

Bradley (JOSEPH P.), LL.D., associate justice of the U. S. Supreme Court, was born at Berne, Albany co., N. Y., Mar. 14, 1813, graduated at Rutgers College, New Brunswick, N. J., with honors, in 1836, was admitted to the bar in 1839 at Newark, N. J., where he has since resided. He married in 1844 a daughter of Chief-Justice Hornblower. Besides his labors in every branch of his profession, he has devoted much attention to mathematics and the study of law as a science, extending his researches to the civil law —researches which have been of great service in his judicial duties in Louisiana and Texas. Engaged in many important causes in the State and U. S. courts, he has never taken a very active part in politics. He was formerly a Whig, warmly sustained the national cause in the civil war, headed the electoral ticket for Grant in 1868, and has ranked as a moderate Republican. He was appointed to the bench of the U. S. Supreme Court Mar. 21, 1870. He received the degree of LL.D. from Lafayette College in 1859.

Bradley (JOSHUA), a Baptist minister and educator, was born July 5, 1773, at Randolph, Mass., and graduated at Brown University in 1799. He was ordained at Newport, R. I., in 1801. Mr. Bradley became a kind of traveling missionary, chiefly in the Western States, residing for short times at many places, and establishing great numbers of churches, schools, and colleges. He died at St. Paul, Minn., in 1855.

Bradley (STEPHEN ROW), LL.D., born at Wallingford, Conn., Oct. 20, 1754, graduated at Yale in 1775, and served as an officer of the Revolutionary war for some time. In 1779 he removed to Vermont, where he was an able and active public officer, representing that State in the U. S. Senate (1791–95, 1801–13). He possessed marked ability, but was eccentric in his manners. He was a friend of Ethan Allen. Died at Walpole, N. H., Dec. 16, 1830.

Bradley (WILLIAM CZAR), LL.D., a son of S. R. Bradley (an able lawyer of Vermont), was born at Westminster, Vt., Mar. 23, 1782, and graduated at Yale. He was elected to Congress in 1813, 1817, 1823, and 1825, and held several other important offices. Died Mar. 3, 1867.

Bradshaw (JOHN), the most prominent of the famous English regicides. He was born in Cheshire, probably in 1602, became in 1627 a barrister, chief-justice of Chester in 1647, a commissioner of the great seal in 1646, sergeant-at-law in 1648, and was in 1649 president of the High Court which condemned Charles I. He conducted that cause with unfeeling sternness and severity, but with dignity, and probably with a conscientious desire to do justice to the king and the country. He afterwards opposed Cromwell's ambitious designs, and was removed from his chief-justiceship, but still later held various important positions. He died in 1659. At the Restoration his body was exhumed from Westminster Abbey, gibbeted, and then beheaded.

Brad'street (ANNE), wife of Gov. Simon Bradstreet, and daughter of Gov. Thomas Dudley, was born in England in 1612. She published a volume of poems, which won her the titles of "the tenth muse" and "the morning star of American poetry." These poems and her other writings have been several times reprinted (the last and best edition in 1867), and some of them are not without merit. Died Sept. 16, 1672.

Bradstreet (JOHN), a major-general in the British army, was born in 1711, and died at New York City Sept. 25, 1774. When a young man, he came to America and entered the colonial army. In 1745, as lieutenant-colonel in Pepperell's (York, Me.) regiment, he figured prominently in the expedition against Louisburg. In the fall of the same year he was made a captain in the regular army, and on Sept. 16, 1746 was appointed lieutenant-governor of St. John's, Newfoundland. He subsequently filled important positions in the wars against the French and the Indians. Was commissioned a major-general in 1762.

Bradstreet (SIMON), colonial governor of Massachusetts, was born at Horbling, Lincolnshire, England, in 1603. He studied at Cambridge, and was for a time the steward of the countess of Warwick. He came to Salem, Mass., in 1630, as an assistant judge, was one of the founders of Cambridge and Andover, and resided also at Ipswich and Boston. Besides holding other important positions, he was governor (1679–86 and 1689–92). Died Mar. 27, 1697.

Brad'wardine (THOMAS), a distinguished English prelate and scholastic theologian, called THE PROFOUND DOCTOR, was born in 1290. He became confessor to Edward III., and afterwards archbishop of Canterbury. His principal work, "De causa Dei adversus Pelagium," is a masterly argument for the doctrine of Augustine. He was an able mathematician of Oxford University. Died Aug. 26, 1349, of the plague.

Brady, capital of McCulloch co., Tex. (see map of Texas, ref. 3–G, for location of county). Pop. in 1880, 115.

Brady (HUGH), an American general, born in Northumberland co., Pa., in 1768. He served under Wayne in 1792, and won distinction by his bravery at the battle of Chippewa, 1812. He was a relative of Capt. Samuel Brady, a famous Indian fighter. Died April 15, 1851.

Brady (JAMES TOPHAM), an American lawyer and politician, born in New York City April 9, 1815, was a prominent leader of the "War Democrats" during the civil war. He held a very high position as a lawyer, and was greatly beloved in private life. His literary tastes were fine and well cultivated. Died Feb. 9, 1869.

Brady (NICHOLAS), D. D., born at Bandon, Ireland, Oct. 28, 1659, was educated at Oxford and Dublin, sided with King William against James II., and in consequence was made chaplain to the king. He received several English church preferments, but is best known for his share in the metrical version of the Psalms, which he made in conjunction with Nahum Tate (1652–1715), the poet-laureate. Tate and Brady's Psalms, though justly ridiculed for their clumsiness, quaintness, and bombast, have some noble passages. Brady also published a "Translation of the Æneid" (4 vols., 8vo, 1726). He died May 20, 1726.

Brady (WILLIAM MAZIERE), D. D., was born in Dublin, Ireland, in 1825, of a prominent family, and graduated at Trinity College with honor. Entering the Irish State Church, he received lucrative appointments, which he hazarded, and in part lost, by his many bold and able attacks upon the Church establishment to which he himself belonged. He was one of the foremost leaders of the movement which resulted in the disestablishment of the Irish Church. He is the author of several works, chiefly upon the ecclesiastical history and antiquities of Ireland and Great Britain, and has written a learned work on "The Episcopal Succession in England, Scotland, and Ireland," the third volume of which was published at Rome in 1877.

Bra'ga (anc. *Bracara Augusta*), a town of Portugal, capital of the province of Minho, is on an eminence near the river Cavado, 39 miles N. N. E. of Oporto. It is the seat of an archbishop. It has a fine Gothic cathedral and a college. Braga is enclosed by old walls and defended by a castle. Here are manufactures of linen, cutlery, firearms, jewelry, etc. It is a very ancient town, and has ruins of a Roman temple and amphitheatre. It was the capital of Lusitania after the latter had been conquered by the Suevi. Its archbishop is titular primate of Portugal. Church councils were held at Braga in 563, 572, and 672 A. D. Pop. 20,258.

Bragan'za, a fortified town of Portugal, province of Tras-os-Montes, situated on a small stream 35 miles N. W. of Mirandi. It has a citadel, a college, and a castle partly ruined, which was the seat of the dukes of Braganza. It is the seat of a Catholic bishop. The name of the reigning family of Portugal and Brazil, the House of Braganza, is derived from this town. It has manufactures of velvet and other silk fabrics. Pop. 5495.

Braganza, or **Caite',** a seaport-town of Brazil, province of Pará, on the river Caite, near its mouth, 106 miles E. N. E. of Pará. It has a trade in sugar.

Bragan'za, or **Bragança,** the name of the royal family of Portugal and the imperial family of Brazil, which is descended from Affonso, duke of Braganza, a natural son of John I., king of Portugal. He died in 1461. The first member of this family that became king of Portugal was the eighth duke, who began to reign as John IV. in 1640. The first emperor of Brazil was Dom Pedro I., the eldest son of King John VI.

Brag'don (C. P.), a distinguished Methodist Episcopal preacher, was born at Acton, Me., Sept. 9, 1808, entered the ministry in 1834, and labored with great zeal and success in Maine, New York State, and Illinois. He was distinguished for the power and effectiveness of his preaching. Died at Evanston, Ill., Jan. 8, 1861.

Bragdon (EDMUND ERASTUS EASTMAN), D. D., an eminent Methodist Episcopal divine and educator, was born at Acton, Me., Dec. 8, 1812, and graduated at the Wesleyan University, Middletown, Conn., in 1841. With the exception of three years in the pastorate, one year of which was in New York City, his life was devoted to the cause of education. He held professorships of ancient languages in the Ohio University, Athens, O., in the Indiana Asbury University at Greencastle, and in Genesee College, Lima, N. Y. He was a faithful and successful instructor, and a man of devout life. Died Mar. 20, 1862.

Bragg (BRAXTON), an American officer, born in 1817 in Warren co., N. C., graduated at West Point in 1837, and became captain June 18, 1846, in the Third Artillery. Served at seaboard posts 1837–45, in Florida war 1837–38 and 1838–42, in removing Cherokees to the West 1838, in military occupation of Texas 1845–46, in war with Mexico 1846–48, engaged at Fort Brown (brevet captain), Monterey (brevet major), and Buena Vista (brevet lieutenant-colonel), and on frontier duty 1849–55. On his resignation, Jan. 3, 1856, he became sugar-planter at Thibodeaux, La., 1856–61, and commissioner of public works for Louisiana

1859–61. In the civil war he was in command of the forces of the Southern army at Pensacola operating against Fort Pickens 1861, of Second Corps at Shiloh 1862, being promoted to general on the death of Gen. A. S. Johnston; movement against Buell to Kentucky 1862, from which he was compelled to retire after defeat at Perrysville; after a brief arrest opposed Rosecrans at Chickamauga 1863, relieved from command Dec. 2, 1863, for loss of Mission Ridge, and led a small force from North Carolina to Georgia in 1864. Became chief engineer of improvements in Mobile harbor. Died Sept. 27, 1876.

George W. Cullum.

Bragg (John) was a brother of Braxton and Thomas Bragg. In 1836 he settled in Mobile, Ala. In 1842 he was appointed judge of the tenth circuit, and in 1851 he was elected to Congress. He served but one term, then retiring from public employments to take care of his large planting interests.

Bragg (Thomas), a brother of Braxton Bragg, born at Warrenton, N. C., Nov. 9, 1810, was admitted to the bar in 1831, was governor of North Carolina 1854–58, U. S. Senator 1859–61, and attorney-general in Jefferson Davis's cabinet 1861–63. Died Jan. 21, 1872.

Bra'gi, written also **Braga** and **Brage** [derivation very uncertain], in Scandinavian mythology, a son of Odin, was the god of eloquence and poetry. He is represented as an old man with a long beard. His wife Iduna keeps the apples of immortality, which bestow immortal youth on those that partake of them. This myth probably has allusion to the power of poetry to confer immortality. (See Thorpe, "Northern Mythology," vol. i.; Keyser, "Religion of the Northmen.")

Bra'he (Tycho), the celebrated Danish astronomer, was born in 1546 at Knudstrup, in Skaane, which at that time was a province of Denmark. The king, Frederic II., gave him the island of Huena, where he built the finest observatory (Uranienborg) which ever had been erected in Europe. He enriched the science of astronomy very much, partly by his very numerous observations, partly by inventing new instruments. He formed a catalogue of 777 stars, increased by his pupil, Kepler, to 1000 from the records which he left behind, and his recorded observations of the planet Mars furnished to the same distinguished successor the material from which he deduced his famous "Laws." He entered the University of Copenhagen in 1559, and was destined for the law, but his attention was diverted to astronomy by the eclipse of the sun in Aug., 1560. In 1562 he was sent to Leipsic to pursue his studies. An uncle who died in 1565 left him an estate. Having passed several years in Augsburg, he returned to his native country in 1570. He rejected the Copernican system, which in his time was not supported by the conclusive evidence we now have in its favor. In fact, Tycho's theory, which made the sun move round the earth, and all the other planets round the sun, explained all the phenomena then known equally well with that of Copernicus. After the death of his royal patron in 1588, he was first neglected, and then so persecuted by the court that he emigrated to Germany in 1597, and was induced by the emperor Rudolph to settle at Prague, where he died Oct. 13, 1601. He published, besides other works, "Astronomiæ Instauratæ Progymnasmata" (1587–89). "As a practical astronomer," says Sir David Brewster, "Tycho has not been surpassed by any observer of ancient or modern times. The splendor and number of his instruments, the ingenuity which he exhibited in inventing new ones, and his skill and assiduity as an observer, have given a character to his labors and a value to his observations which will be appreciated to the latest posterity."

Brahilof', or **Braïloff'** [Turk. *Ibraila*], a fortified town of Wallachia, on the left bank of the Danube, about 100 miles from its mouth and 102 miles N. E. of Bucharest. Large quantities of grain and other produce are shipped at this place, which is the chief port of Wallachia. Pop. 15,767.

Brăhm, written also **Brahme** (but pronounced in one syllable), in the Hindoo mythology, the name of the eternal, self-existent Spirit, whom Manu describes as follows: "He whom the mind alone can perceive, whose essence eludes the external organs, who has no visible parts, who exists from eternity—even He, the soul of all beings, whom no being can comprehend." His image is the external universe. His attributes or powers took a personal form in Brahma, Vishnu, and Siva (which see). "Of that infinite, incomprehensible, self-existent Spirit no representation is made, to his direct and immediate honor no temples rise; nor dare a Hindoo address to him the effusions of his soul, otherwise than by the mediation of a personified attribute, or through the intervention of a priest." (Moor's "Hindu Pantheon.") The Hindoos make no images of Brahm, but the devout Brahmans meditate with silent and unspeakable awe on his mysterious attributes.

Brăh'mâ, a Sanscrit term which literally signifies "worship" or "prayer," but now used as the name of one of the great Hindoo deities, called the "Creator," but who is in fact the personification of the creative power of Brahm (which see). Brahma, though regarded as the first of the gods, is much less worshipped by the Hindoos than either Vishnu or Siva. The votaries of the last-named gods are stimulated by hope and fear. (See Vishnu and Siva.) But the votaries of Brahma may be said to be actuated only by the feeble principle of gratitude. Accordingly, there are no temples and no rites exclusively dedicated to Brahma, though his images are occasionally found in the temples of the other gods. The all-producing earth being the most remarkable of the external types of creation, earth is taken as the symbol of Brahma, as water is the symbol of Vishnu, and fire that of Siva. The pictures of Brahma are commonly of a reddish hue, this being the usual color of the earth. Viewed in another relation, Brahma represents matter, while Vishnu represents spirit, and Siva time. (See Moor, "Hindu Pantheon.")

Brah'manism, the name given to the religious system founded by the Brahmans of India. Scarcely any trace of Brahmanism is discoverable in the Vêdas, the oldest writings of the Hindoos. We first find it developed in a work of somewhat uncertain date entitled the "Institutes of Manu" (or Menu), which was probably composed between 600 and 900 years before the Christian era. The deities of the Vêdas are such as would naturally have been suggested by the phenomena or objects of external nature, such, for example, as the heavens, called Varuna (Uranus), Mitra, the Sun, Fire (Agni, Ignis), and so on. The greatest and most powerful of the Vêdic divinities is Indra (perhaps allied to the Latin *imber*), the god of the atmosphere, of clouds, and of storms, and hence the Thunderer, corresponding in this respect to the Jupiter of the classic, and to Thor of the Northern, mythology. But in the Brahmanical system all these deities of nature retire into the background, and are replaced by the great gods (the *Dii majores*), such as Brahma, Vishnu, and Siva, with their consorts (*saktis*), their various avatars, etc.

In the primitive ages the head of each family among the Aryas (see Arya) appears to have acted as priest, sacrificing to the gods in his own name; but as the people receded from their primitive simplicity, they employed professional priests, who were believed to understand the wishes of the gods, and to know how their favor could best be propitiated. Having thus become a necessary element in the community, the priestly class soon established themselves as the dominant power in the state; and in order to secure the position which they had thus acquired, they founded the distinctions of Caste (which see).

The doctrine of "emanation," as it is called—with its associated doctrine of transmigration—may be said to form the philosophical basis of the Brahmanical system. According to this doctrine, Brahm (which see) is the centre and source of all the various beings of the universe, these being nothing more than emanations from him; and as He is the source whence all things have been evolved, so all things will ultimately return to him, and be absorbed into the essence of the Self-existent. This final absorption is regarded by the Hindoo as his salvation. His aversion to activity or excitement makes the notion of complete repose necessary to his ideal of perfect felicity. Hence the final aim of all the efforts of the devout Hindoo is to bring his transmigrations to an end, that his individual existence may cease, and his soul be completely swallowed up in Brahm. The same general doctrine, with some modifications, forms also the basis of Booddhism.

One of the most remarkable features of the Brahmanical system is the great importance which it attaches to the performance of penance and prayer. According to the Christian and Hebrew Scriptures, prayer and sacrifice are of no avail if they are not acceptable to God. But the Brahmans teach that persevering prayer, if made in due form, though prompted by the most unworthy motives, can, especially when it is combined with penance and sacrifice, compel the gods to accede to the wishes of the suppliant. (See Moor, "Hindu Pantheon;" Prof. H. H. Wilson, "Essays on the Religion of the Hindus;" "Institutes of Menu," translated by Sir W. Jones.)

J. Thomas.

Brahmapoo'tra, written also **Burrampooter** (anc. *Dyardanes* or *Œdanes*), a great river of Asia, rises in Thibet, on the N. side of the Himalaya Mountains. It flows nearly eastward to the E. extremity of Bootan, thence turns southward, and breaks through the Himalayas into Assam. Its general direction is nearly W. S. W. until it passes through Assam and enters Bengal. It flows southward through Bengal, and enters the Bay of Bengal close to the mouth of the Ganges. It is connected with the Ganges not only by a common delta, but by a large branch or channel called the Jena, which leaves the Brahmapootra about lat. 25° N. Its entire course is estimated at 1700 miles. It inundates the level tracts of Bengal from April to September, and is said to discharge into the sea more water than the Ganges. The violence of its current and its *bore* (an upward wave caused by the sudden influence of the tide) render navigation difficult.

Brah'mo So'maj (*i. e.* "worshipping assembly") is the name of a society of Theists in India. Founded in 1830 by Rammohun Roy, it increased in numbers and activity after 1842, under the leadership of Debendro Nath Tagore, who succeeded in emancipating it from Vedantism. In 1859 a new impulse was given to it by the ability and enthusiasm of Keshub Chunder Sen, who effected the separation of those who were willing to abolish caste in their communion, as the "Brahmo Somaj of India." The more conservative members remained in the Somaj or Church of Calcutta. The whole number of Brahmos is probably not more than 1000. Many of them are young Hindoos educated at the English colleges. The first building for public worship of the progressive Brahmos was opened at Calcutta in 1869. In 1873 there were only 143 Brahmos registered in Calcutta, and only 40 in Bombay.

Keshub Chunder Sen, in his sermons and published tracts, avowed a belief in the unity of God, in immediate revelation, in the necessity of a new birth, in the immortality of the soul, and in the efficacy of prayer. His morality was pure, and he inculcated reverence for the character of Jesus Christ, but repudiated the doctrines of his divinity, mediation, and atonement as taught in the New Testament. This "Unitarian Theism" is said to resemble the theological rationalism of Theodore Parker. (See "Six Months in India," by Miss Carpenter; "Hours of Work and Play," by Miss F. P. Cobbe; an article in the "Contemporary Review" on "Indian Theism," etc., 1869; Dr. Jardin's paper in "Proceedings of the Allahâbâd Conference," 1872.)

Braid'wood, a city on R. R., Will co., Ill. (see map of Illinois, ref. 3–G, for location of county), 58 miles from Chicago. Pop. in 1880, 5524.

Brain [Gr. ἐγκέφαλος; Lat. *cerebrum;* Fr. *cerveau* or *cervelle;* Ger. *Gehirn*], the *encephalon* or contents of the head; the material instrument of thought, impulse, and perception in man and the higher animals. Only vertebrates have a true brain; in others ganglia or nerve-centres exist; but, in the view of anatomists, the "cephalic ganglia" of insects and other invertebrate animals are not strictly homologous with the brain.

The *amphioxus* is the only brainless vertebrate; it is a small oceanic fish, exceptional in many respects of structure. There is an ascent in the endowment of brain from the fishes, batrachians, reptiles, birds and lower mammals, until the culmination is reached in man. The proportion, by weight, of the encephalon to the whole body is in fishes on the average (according to Leuret) about as 1 to 5668; in reptiles, 1 to 1321; birds, 1 to 212; mammals, 1 to 186; in man, 1 to 36. The elephant has the largest brain, in actual weight, of all animals, sometimes reaching nine or ten pounds; next is that of the whale, about five pounds. The heaviest human brains have never weighed so much as this. Yet the proportion of weight of the brain to the whole body in the elephant is as 1 to 500. In some small animals and birds the proportion is relatively larger; as in the marmoset, 1 to 22; field-mouse, 1 to 31; linnet and canary-bird, 1 to 20; and blue-headed tit, 1 to 12. But it must be remembered that the *kind* of brain varies also; and the sensori-motor portions at the base of the brain are of much greater relative size in the lower animals than in man. There is an obvious connection between the degree of cerebral development in the different groups of animals and their intelligence; and the human brain is greatly superior to any other in its endowment. As Huxley has pointed out, the difference in the *structure* of the brains of men and of the higher apes is not very marked, and the disparity in *size* is less than between the highest and the lowest of the quadrumana. But the gap is evidently a very wide one; as Professor Huxley admits that an average European child of four years old has a brain twice as large as an adult gorilla, whose weight is perhaps four times as great. *Cephalization* is a term applied by Professor Dana to the predominance of the head and its prehensile appendages, by which the higher are distinguished from the lower animals; and of which the erect position and large, evenly-balanced head of man furnish the only perfect exemplification.

The typical *encephalon* of vertebrate animals may be regarded as constituted mainly of the following parts, in varying proportions: olfactory ganglia, cerebral hemispheres, optic lobes, and cerebellum, besides the *medulla oblongata*, which, as its name implies, is the continuation of the spinal axis within the skull. In fishes, those parts which (in a rudimentary manner) represent the cerebral hemispheres are generally no larger than the optic lobes; a condition to which, at a certain stage of development, the brain of the human embryo presents a near though not exact resemblance. In reptiles and batrachia, there is not much advancement, but the cerebral hemispheres are larger and the cerebellum smaller. Birds have a considerable increase in the size of the hemispheres, which, in them, cover the olfactory ganglia in front and the optic lobes behind; the cerebellum in them is large. To each of these the embryonic human brain has, at certain stages, a general resemblance.

Mammals present great diversity, from the smooth-brained (Lissencephala of Owen) Monotremata, Marsupialia, and Rodentia, up through the other groups to the highly-convoluted (Gyrencephala) and otherwise complex brains of the anthropoid apes, as the gorilla and chimpanzee. In mammals only do we find the large transverse commissure (connecting band) called the *corpus callosum*, between the hemispheres; and in the lowest of them, as the duck-billed platypus of Australia, it is wanting. In the higher apes, as well as in man, the cerebral hemispheres roof over and conceal, when looked at from above, the cerebellum behind, as well as the olfactory bulbs in front; but in the lowest Quadrumana (as the lemurs) the cerebellum is uncovered, and the surface of the cerebrum is almost devoid of convolutions.

Of the different lobes into which the cerebral hemispheres are imperfectly divided, the last to appear in the ascent from lower to higher groups of vertebrates, and the last to be developed in the growth of the human embryo, is the posterior lobe. This is among the facts which suggest a different hypothesis concerning the relative functions of the anterior, middle, and posterior lobes from that which is generally entertained.

An adult man's brain weighs, on the average, 48 ounces; a woman's, 44 ounces; yet, as Tiedemann (Philadelphia translation, 1836) observes, since the female body is lighter than the male, there is no inferiority in the *relative* size of the brain.

In capacity, the largest human brain of 900 measured (R. Wagner) was that of a woman, 115 cubic inches; the smallest adult male's, 62 cubic inches. Morton, however ("Crania Americana," p. 132), mentions a skull of the Inca Peruvian race, 60 cubic inches. The Hindoos probably have the smallest skulls of all known races. The following table is from Morton:

Races.	No. of skulls.	Mean capacity.	Largest.	Smallest.
Caucasian, . .	52	87	109	75
Mongolian, . .	10	83	93	69
Malay, ...	18	81	89	64
American, . .	147	82	100	60
Ethiopian, . .	29	78	94	65

The human brain is enveloped, within the skull, by three membranes—the outer, fibrous, *dura mater;* the middle,

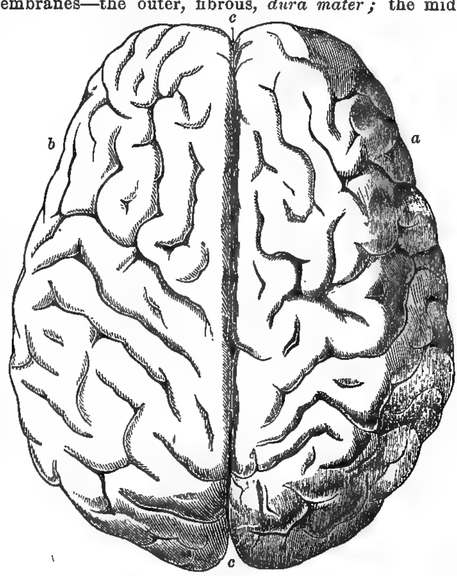


Fig. 1. Brain viewed from above.

serous, *arachnoid;* the inner, *pia mater*, consisting of small blood-vessels, with connective tissue between them. As usually described, the parts of the encephalon are, the *cerebrum, cerebellum, medulla oblongata*, and *pons varolii.*

The cerebrum is composed of the right (Fig. 1, *a*) and left (*b*) hemispheres, partially separated by the longitudinal fissure (*c c*). The convolutions on the two sides do not correspond (unless in a few principal forms) with each other; nor are they the same in different subjects. The fissure of Sylvius (Fig. 2, *a a*), on each side, separates (partly) the anterior from the middle lobe. On the surface of the hemispheres, gray (cineritious) vesicular nerve-substance predominates, although thin alternating layers of white substance exist in the convolutions. The central mass of the cerebrum is mainly composed of white, fibrous nerve-substance.

Laying the brain over so as to examine its base, the *cerebellum* (Fig. 2, *b b*), *pons varolii* (*c*), and *medulla oblongata* (*d*) are seen posteriorly. The relative positions of these parts can be understood by the aid of the figure. In front of these the cranial nerves. They are commonly enumerated in the order of their emergence from the brain, as the 1st (most anterior), olfactory nerve; 2d, optic; 3d, motor oculi, etc.

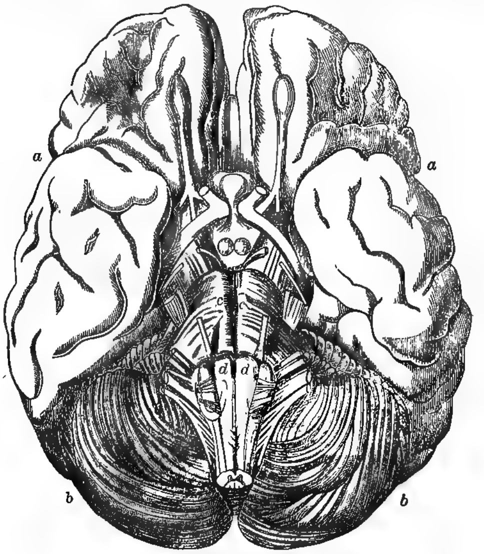


Fig. 2. The base of the Brain.

To inspect the interior of the brain, it should be placed upon its base and sliced away above the *corpus callosum*, (Fig. 3, *a*) which bridges transversely the two hemispheres. The lateral ventricles (*b b*) may be thus exposed, and other parts, the technical names of which would cumber the memory of the general reader, especially as the particular uses of all of them have not yet been clearly determined. The figure will suffice to locate some of them.

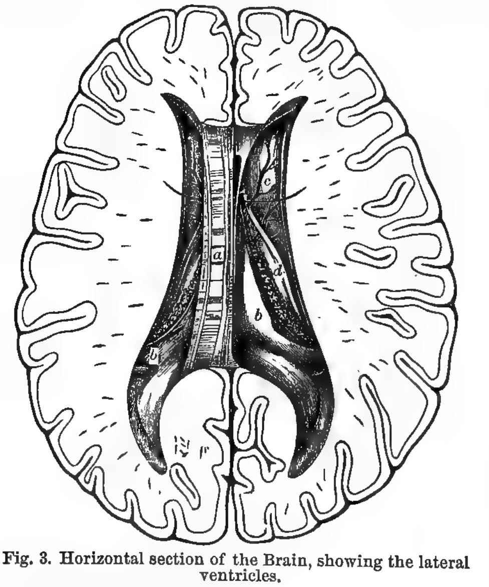


Fig. 3. Horizontal section of the Brain, showing the lateral ventricles.

The most important parts of the floor of the ventricles are the *corpora striata* (*c*) and the *thalami* (*d* and Fig. 4, *a a*). The former (one on each side) are anterior, the latter posterior. Both are rounded masses, partly of gray and partly of white nerve substance.

Connected with the thalami on each side by commissural filaments, and lying between the cerebrum and cerebellum, are the (four) *tubercula quadrigemina*, which correspond nearly with the optic lobes of birds, reptiles, and fishes. The optic nerves principally terminate in them.

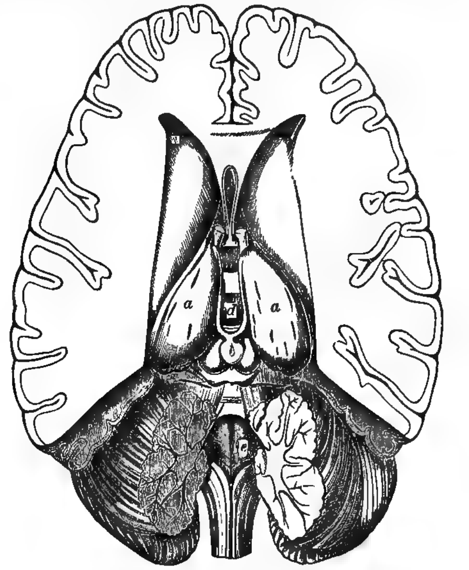


Fig. 4. Brain, showing horizontal section of the third (*d*) and fourth (*e*) ventricles.

The *cerebellum* (*c*) is much smaller than the *cerebrum*, and lies behind and below it; they are separated by the membranous *tentorium.* The cerebellum consists of a right and a left hemisphere, with a fissure between them, interrupted by commissural connections. The outer portions of these hemispheres are arranged in nearly parallel delicate *lamellæ* or layers of gray nerve-matter. When a vertical section is made, we see an arborescent internal structure of white nerve-substance enclosed in the gray; this is called the *arbor vitæ* by anatomists. The *pons varolii* is principally composed of bands of transverse filaments, connecting the hemispheres of the cerebellum. The *crura cerebri* are bundles of white substance diverging from the pons varolii into the hemispheres of the cerebrum, widening as they pass forward.

The *medulla oblongata* (*f*) is a pyramidal mass of nerve-substance, continuous with the spinal marrow, as well as connected with the cerebrum and cerebellum. It is divisible on each side into four portions. The anterior of these, *corpora pyramidalia*, are composed of bundles of white nerve-fibres, which *decussate—i. e.*, cross each other, a little below the *pons.* They are connected with the antero-lateral columns of the spinal cord, and their crossing explains some facts in connection with one-sided motor palsy. The *posterior pyramids* are continuous with the posterior tracts of the spinal cord. The other portions of the *medulla oblongata* are called *corpora olivaria* and *corpora restiformia.* (For a more detailed description, the reader is referred to works on special anatomy.)

The *functions* of the brain, except as regards the general fact of its serving as the instrument of mental action, including perception, thought, emotion, and will, constitute a difficult subject of study, whose investigation has not yet been completed. We can give here only those views upon which physiologists are most nearly agreed. (For the consideration of some others, see PHRENOLOGY.)

The *medulla oblongata*, besides fibres of a commissural nature, is believed by most inquirers (Brown-Séquard excepted) to contain the ganglionic centre, under the control of which, through reflex action, are performed the movements connected with breathing and swallowing. A serious injury to it is always fatal, by interruption of respiration.

The *cerebellum* (believed by Gall to be the seat of the organ of amativeness or sexual propensity) has, since the inquiries and experiments of Flourens, been generally thought to have the office of harmonizing or co-ordinating voluntary movements. Animals which climb, as the ape and the bear, have a larger cerebellum than those of simple locomotion, as the dog and the hog. Among birds, those of rapid and varied flight, as the swallow and many birds of prey, have it larger than the heavily-flying pheasant family, of which the barn-fowl is an example. Possibly the cerebellum may be the seat of the "muscular sense" of some physiologists. It is an unexplained fact that it has often been found considerably altered in persons who have died insane. Some recent investigations of Doctor S. Weir Mitchell of Philadelphia appear to throw doubt in the way of the acceptance of the *co-ordinative* theory concerning the cerebellum. He found that in animals which survived the entire removal of the cerebellum, although the order and balance of locomotor actions was lost for a considerable time, it was finally restored. Doctor Mitchell suggests, therefore, that the cerebellum cannot be the *exclusive* centre of muscular co-ordination, however it may share this office with other parts of the cerebro-spinal axis, but that it may be a great reservoir for accumulation of motor force.

The *corpora striata* are probably connected with the direct emanation of the motor impulses, upon which voluntary actions depend.

The *thalami* (formerly called *nervorum opticorum*) appear to be the ultimate *termini* of the nervous filaments which bring from the spinal cord impressions of common sensation or touch. These, with the *corpora striata*, the *tubercular quadrigemina*, and other central masses at the base of the brain, constitute the group of *sensori-motor ganglia*, believed by Carpenter and others to be the immediate seat of consciousness and will. Sensori-motor actions are those in which motion is guided by sensation, through the medium of this ganglionic apparatus. The importance of such guidance is easily illustrated by many familiar actions. We walk by sight; if one closes his eyes, his steps become uncertain. So, every one speaks or sings by aid of his hearing; the phrase "a good ear for music" is justifiable. One born deaf is also mute, from lack of this guidance. A blind person learns to substitute the use of the senses of touch and hearing for sight, but some guidance by sensation must always be had. All confused or unusual impressions make action difficult or irregular, as when one endeavors, without practice, to walk a narrow plank at a great height from the ground.

The cerebral hemispheres are, by universal consent, regarded as the material organs of intellect and of the emotions. Commonly it is believed that the anterior portion of the brain (the "gray matter" of its convolutions) is the seat of intellectual activity; the emotions, if separately located at all—which Carpenter disputes—being connected with the middle and posterior lobes. Yet the order of development, compared with the successive periods of maturing of the impulses and the reasoning powers, would point rather to the posterior lobes as being the organs of intellect.

The nature of the relation between mind and brain is a topic of endless controversy. (See Materialism and Mental Philosophy.) Certain propositions may be here advanced, as open to very little question at the present time: 1. The two hemispheres of the brain, under normal conditions, act as one. We are not conscious of anything but unity in our mental activity. 2. Yet the brain is probably, in relation to our faculties, a multiple organ. This is shown by the partial consciousness of dreaming and somnambulism; partial insanity or monomania; limited disturbance of mental or moral powers after certain injuries; and the special gifts of mind so different in different individuals, recognized under the name of genius. 3. Reflex action, as pointed out first by Dr. Laycock, affects the brain, as well as the lower nervous centres. Emotional actions, excited by the presence of particular objects or impressions, exemplify this. 4. Mental action, intellectual as well as emotional, is often truly automatic or involuntary. The will (as all psychologists recognize) controls thought and feeling only by the directing and selective power of attention, by which one, rather than another, kind of impression or ratiocination acquires momentum and continuance. Great mental capacity is, indeed, often combined with deficiency of will, as in such striking examples as Mozart and S. T. Coleridge. 5. There is reason to believe, as Doctor Carpenter has shown, that mental activity may sometimes be unconscious —the "unconscious cerebration" of authors. During sound sleep, for instance, most persons are able to awake at a determined time. When we have forgotten a once-familiar name or number, our attention being withdrawn from the search, it frequently comes back unsought. Many other facts may receive the same kind of explanation. (See "Human Physiology," by W. B. Carpenter, M. D., chapters on the "Nervous System.")

Henry Hartshorne.

Brain'ard (John Gardiner Calkins), an American poet of merit, born at New London, Conn., Oct. 21, 1796. He graduated at Yale in 1814. He published a volume of poems in 1825, and was for six years editor of the "Connecticut Mirror." Died Sept. 26, 1828. (See "Memoir of Brainard," prefixed to his works, by J. G. Whittier, 1832.)

Brainard (Lawrence L.), a prominent citizen and business-man of St. Albans, Vt., born about 1794, was several times candidate for governor, and was U. S. Senator from Vermont 1854–55. Died May 9, 1870.

Brain Coral, a name of various corals of the order Madreporaria and family Mæandrinidæ, especially applied to the *Mæandrina cerebriformis*, which grows in warm seas, and takes its name from the fact that its surface has convolutions shaped somewhat like those of the human brain.

Braine (Daniel L.), U. S. N., born May 18, 1829, in the city of New York, entered the navy as a midshipman May 30, 1846, became a passed midshipman in 1852, a lieutenant in 1858, a lieutenant-commander in 1862, and a commander in 1866. In 1861–62 he commanded the steamer Monticello, taking part in the engagement with the battery at Sewell's Point, near Norfolk, Va., May 19, 1861, and in the capture of Forts Hatteras and Clark, N. C., Oct. 5 of the same year. He was frequently under the fire of Forts Fisher and Caswell while blockading the port of Wilmington, and participated in both the Fort Fisher fights, and in the capture of Fort Anderson on the 19th of Feb., 1865. For the "cool performance" of his duty in these battles Braine was recommended for promotion by Rear-Admiral Porter in his "commendatory despatch" of Jan. 28, 1865. Was capt. 1883. Foxhall A. Parker.

Braine-l'Alleud, a town of Belgium, in Brabant. It has cotton-factories. Pop. 5578.

Braine-le-Comte, a town of Belgium, in the province of Hainault, on the railway from Brussels to Valenciennes, 20 miles by rail N. N. E. of Mons. It has a church built about the year 1300, also cotton-mills and dyeworks. Fine flax is raised in the vicinity. Pop. 6464.

Brain'erd, R. R. junction, capital of Crow Wing co., Minn. (see map of Minnesota, ref. 6–D, for location of county), is situated on the Mississippi River, 115 miles W. S. W. of Duluth. Pop. in 1880, 1865.

Brainerd (David), an American missionary, born at Haddam, Conn., April 20, 1718. He entered Yale College in 1739, but was expelled in 1742 for a very trivial offence. In 1743 he began his famous labors among the Indians in a village about halfway between Stockbridge, Mass., and Albany, N. Y. The year following he went among the Delawares in Pennsylvania, and afterwards to Crosweeksung in New Jersey, where he had his most signal success. In the summer of 1747 he returned to Massachusetts in broken health, and died at Northampton Oct. 9, 1747. Jonathan Edwards, to whose daughter he was engaged to be married, and at whose house he died, published a memoir of him in 1749. A new (and now the standard) edition of this, with his journals, was published by Rev. Sereno E. Dwight in 1822.

Brainerd (John), a younger brother of the preceding, was born at Haddam, Conn., Feb. 28, 1720, graduated at Yale College in 1746, and was for a time missionary among the Indians in New Jersey. In 1757 he was settled at Newark, and in 1777 at Deerfield, N. J., where he died Mar. 17, 1781. (See his "Life," by Rev. Thomas Brainerd, 1865.)

Brainerd (Thomas), D. D., of the same stock as the above, was born at Leyden, N. Y., June 17, 1804, graduated at Andover Theological Seminary, Mass., in 1831. From 1831 to 1833 he was pastor of the Fourth Presbyterian church in Cincinnati, O., from 1833 to 1836 edited the "Cincinnati Journal" and "Youth's Magazine," and from 1837 till his death at Scranton, Pa., Aug. 21, 1866, was pastor of the Pine Street church, Philadelphia. He was an accomplished and able writer. Besides various sermons and pamphlets, he published in 1865 the "Life of John Brainerd," referred to above.

Brain Fever is a popular name for acute cephalic meningitis (see Meningitis), a dangerous disease, characterized in its earlier stages by very high fever and intense headache, usually followed by delirium and death. Inflammation of the brain itself (encephalitis) is less common, but is even more fatal than the former. It is not easy to discriminate between the two during life. Cold applications to the head and mild but persistent derivative treatment are generally indicated.

Braize, or **Becker** (*Pagrus vulgaris*), a sea-fish of Europe, represented in American Atlantic waters by the big porgy or scup (*Pagrus argyrops*), which is prized both for the table and for its oil.

Brake, a term with various significations; it sometimes denotes a thicket, a place overgrown with shrubs, brambles, or ferns. In the U. S. a thicket of canes is called a "canebrake."

Brake is a name applied, especially in America, to plants of the order Filices. The more correct name is Fern (which see, by Prof. D. C. Eaton, LL.B.).

Brake, an instrument used to break flax or hemp; the hand or lever by which a pump is worked; a large harrow used in agriculture; a sharp bit or snaffle (of a bridle).

Brake, a machine attached to the wheels of heavy carriages and railroad cars, which, when pressed against the wheels, retards or stops their motion by friction. Patents have been obtained in the U. S. for numerous machines or inventions for this purpose. Among these are "steam car-brakes," in the use of which the friction is produced by steam-power, and the engineer of a locomotive applies the brakes by the turning of a cock; and the "Westinghouse air-brake," now extensively used.

Bra'ma, a genus of fishes of the family Chætodontidæ, having the body very deep and compressed, a single elongated dorsal fin, and a forked tail, the points of which are widely divergent. The *Brama raii*, sometimes called *bream*, is common in the Mediterranean, and is highly esteemed for food.

Bra'mah (Joseph), an English machinist and inventor, born in Yorkshire April 13, 1749. He carried on business in London, and gained distinction by numerous and valuable inventions, among which are a safety lock, a hydrostatic press, and improvements in fire-engines and steam-engines. Died Dec. 9, 1814.

Bramah's Press, See Hydrostatic Press.

Braman'te (Donato Lazzari), a celebrated Italian architect and painter, born near Urbino in 1444, was a relative of Raphael. He studied and worked at Milan from 1476 to 1499, and afterwards removed to Rome, where he was patronized by Pope Julius II. He designed the vast galleries which connect the Vatican with the palace of Belvedere. He was the first architect of St. Peter's church, which he began to build in 1506. Only a small portion of his design had been realized when he died in 1514, and the succeeding architects deviated from the original plan. (See Vasari, "Lives of the Painters;" Pungileoni, "Memoria intorno alla Vita di Donato Bramante," 1837.)

Bram'bling, Bram'blefinch, or **Mountain Finch** (*Fringilla montifringilla*), a small bird nearly allied to the chaffinch, than which it is rather larger. The predominant colors of the upper parts are black and brown, with white bands on the wings. The belly is white, and some of the wing-coverts are yellow. It breeds in the northern parts of Sweden and Norway, and visits England, Italy, and other countries as a winter bird of passage.

Bramp'ton, a post-village, capital of Peel co., Ontario, on the Grand Trunk Railway, 21 miles W. of Toronto, has manufactures of flour, farming implements, pumps, etc., and a large trade. Pop. in 1881, 2920.

Bran, the husk or outer covering of wheat, which in the process of flouring is separated from the fine flour. In 100 parts of bran there are of water, 13.1; albumen, 19.3; oil, 4.7; husk (with a little starch), 55.6; ash or saline matter, 7.3. Calico-printers use bran and warm water to remove coloring-matter from those parts of their goods which are not mordanted. Bran and the flour united—*i. e.* unbolted wheat flour—make a good bread, which is considered more digestible than that made of fine white flour.

Branch [Fr. *branche*; Lat. *ramus*], a limb of a tree or plant; a bough, or division of the stem or trunk; a ramification; any member or part of a body or system; a distinct article or section, as a branch of science or education. In geography several streams which unite to form a river are called its branches. The term "branch" is also applied to an individual of a family descending in a collateral line; any descendant of a common parent. In botany each branch originates in a leaf-bud, which is produced at a node of the stem or of an already existing branch. The arrangement of the branches as alternate or opposite corresponds to the relative position of the leaves.

Branch (John), born at Halifax, N. C., Nov. 4, 1782, graduated at the University of North Carolina in 1801, became a lawyer, was made a judge of the superior court, governor of North Carolina (1817–20), U. S. Senator (1823–29), secretary of the navy (1829–31), member of Congress (1831–33), governor of Florida Territory (1844–45), besides holding other important offices. Died at Edgefield, N. C., Jan. 4, 1863.

Branch (Lawrence O'Brien), son of the preceding, born in Halifax co., N. C., in 1820, graduated at Princeton in 1838, was a Democratic Representative in Congress from 1855 to 1861. He was made a brigadier-general in the Confederate army in 1861, and was killed at Antietam in 1862.

Branchiop'oda [from the Gr. *βράγχια*, the "gills," and *πούς, ποδός*, a "foot"], an order of entomostracous crustaceans, deriving their name from the peculiarity of having the gills, which are numerous, attached to the feet. They are small, many of them almost microscopic, and abound in stagnant fresh waters. A few are found in salt water. Some are known by the name of water-fleas; the genera *Cyclops* and *Cypris* may be mentioned, the former on account of its frequency in stagnant waters, the latter because its fossil shells are abundant. Western North America abounds in species; Eastern North America has none.

Brand, a burning piece of wood, or a stick of wood partly burned; a sword (this use of the word is obsolete except in poetry); a thunderbolt; a mark made by burning with a hot iron on a criminal or on a cask, etc.; a stigma. (See Branding.) The term brand is applied in England to some diseases of plants, especially of cereal grains, which are also called blight, bunt, mildew, rust, or smut. These diseases are caused by minute parasitic vegetation. Perhaps the most common application of this term is to a peculiar spotted and burnt appearance of leaves and bark, the cause of which is probably not known.

Brande (William Thomas), F. R. S., an English chemist, born in London in 1788. He lectured with success on chemistry at the Royal Institution, and filled for many years an important office in the Mint. Among his works are a valuable "Dictionary of Science, Literature, and Art" (1842) and a "Manual of Chemistry." Died Feb. 11, 1866.

Brand'enburg, the most important province of Prussia, and that which formed the nucleus of the Prussian kingdom. It corresponds nearly to the old Mark of Brandenburg, and has an area of 15,505 square miles. It is mostly a level plain which has but little elevation above the sea. It contains numerous lakes, is intersected by the Oder, and also drained by the Warthe, the Spree, the Havel, and the Elbe, which latter forms part of its W. boundary. The soil is sandy and moderately fertile. The province is traversed by several canals and railways. It has extensive manufactures of cotton, wool, linen, silk, paper, leather, sugar, etc. The chief towns are Berlin, Potsdam, Königsberg, and Frankfort-on-the-Oder. The inhabitants are mostly Protestants. It is divided into two regencies (Regierungsbegirke) and thirty-three circles. This country was conquered by Charlemagne in 789 A. D. The first margrave of Brandenburg was Albert the Bear, who is called the founder of the House of Brandenburg. He began to reign in 1134. Early in the fifteenth century the margrave became an elector of the German empire, and took the title of elector of Brandenburg. Frederick William, who became elector in 1640, added the duchy of Prussia and part of Pomerania to his dominions, and his son took the title of king of Prussia in 1701. Pop. in 1880, 3,389,155.

Brandenburg (anc. *Brennaborch* or *Brennabor*), a town of Prussia, in the above province, is situated on both sides of the river Havel, and on the Berlin and Magdeburg Railway, 38 miles by rail W. S. W. of Berlin. It is enclosed by walls, and divided by the river into the old and new town, between which, on an island, is a quarter called "Venice," containing a castle and a mediæval cathedral. The town has a ritter akademie, a gymnasium, a realschule, and a public library; also manufactures of woollen and linen goods, hosiery, paper, leather, etc. Pop. in 1880, 28,685.

Brandenburg, capital of Meade co., Ky. (see map of Kentucky, ref. 3–F, for location of county), is on the Ohio River and on a high bluff, 40 miles below Louisville. Pop. in 1870, 427; in 1880, 587.

Brandenburg, New, a walled town of Mecklenburg-Strelitz, is situated near the N. end of Tollensee, 18 miles N. N. E. of Strelitz and 53 miles W. N. W. of Stettin. It has wide and regular streets, and is said to be the most beautiful town in Mecklenburg-Strelitz. It has a grand-ducal palace, and manufactures of cotton and woollen goods, damasks, paper, and chemical products. Pop. in 1880, 8406.

Brand'ing, a mode of punishment formerly practised in England, by burning the face or hand of an offender with a hot iron. This penalty was inflicted in the case of all clergiable offences (see Benefit of Clergy), but it was abolished by an act of Parliament in 1822. Branding is now obsolete except in the case of deserters from the army, who are marked with the letter D, not by a hot iron, but by ink or gunpowder. By the Mutiny act of 1858 it is enacted that the court-martial, in addition to any other punishment, may order the offender to be marked on the left side, two inches below the armpit, with the letter D, such letter to be not less than one inch long.

Bran'dis (Christian August), professor at Bonn University, born at Hildesheim, in Hanover, Feb. 15, 1790, was the son of Joachim Dietrich Brandis, a celebrated physician. He edited, with Emmanuel Bekker, a critical edition of Aristotle. He was the secretary of King Otho in Greece. His main work was a history of the Greek and Roman philosophies (2 vols., 1835–44; the third volume appeared in 1860–66) and a "History of the Development of Greek Philosophy" (2 vols., 1862–64). Died July 24, 1867.

Brandon, on R. R., capital of Rankin co., Miss. (see map of Mississippi, ref. 7–F, for location of county), 13 miles E. of Jackson, contains a large female college, and is surrounded by numerous mineral wells, limestone and marl-beds. Pop. in 1870, 756; in 1880, 864.

Brandon, on R. R., Rutland co., Vt. (see map of Vermont, ref. 7–B, for location of county), near Otter Creek, 16 miles N. N. W. of Rutland. It has a graded academy, two parks, and manufactures of Howe scales, iron castings, carriages, flour, lime, lumber, paint, marble, etc. A beautiful soldiers' monument was dedicated here May 30, 1886. Pop. of the township in 1870, 3571; in 1880, 3280.

Brandreth (Benjamin), M. D. See Appendix.

Bran'dy [Ger. *Branntwein* (*i. e.* "burnt wine"); Fr. *eau de vie*] is the liquid obtained by distilling the fermented juice of the grape. It is generally manufactured from white and pale-red wines. White wine yields a richer brandy than red wine, as it contains more of the essential oil of grapes, to which the flavor of the brandy is due. The peculiarities of the wine pass to a certain extent to the brandy. Wines which taste of the soil communicate the same taste, the *goût de terre*, to the brandy distilled from them. Wines of Selleul in Dauphiny yield a brandy having the odor and taste of Florentine iris; those in St. Pierre in Vivarais give a spirit which smells of violet. The stronger the wine the greater the yield. The wines of the S. of Europe, being richest in alcohol, yield the most brandy. The usual yield is from 100 to 150 gallons from 1000 gallons of wine. The best brandy, that distilled in the department of Charente, known as *cognac* and *armagnac* (names of towns), is made from very choice wines. Inferior brandies are distilled from dark-red wines of France, Spain, and Portugal, also from the fermented *marc* or refuse of the grape, and from the lees of wine and the scrapings of the casks. The catawba brandy, made from the lees of catawba wine in Ohio, is a very good brandy, though it has the peculiar flavor of this wine. The brandy distilled from catawba marc has an unpleasant taste, and contains much fusel oil. The wines of California yield brandy abundantly and of good quality. Various other liquors are known as brandies, such as "cider brandy" or "apple jack," distilled from cider or from the "pomace" or refuse ground apples from the cider-press. This, when new, is a harsh, fiery liquor, but is much improved by age. "Peach brandy" is extensively made from the pulp of ripe peaches in some of the Southern States.

Fresh brandy is colorless, and remains so in glass vessels. The sherry-wine color which brandy generally exhibits is either derived from the cask or from burnt sugar purposely added. Brandy is almost pure alcohol and water, the percentage of alcohol varying from 48 to 56 per cent. It has an agreeable vinous, aromatic odor, and a peculiar well-known taste. Its specific gravity is from 0.902 to 0.941. Besides alcohol and water it contains the volatile oil of the wine, a little acetic acid, acetic ether, aldehyde, etc., together with the coloring-matter and tannic acid derived from the cask.

Brandy for medical use should be free from disagreeable odor and taste, and should be at least four years old. The advantage of keeping brandy a few years in the cask is due to the oxidation and removal of the ranker fusel oils, and to the precipitation of possible traces of copper or lead derived from the still by the tannic acid of the cask.

The greater part of the brandy and cognac of commerce is made from alcohol derived from Indian corn,—rectified and deodorized whisky. This is diluted to proof, 50 per cent., and flavored with acetic ether, œnanthic ether, oil of grapes, argol, and tannin, and colored with burnt sugar. It is improved by the addition of a little real brandy, and by keeping it a few years in the cask. The following recipe for cognac brandy is taken from the circular of a New York firm, whose business is to supply the necessary materials to the manufacturers of wines and liquors: "To 40 gallons of cologne spirit, double distilled and free from odor, and reduced to proof with distilled water, add ⅛ ounce of our best cognac oil, distilled from grapes, 1½ pints burnt-sugar coloring, and ¼ ounce of tannin." At the prices charged for the materials this choice brandy would cost the compounder $1.25 per gallon, and would sell at from $10 to $25.

Brandy is an esteemed cordial and stomachic. It is frequently given in the sinking stages of low fevers and to convalescents, and to check diarrhœa.

C. F. Chandler.

Brandy Station, on R. R., Culpeper co., Va. (see map of Virginia, ref. 5–G, for location of county), 56 miles S. W. of Alexandria, the scene of conflicts between the Federal and Confederate forces on the 9th of June and 11th of Oct., 1863. Pop. in 1880, 201.

Brandywine Creek is formed by the East and West branches, which unite in Chester co., Pa. It flows south-eastward into the State of Delaware, and enters the Christiana Creek near Wilmington. It furnishes water-power for numerous mills. On its banks, in Chester county, the British general Howe defeated Washington Sept. 11, 1777.

Bran'ford, a borough of New Haven co., Conn. (see map of Connecticut, ref. 6–P, for location of county), in Branford township, on R. R. and Long Island Sound, 8 miles E. S. E. of New Haven. The harbor will admit vessels of 300 tons. It is a place of summer resort, has various manufactures, and is the seat of an academy. Pop. of township in 1870, 2488; in 1880, 3047.

Branks, an instrument formerly used in England and Scotland for the punishment of scolding women. It was of various forms, but consisted essentially of a bridle of iron or leather, to which was attached a piece of iron which held the tongue firmly. It is asserted that in some obscure places in England its use came down to quite recent times.

Bran'nan (John Milton), an American officer, born in 1819 in the District of Columbia, graduated at West Point in 1841, colonel Fourth Artillery Mar. 15, 1881, and Sept. 28, 1861, brigadier-general U. S. volunteers. He served at seaboard posts 1841–73, in suppressing Canada border disturbances 1841–42, in the war with Mexico 1846–48, engaged at Vera Cruz, Cerro Gordo, La Hoya, Contreras, and Churubusco (brevet captain), and the city of Mexico (severely wounded at Belen Gate), as adjutant First Artillery 1847–54, in Florida hostilities 1856–58. In the civil war he served in command of the department of Key West, Fla., 1862, in the department of the South 1862–63, engaged on expedition to St. John's River, Fla. (brevet lieutenant-colonel), at Pocotaligo, S. C., and several minor actions, in Tennessee campaign 1863, engaged at Hoover's Gap, Tullahoma, Elk River, and Chickamauga (brevet colonel), as chief of artillery department of the Cumberland 1863–65, engaged at Missionary Ridge, in the various operations of the Atlanta campaign 1864 (brevet brigadier-general), in command of the district of Savannah, and temporarily of department of Georgia 1865–66. Brevet major-general Mar. 13, 1865, for meritorious services in the field.

George W. Cullum.

Brant. See Barnacle Goose.

Brant (Joseph Thayendanega), an Indian Mohawk chief, born in 1742, fought in the British army against the Americans in the war of the Revolution. He published the Gospel of Mark in Mohawk. Died Nov. 24, 1807. (See W. L. Stone, "Life of Brant," 1838.)

Brant (Sebastian), a German poet, born at Strasburg in 1458. He was appointed an imperial councillor by the emperor Maximilian. He wrote a satirical poem entitled "Das Narrenschiff" ("The Ship of Fools," 1494). Died May 10, 1520.

Brant'ford, a city of Ontario (Dominion of Canada), the capital of Brant county, is on Grand River and the Grand Trunk Railway, 24 miles W. S. W. of Hamilton and 84 miles S. E. of Goderich. The river, an affluent of Lake Erie, is navigable to Brantford, which has an active trade. Here are large machine-shops and engine-houses of the railway company, and manufactures of brass and iron castings, farming implements, etc. The county buildings are substantial. There is an orphans' home for girls and a widows' home supported by the charitable. Pop. in 1881, 9616.

Brant'ley (William Theophilus), D. D., born May 1, 1816, at Beaufort, S. C., educated at Brown University, pastor of the First Baptist church at Augusta, Ga., 1840–48, professor of belles-lettres and evidences of Christianity in the University of Georgia 1848–56, pastor in Philadelphia 1856–61, Atlanta, Ga., 1861–71, and of the Seventh Baptist church of Baltimore since 1871.

Brantôme (Pierre de Bourdeilles), a French historian, born of a noble family at Périgord about 1540. He served in the army in several campaigns, and gained the favor of Charles IX., at whose court he passed some years. He wrote "Les Vies des Hommes Illustres et grands Capitaines, etc.," a work of high reputation. His style is charming, vivacious, *naïf*, abounding in ingenious turns, and sometimes rising to eloquence. Another work of his is "Vies des Dames galantes." Died July 15, 1614.

Bra'shear City, now Morgan City (La.), which see.

Bras'idas [Gr. Βρασίδας], an eminent Spartan general in the Peloponnesian war, which began in 431 B. C. He relieved Megara in 424, and gained several victories over the Athenians. He was killed in 422 B. C. at Amphipolis, where he was opposed to the Athenian general Cleon. His memory was long honored by annual sacrifices.

Brass [Lat. *æs*, gen. *æris;* Fr. *airain*], an important alloy of copper and zinc extensively used for a great variety of purposes in the arts, on account of the ease of working and its acceptable color. It is made (1) by fusing copper and zinc in crucibles, placing the latter below; considerable of the zinc is lost during the operation, owing to its volatility; (2) by heating copper in grains or sheets with oxide of zinc and charcoal; (3) the ancient method, by heating copper with calamine, a native ore of zinc, and charcoal. Different varieties of brass, adapted to special uses, are obtained by varying the proportions of the component metals. Common brass for ordinary purposes, which is cast in moulds and finished by turning and filing, contains about 70 parts of copper and 30 of zinc. *Munz* or *yellow metal*, which is rolled into sheets and used for sheathing ships, contains from 50 to 63 parts of copper and 37 to 50 of zinc. *Tombac, pinchbeck, prince's metal, Mannheim gold, mosaic gold, similör*, etc., contain 80 parts or more of copper to 20 or less of zinc. A little lead diminishes the ductility, while tin increases the hardness of brass. Articles of brass are cleaned by immersion in aqua fortis (nitric acid), and lacquered with shell-lac in alcohol. Brass is harder than copper, is malleable and ductile, and can be readily cast, rolled, stamped, and turned in the lathe. Next to iron in its different forms, it is the most important metal used in the arts. C. F. Chandler.

Bras'sarts, or **Bras'sards,** jointed plates of steel which in plate-armor protected the upper part of the arms, and united the shoulder and elbowpieces. The ancient name of them was *brachiale*. When the front of the arm only was shielded the pieces were called demi-brassarts.

Brasses, Monumental, are either plates or inlaid figures of brass or latten, which occur in old churches of Europe, generally designed to represent the figure and the heraldic honors of the dead. Monumental brasses were often wrought with fine artistic taste. This ancient practice, which had become nearly obsolete, has been lately revived.

Brasseur de Bourbourg (Charles Étienne), a French priest, born Sept. 8, 1814, travelled extensively in North and Central America, and published, as the result of his travels, "Histoire de Canada" (2 vols., 1851), "Histoire des nations civilisées du Mexique et de l'Amérique Centrale" (4 vols., 1857–59), "Gramatica de la lengua Quiche" (1862), and other works.

Bras'sica, a genus of herbaceous plants of the order Cruciferæ, distinguished by a round and tapering 2-valved pod (*silique*), globose seeds in one row in each valve, and conduplicate cotyledons. The species of this genus, which comprises the cabbage, cauliflower, broccoli, turnip, rape, etc., are natives of the temperate and cold regions of Europe and Asia. The species just named are extensively cultivated in gardens and fields. (See Cabbage and Turnip.)

Brat'tice, in mining engineering, is a term applied to a partition of iron plate and other fit material which divides the great general shaft into two chambers, which serve as up-cast and down-cast shafts for ventilation.

Brattleboro', R. R. centre, Windham co., Vt. (see map of Vermont, ref. 9–C, for location of county), on the Connecticut River, 60 miles N. of Springfield, Mass. It is the seat of the Vt. Asylum for the Insane, and the trade-centre of South-eastern Vt. The Estey Cottage Organ-Works is the leading manufacturing industry. West Brattleboro' has an academy for the young. The town is noted for its beautiful natural scenery. Pop. of township in 1870, 4933; in 1880, 5880, including 4471 in village.

Brauns'berg, a walled town of Prussia, in the province of Prussia, on the river Passarge, about 35 miles S. W. of Königsberg. It has manufactures of woollen and linen goods, and an active trade in grain, timber, etc. Pop. in 1880, 11,542.

Bra'vo (Nicolas), a Mexican general, born about 1792, fought against the Spaniards in several campaigns. He was elected vice-president of Mexico in 1824, revolted against Vittoria in 1827, and was defeated. He officiated as the executive chief and substitute of Santa Anna in the absence of the latter, from Oct., 1842, to Mar., 1843. Died April 22, 1854.

Bra'vo-Muri'llo (Juan), a Spanish statesman, born in June, 1803, became in 1847 minister of justice, then of public instruction and of the finances. In 1851 he became the head of a new cabinet, in which position he followed a reactionary policy. In April, 1868, he again became president of the cabinet. On the expulsion of the queen he followed her to Bayonne. Died in Jan., 1873.

Brawn, the flesh of a boar, or the animal itself; the fleshy, protuberant muscular part of a man or animal; bulk, muscular strength; sometimes the arm; also a preparation of meat made of the head and belly of a young pig, with the addition of ox feet to render it gelatinous. The whole is rolled up tight in sheet tin and boiled for four or five hours. The moisture is then pressed out, and after it has stood about ten hours, the meat is put into cold salted water and is ready for use.

Braxton (Carter), an American planter, born in Newington, Va., Sept. 10, 1736. He graduated at William and Mary College in 1756. He was elected to the Continental Congress in 1775, and signed the Declaration of Independence. Died Oct. 10, 1797.

Braxton Court-house, or **Sutton,** capital of Braxton co., W. Va. (see map of West Virginia, ref. 4–D, for location of county). Pop. in 1880, 279.

Bray, England. See Appendix.

Bray, Ireland. See Appendix.

Brazen Sea, a great bowl of cast metal, probably of copper or bronze, which stood in the priests' court in Solomon's temple. (1 Kings vii. 23–26; Josephus's "Antiquities," viii. 3, 5.) Its purpose was to hold water for the ablutions of the priests. The brazen sea stood upon twelve oxen, the latter facing outward. The exact shape and size of the brazen sea are not known, but the best commentators think its contents exceeded 11,000 wine gallons.

Brazen Serpent, the name of a copper or bronze figure of a serpent erected by Moses during the journey of the Israelites from Egypt to the land of promise, for the miraculous cure of those who had been bitten by venomous serpents. This brazen serpent became an object of superstitious worship among the Israelites, and was consequently destroyed by Hezekiah. In accordance with John iii. 14, the brazen serpent is regarded as a type of Christ.

Brazil, bra-zil' [Port. brah-zeel'], the only empire or monarchy on the American continent, and the largest state of South America, is bounded N. by the Atlantic Ocean, Guiana, and Venezuela, W. by Ecuador, Peru, Bolivia, Paraguay, and the Argentine Confederation, S. by Uruguay, and E. by the Atlantic. It extends from lat. 4° 30′ N. to 33° 45′ S., and from lon. 34° 40′ to 72° 30′ W., being 2600 miles in length from N. to S., and 2500 miles in breadth from E. to W. Its area is 3,218,166 square miles, about 305,000 square miles less than the U. S.

Topography, Rivers, and Lakes.—Brazil has several chains of mountains, but is nowhere connected with the Andean system. The mountains approach the coast at only three or four points—viz. near Cape Orange, on either side of Cape St. Roque, and at some distance from it, and from above Rio Janeiro to Torres. Elsewhere the coast-lands for many miles inward have very little elevation. Of the mountain-chains, the Serra do Mar extends along the coast to 26° 30′ S., and encloses with its two branches the valley of the Uruguay. The central chain, Serra de Mantiqueira, extending from 20° 30′ to 23° S., has the highest elevation in Brazil. Its continuation, Serra do Espinhaço, is parallel to the coast. The other chains farther W. are Serra da Tabatinga, Serra Piauhy, Serra Ibiapaba, the Pyreneos Mountains, and the low chains along the S. branches of the Amazon. The Amazon is the largest river. Its N. branches are the Yapura, the Rio Negro, the Trombetas, etc.; the S. branches, the Xingu, Topayos, Madeira, Purus, Yurua, and Yavari. Other rivers, Araguay and Tocantins, Maranhão, San Francisco, Paranahyba, Rio Grande de Belmonte, Rio Doce, San João de Parahiba Contas, Vaso, Rio Grande do Sul. The Rio Paraná, the Paraguay, and Uruguay rise in Brazil, but pass through other states. There are many small lakes, but only Lake Mirim and Lake Patos are important.

Minerals.—These comprise gold, silver, iron, copper, zinc, coal, diamonds of great size and beauty and in great numbers, chromate of lead, euclase, immense crystals of iron-glance, talc, topaz, crystals, rock-crystals, and kyanite. Some of the diamonds, first discovered in 1730, are famous for both size and perfection.

Soil and Vegetation.—Soil is generally excellent, but only one-one-hundredth of it is under cultivation, and this mostly in the N. E. and along the coast. Of cultivated plants, shrubs, and trees, the most useful are sugar-cane, coffee, cotton, cacao, rice, tobacco, maize, manioc, beans, bananas, ipecacuanha, ginger, yams, lemons, oranges, figs, cinchona, etc. The manioc produces tapioca, the staple farinaceous food of the empire. It yields six times as much nutriment to the acre as wheat. The forests of Brazil are vast in extent and luxuriance, and many are draped with climbing plants and parasites. Some of the forests are too dense to be penetrated. Many of the trees are valuable for medicine or the arts, as the cinchona, siphonia or caoutchouc, bertholletia (Brazil-nuts); purga das Paulistas, which yields a tasteless but powerfully purgative oil; the myrtaceous trees, whose blossoms fill the air with perfume; Brazil-wood, rosewood, fustic, mahogany, the jaborandi, Franciscea, uniflora or manuca, and other shrubs. The flowers of Brazil are the most beautiful in the world.

Animals.—The vast plains are covered with herds of horses and horned cattle, many of them wild; and large flocks of goats and sheep, though not of high grade, and herds of swine are pastured there. Pumas, jaguars, several native animals of the wolf family, sloths, porcupines, peccaries, capibaras, monkeys, or rather lemurs; vampire bats, many batrachians; of serpents, anacondas and other pythons, coral snakes, surucucús, and jararacas: the last three are venomous and deadly; turtles abound in the Amazon, and tortoises and terrapins on land; of birds of prey, many vultures, condors, eagles, hawks, and owls; of birds of beautiful plumage, an infinite variety, including many species, and immense numbers of humming-birds, parrots and parroquets, toucans, cockatoos, and hundreds of native species; wading birds of fine plumage, ducks, geese, pelicans, etc. The insect tribes are brilliant, abundant, and beautiful; over one thousand species of butterflies have been described. Scorpions and centipedes are formidable, while the bees are stingless. The rivers abound in fish; Prof. Agassiz found 1163 new species in the Amazon alone.

Climate.—Most of the northern provinces are subject to heavy rains, and some of them are unhealthy. In the N. E. there are frequent droughts, and sometimes no rain for two or three years. In the S. the climate is healthy and settled, though often very warm. December, January, and February are the hottest months, and June, July, and August the coolest. While malarial fevers prevail along the lower Amazon and its affluents, yellow fever is hardly known there, and many other northern diseases never occur. Some of the contagious diseases are very malignant.

Industries, Exports, and Imports.—Brazil is almost wholly an agricultural, a pastoral, and a mining country, and its industries, except those connected immediately with its own necessities, are very few, and mostly crude. The preparation of sugar in its unrefined state, of coffee for shipment, of the caoutchouc in crude masses, of the various woods, roots, and barks for medicinal, chemical, or economic uses, of the various farinas and cacao for use, the production of lumber for home use, and of food products, rude manufactures of cotton, wool, and of the native silk, —these constitute the greater part of its industries. Its exports are mostly coffee, sugar, cacao, tapioca, hides, cotton, wool, and hair of horses, goats, etc. In 1881–82 the total value of imports to Brazil amounted to £27,554,160, and of exports to £30,018,090. In 1880 our imports from Brazil (its exports to the U. S.) were nearly $52,000,000, while its imports from the U. S. were only $8,605,346.

Finances.—The public debt, foreign, home, and floating, in 1884 was £81,369,000; estimated public revenue 1884–85, £13,191,460; estimated public expenditure, £13,018,505.

Religion and Education.—Roman Catholic the established religion; other religions tolerated; no persecution allowed; some Protestant churches and missions; Indian tribes mostly pagan. Great efforts are making to improve the educational condition of Brazil; primary schools in most of the large towns; military and naval schools, engineering schools, museum, libraries, and medical school at Rio Janeiro; a medical school and two law schools elsewhere. The official language of Brazil is Portuguese.

Government, hereditary constitutional monarchy; the emperor, Dom Pedro II., is of the house of Braganza. Legislature, two chambers; senate elected for life, the deputies for four years.

Railways and Telegraphs.—1911 miles of railway open in 1882, and 477 miles more to be completed in 1884; about 4340 miles of telegraph in 1882.

History.—Discovered in 1500 by V. Y. Pinzon, one of the companions of Columbus; Pedro A. Cabral took possession of it; Portugal made settlements, notwithstanding opposition of other nations; Indians exempted from slavery in 1755; John VI. of Portugal came to Brazil in 1808, escaping from the French; in 1815 he raised Brazil to the rank of a kingdom; returned to Portugal in 1820, leaving his son, Dom Pedro I., regent; in 1822, Dom Pedro declared Brazil free and independent, assumed the title of emperor and was recognized by Portugal in 1825; Dom Pedro I. abdicated in 1831 and returned to Europe, leaving his son, then six years old, as his successor; Dom Pedro II. remained under regents until 1841, when he was crowned, and has proved himself a wise and able ruler; gradual abolition of slavery provided for in 1871; war with Paraguay 1865 to 1870; all important rivers opened to foreign commerce in 1866; subsidies given to steamship lines.

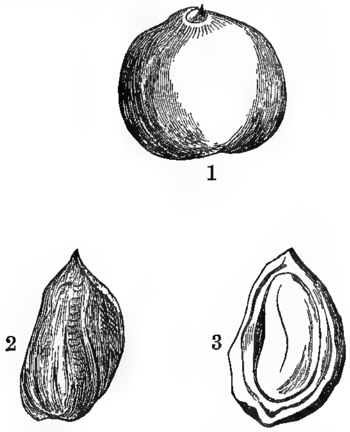
Population, estimated from partial enumeration, is about 10,108,291. Of this number it is officially estimated that 1,000,000 are wandering tribes of Indians. There were 1,016,262 slaves in 1874, Brazil being the only American state in which slavery exists; and even here partial emancipation is in progress. There are six prominent and many smaller tribes of Indians, mostly in the N. The negroes, free and slave, are in a majority in the S. There are great numbers of the mixed races, descendants of whites and Indians (Mamelucoes), of Indians and negroes (Cafuzoes), and of the settled Indians (Caboclos). The white inhabitants are mostly of Portuguese descent, except the colonists, who are largely German. While the inhabitants of Minas Geraes are farthest advanced in intellectual culture, manufacturing industry is most advanced in Bahia. The inhabitants of Pernambuco are of the true type of a slaveholding aristocracy, while those of Rio Grande do Sul are an independent race of shepherds. The provinces, twenty in number, are Rio de Janeiro, São Paulo, Santa Catharina, Paraná, Rio Grande do Sul, Espirito Santo, Bahia, Parahiba do Norte, Pernambuco, Alagoas, Sergipe, Rio Grande do Norte, Ceará, Piauhy, Maranhão, Pará, Minas Geraes, Goyaz, Matto Grosso, and Alto Amazonas. The principal cities are Rio Janeiro (the capital), 274,972; Bahia, 128,929; Pernambuco, 116,671; Pará, 35,000; São Paulo, 25,000; Parahiba, 15,000; Maranham, 31,604; Rio Grande do Sul, 20,000. L. P. BROCKETT.

Brazil, R. R. junction, city, and capital of Clay co., Ind. (see map of Indiana, ref. 8–C, for location of county), 16 miles E. N. E. of Terre Haute. It is an important centre of the block coal and iron business. There are several blast-furnaces and collieries in the vicinity. Pop. in 1870, 2186; in 1880, 3441.

Brazil Cabbage, the *Caladium sagittifolium*, a plant of the natural order Araceæ, having arrow-shaped, pointed leaves. It is supposed to be a native of tropical America, but is now in cultivation throughout the tropics; not only the root being used for food, but also the leaves, boiled as greens. Both root and leaves are almost entirely destitute of the acridity so generally characteristic of the order.

Brazil'ian Grass, a popular name of a substance used in the manufacture of hats, sometimes called chip hats. It is not grass, but the leaves of a species of palm (*Chamærops argentea*) which are imported from Cuba.

Brazil-nuts, the seeds of the *Bertholletia excelsa*, a beautiful tree of the natural order Lecythidaceæ. This tree, which attains a height of 100 feet or more, abounds on the banks of the Orinoco and in the northern parts of Brazil, and bears a round woody pericarp nearly as large as a man's head. This pericarp contains about twenty-four seeds or nuts, which have the form of a triangular prism, and a hard shell enclosing a white kernel, which is very agreeable when fresh, but soon becomes rancid. They yield a large quantity of oil, which is valuable for burning in lamps. Many Brazil nuts are exported from Pará to Europe and the U. S.



Brazil-nut.

Brazil-nut: 1, represents the round woody pericarp, about one-fifth the natural diameter of an example of moderate size; 2, one of the nuts or seeds, half the natural length; 3, section of the same.

Brazil-wood, an important dyewood from the *Cæsalpina crispa,* a tree of the order Leguminosæ. There are several varieties, known as Pernambuco, Lima, Santa Martha, Sapan or Japan, etc. The wood contains a colorless principle, *brazilin* ($C_{18}H_{14}O_6$), which changes by oxidation to *brazilein* ($C_{18}H_{14}O_7$), which is the red coloring-matter which gives the wood its value. Pernambuco and Lima wood contain as high as 2.7 per cent. of brazilein, Sapan 1.5, and Santa Martha (also called Peach or Nicaragua) still less. Brazil-wood is very heavy and hard, is pale when freshly cut, but becomes red by exposure to the air. The coloring-matter is soluble in water, but more so in alcohol or ammonia. It is used in dyeing to produce reds with alumina, purples with tin, etc., for coloring wall-paper and for red ink. C. F. CHANDLER.

Brazil-wood.

Brazoria, capital of Brazoria co., Tex. (see map of Texas, ref. 6–J, for location of county), on the right (W.) bank of the Brazos River, about 30 miles from its mouth, and 60 miles W. S. W. of Galveston. Pop. in 1870, 725; in 1880, 676.

Bra'zos, one of the largest rivers of Texas, rises in the high table-land in the N. W. part of the State, and flows first nearly eastward to Baylor, then S. E. for about 200 miles, and subsequently S. S. E. till it enters the Gulf of Mexico. Its whole length is estimated at 900 miles. In the rainy season, from February to May inclusive, it is navigable for steamboats about 300 miles from its mouth.

Bra'zos Santia'go, an inlet and seaport of Texas, in Cameron co. (see map of Texas, ref. 8–H, for location of county), between the N. end of Brazos Island and the S. extremity of Padre Island. It has some trade, but it has a bad and shifting bar. The settlement is on Brazos Island, in lat. 26° 04′ N., lon. 97° 12′ W.

Breach of the Peace, the offence of disturbing the public peace, either by actively or constructively breaking it. Unlawful assemblies, riots, affrays, challenges to fight, and libels are breaches of the peace, and by the common law the offender is indictable. The phrase is sometimes used to distinguish civil from criminal cases, as in the clause of the U. S. Constitution which grants to members of either house of Congress freedom from arrest except in cases of treason, felony, and "breach of the peace." In this connection it seems to include all indictable offences, not only those which are in fact attended with force and violence, but also those which are constructive breaches of the peace of the government, as tending to violate good order.

Bread [Gr. ἄρτος; Lat. *panis;* Fr. *pain;* It. *pane;* Ger. *Brod;* etymology uncertain], the most common kind of prepared food. It is made from the flour or meal of some grain, which is moistened with water, and mixed or kneaded till uniform. It may or may not be *raised* by the development in the mass of carbonic acid or other gas; it is then formed into loaves or cakes, and finally baked before a fire or in an oven.

I. *Bread which is not raised* is often called *unleavened* bread. This may be made from the whole grain by soaking it in water, forming it in the hands, and either drying it in the sun or baking it before a fire. This is the simplest process of bread-making, and is still practised to some extent among savages. Generally, unleavened bread is made from grain which has been pounded or brayed in a mortar or between flat stones, reduced to meal in a mill, or even further reduced to flour. Coarse oat, barley, and pease meals are in Scotland made into bread by simply kneading with water, flavored with salt, and baking before a fire. Wheat bread is made in a similar manner in many localities. The *passover cakes* of the Israelites were thus prepared. In the U. S., especially among the poorer classes in the South, Indian corn meal is thus made into corn bread. From wheat flour, sea biscuit and the various kinds of crackers are prepared.

II. *Raised bread* is bread which is made porous and spongy by the aid of some gas, produced either before or during the baking. This gas may be carbonic acid, either generated by fermentation, produced by the decomposition in the bread of an alkaline bicarbonate, or mingled with the flour in solution in water under pressure. It may be air which is incorporated with the dough during the kneading and expanded during the baking, as in pastry, sponge cake, etc., or it may be carbonate of ammonia, which is vaporized during the baking.

The best bread is made of wheat flour, although the flour of rye, oats, and other grains is used. (See FLOUR.) Wheat flour owes its superiority to the large percentage of gluten which it contains. This body, when moistened with water, becomes adhesive, elastic, and tenacious, and holds the bubbles of gas formed during the process of raising the loaf, although it be distended to a spongy mass several times the original volume of the dough. The other cereals contain scarcely any gluten; hence it is difficult to make light-raised bread from them. (See GLUTEN.) The bread from wheat flour is whiter than that of other grains. The composition of the most important kinds of flour and meal is, according to Von Bibra, as follows:

	Wheat Flour.	Rye Meal.	Barley Meal.	Oat Meal.
Water	15.54	14.60	14.00	11.70
Albumen	1.34	1.56	1.20	1.24
Vegetable glue	1.76	2.92	3.60	3.25
Casein	0.37	0.90	1.34	0.15
Fibrin	5.19	7.36	8.24	14.84
Gluten	3.50			
Sugar	2.33	3.46	3.04	2.19
Gum	6.25	4.10	6.33	2.81
Fat	1.07	1.80	2.23	5.67
Starch	63.64	64.28	53.15	58.13
Sand	......	......	6.85	

Besides the above constituents the flour and meal contain small but important quantities of potash, soda, lime, magnesia, oxide of iron, chlorine, sulphuric and phosphoric acids, silica, etc., although the larger part of these substances remain in the bran, which is separated by bolting or sifting during the milling of the grain.

1. *Fermented bread* is prepared either with leaven or yeast. Leaven is dough—*i. e.* flour and water—in a state of incipient putrefaction. When flour is moistened with water and placed in a warm situation, spontaneous chemical action begins in the nitrogenous constituents, casein, fibrin, gluten, etc. This change extends later to the sugar, gum, and starch. At one stage of the decomposition the products of vinous fermentation may be detected, alcohol and carbonic acid; at a later stage an acid fermentation supervenes, producing lactic acid. The alcohol, carbonic acid, and lactic acid are formed from sugar, either the small quantity originally contained in the flour, or an additional quantity formed during the decomposition from the gum and starch. (See FERMENTATION.) The change of sugar in the vinous and lactic acid fermentations is shown in the following formulæ:

$$\overset{\text{Sugar.}}{C_6H_{12}O_6} = \overset{\text{Carbonic acid.}}{2CO_2} + \overset{\text{Alcohol.}}{2C_2H_6O.}$$

$$\overset{\text{Sugar.}}{C_6H_{12}O_6} = \overset{\text{Lactic acid.}}{2C_3H_6O_3.}$$

It is here seen that the transformation from sugar to alcohol and carbonic acid, or to lactic acid, is very simple. Where leaven is used for raising bread, a portion of the dough is set aside at each baking to serve as leaven for the next. The process of making the bread is very simple. The proper quantity of flour is mixed with tepid water, the leaven, and a little salt, the whole being well incorporated by kneading. The mixture is placed in a warm situation and left over night to ferment. If the leaven is in the proper stage of decomposition, it will induce vinous fermentation, producing alcohol and carbonic acid gas; the latter, held by the elastic and tenacious gluten, will expand the mass into a light, porous sponge, which becomes in the oven a palatable loaf. If, however, the leaven be in a more advanced state of decomposition, or if some other necessary condition fail, instead of alcohol and carbonic acid, lactic acid will be formed, and the dough will not be *raised* by gas, but will be heavy and sour. To avoid this latter result, sal aëratus, bicarbonate of potassa or soda, is added to the dough. This neutralizes the lactic acid as fast as it is formed, and by liberating carbonic acid gas at the same time inflates the sponge and makes it light and porous. Were there any certainty as to the quantity of lactic acid that would be generated, it might be possible to add the proper amount of sal aëratus to neutralize it, but in practice there is generally an excess or a deficiency. In the former case the bread is alkaline, yellow, and disagreeable; in the latter case, sour. Leaven is also liable to communicate a disagreeable taste and odor.

Notwithstanding the difficulty of making good bread with leaven, and the frequent failures in private families, in Paris, where bread-making has reached a high degree of perfection, the bread is raised chiefly by leaven, a little yeast only being added to facilitate the fermentation. According to Prof. Horsford, the following is the common method practised in Paris: At eight o'clock in the evening a mass of paste (leaven or sour dough) is taken, composed of 8 kilogrammes of flour and 4 kilogrammes of water. This is left until six o'clock in the morning, and constitutes the main leaven; 8 kilogrammes more of flour and 4 kilogrammes of water are then added: this forms the first quality of leaven. At two o'clock in the afternoon 16 kilogrammes of flour and 8 of water are added: this is the second quality of leaven. At five o'clock the complete leaven is prepared by adding 100 pounds of flour and 52 kilogrammes of water, mixed with from 200–300 grammes of yeast. At seven o'clock 132 kilogrammes of flour and 68 kilogrammes of water, holding in solution 2 kilogrammes of salt, and mixed with from 300–600 grammes of yeast, are added to the leaven, and made into well-kneaded dough.

With this quantity of paste five or six batches of bread are made in the following manner: 1*st Batch.*—This is composed of half the dough prepared as above, which is moulded and left to rise, and then set in the oven. The bread of this first baking is sour, rather brown, and not particularly light. 2*d Batch.*—The dough remaining of the first batch is mixed with 132 kilogrammes more of flour and 68 kilogrammes of water, mixed with the same proportion of salt and yeast as the preceding batch. Half of this dough forms the second baking, the bread of which is whiter and better than the first. 3*d Batch.*—The same quantity of flour, water, and salt, with 300 grammes of yeast, is again added to the dough, of which half is baked as usual. 4*th Batch.*—Same proceeding as for the third. 5*th Batch.*—This is prepared like the foregoing, and produces what is called fancy bread, the finest quality of any.

The use of leaven is of great antiquity. The usual agent for raising bread in the public bakeries in the U. S. and in many families is yeast, either obtained from some brewery or specially prepared for the purpose. (See YEAST.) The following is a recipe in common use in New England: "Take eight good-sized potatoes, boil, mash fine, pass through a sieve, and work in a cup of flour. Thin to a cream with hot water, and add a tea-spoonful of salt and a table-spoonful of sugar. When cooled to lukewarm, add a cupful of old yeast, and set aside in a warm place. In six hours the yeast will be ready to use. Bottled it will keep for a week. Use a cupful for two loaves of bread." (*My Mother.*)

A very essential element of success in bread-making is thorough kneading. When the bread has risen sufficiently it is baked. There is a loss of about 25 per cent. in baking, chiefly water. In bread raised by fermentation some alcohol is evolved. Liebig estimated that 150,000 gallons of alcohol are thus lost annually in London alone, and 12,000,000 gallons in Germany. Efforts have been made to save it by condensation, but thus far without success.

The carbonic acid which gives lightness to fermented bread is derived chiefly from the small amount of sugar contained in the flour. If wheat is exposed to dampness after harvesting, or if the flour has been exposed to heat and moisture, the albumen which it contains is transformed into diastase (see BEER), which possesses the property of changing starch to dextrine (gum) and sugar. Bread made from such flour is sweet, sticky, heavy, and dark-colored. Several substances have been used to prevent these results. Alum is said to have been extensively used in London; its use being now forbidden by law, lime-water was recommended by Liebig, and is largely used by the Glasgow bakers. Sulphate of copper is a poisonous salt, said to be used in Belgium, $\frac{1}{30000}$ to $\frac{1}{15000}$ being sufficient for the purpose. Mege-Mouriès announced some years since (*Compt. Rend.*, xxxvii., 775; xxxviii., 351, 505; xlii., 1122; xliv., 40, 449; xlvi., 126; xlviii., 431; l., 467) the discovery of a body, "cerealine," found almost wholly in the bran, which possesses properties similar to those of diastase. He devised means for getting rid of this agent, or at least of its effects, and the following method of bread-making bears his name: It is assumed that 100 kilogrammes of wheaten meal have given

72 kil. 750 grammes finest white flour,
15 " 750 " dark groats,
11 " 500 " bran.

1. At six o'clock in the afternoon take 40 litres* of water at 18° R. (72½° F.), add 70 grammes of pure yeast, or 700 grammes common grocer's yeast, and 100 grammes of starch-sugar. (Instead of the yeast and sugar, take, if necessary, 26 grammes of tartaric acid.) The place where the mixture is set aside must be maintained nearly at the temperature of 18° R. 2. The next morning, at six o'clock, the fluid will be saturated with carbonic acid. Stir in the 15 kilogrammes 750 grammes of groats. Fermentation will commence immediately. 3. At two o'clock in the afternoon add 30 litres of water, and pass the whole through a very fine silk or silver-wire sieve, to separate the fine bran. 4. The 70 litres with which the groats have been treated, after passing through the sieve, will be reduced to about 55 litres, with which the 72 kilogrammes 750 grammes of white flour and 700 grammes of salt are to be kneaded into a dough. (The bran is again extracted with 30 litres of water, and the extract employed in the next batch.) 5. The dough is then placed in baking-pans to ferment. 6. When raised, it is placed in the oven.

The baking of bread can be effected at 212° F., but no crust will be formed; to secure the best result a temperature of 350° to 570° F. should be employed. A high heat should be avoided at first, lest a hard crust be formed while the interior of the loaf remains unbaked. 100 pounds of flour yield from 125 to 135 pounds of bread, the increase being due to the water added. The most common faults of wheat bread are due to its being (1) *sour*, from the flour having been partly spoiled, the yeast or leaven having been too old, or the dough having been allowed to stand too long before baking; (2) *bitter*, from excess of yeast or bad yeast; (3) *heavy*, from insufficient kneading, raising, or bad leaven; (4) *mouldy*, from the flour having been kept too long in a damp place.

Graham bread is made from the unbolted meal of wheat, a mixture of bran and flour; it is used by dyspeptics. *Rye bread* is largely used in Northern Europe, and to some extent in the U. S. It is dark-colored, is harder than wheat bread, and has a peculiar taste.

2. *Substitutes for Fermentation.*—Carbonic acid may be developed in the dough by the decomposition of bicarbonate of potassa (sal aëratus) or of bicarbonate of soda by some acid. Sour milk, hydrochloric acid, tartaric acid, bitartrate of potassa (cream of tartar), and the acid phosphate of lime have been used for this purpose. They give rise respectively to lactate, chloride, tartrate, double potassic tartrate (Rochelle salt) of potassium or sodium, or to (in the case of the last mentioned) a mixture of phosphate of lime and soda or potassa. As neither of these agents causes fermentation, none of the elements of the flour are lost, and a greater yield of bread is claimed. This saving is, however, very trifling, as the loss in fermentation is small. The use of the acid phosphate of lime, suggested by Prof. Horsford, is claimed to restore to the flour the phosphates of the wheat which were removed in the bran. The process has been commended by Liebig. One strong recommendation for these "baking-powders" is the fact that bread may be mixed and baked at once, without the delay of several hours which is necessary where fermentation is resorted to. As cream of tartar and acid phosphate of lime do not act on bicarbonate of soda in the absence of water, either of these acid salts may be mixed with the flour, together with the bicarbonate, thus producing what is now extensively sold in the U. S. under the name of "self-raising flour," which is already salted, and merely requires to be mixed with water and baked to produce a palatable loaf. Carbonate of ammonia (sal volatile) is sometimes used alone to raise bread; being very volatile, it is converted into vapor during the baking and raises the loaf to a light sponge. Mr. Dauglish introduced *aërated bread*, which is prepared by kneading flour in a closed vessel with water supersaturated under pressure with carbonic acid gas. On bringing the dough into the air, the carbonic acid gas set free by the removal of the pressure expands it into a sponge. "Sponge cake" is raised by means of air which is incorporated with the flour by first beating eggs to a froth, stirring in the flour, and quickly baking. "Pastry" is made flaky, but not really spongy like bread, by mixing flour and water to a dough, rolling it out into sheets, applying butter liber-

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* A litre of water weighs 1000 grammes = 1 kilogramme = 2.2 pounds avoirdupois.

ally, doubling over the sheet, rolling it out again, and again applying butter. These operations are repeated till the dough becomes a sheet of innumerable layers of dough alternating with a thin coating of butter. On exposing this to the heat of the oven, the different layers of dough separate, either from the expansion of the imprisoned air or from steam, and the mass becomes light and flaky.

C. F. CHANDLER.

Breadal'bane, EARLS OF, earls of Holland, viscounts of Tay and Paintland, Lords Glenorchy, Benederaloch, Ormelie, and Wreik (1677, in Scotland), and baronets (1625, in Scotland), a prominent family of Scotland.—GAVIN CAMPBELL, the seventh earl, was born in 1851, and succeeded his father in 1871.

Bread-fruit Tree (*Artocarpus incisa*), an important tree of the order Artocarpaceæ, a native of Southern Asia, of the islands of the South Pacific and of the Indian Archipelago, now naturalized in some of the West Indies. This tree grows to the height of forty or fifty feet, and has large, glossy, dark-green leaves, which are pinnatifid or deeply divided into pointed lobes. The leaves are sometimes eighteen inches long. The fruit, which is a *sorosis*, is nearly spherical, and is covered with a rough rind, which is marked with small irregularly hexagonal divisions, having each a small prominence in the middle. The fruit sometimes weighs four pounds or more, contains a large portion of starch or fecula, and is a principal part of the food of the natives of the South Sea Islands. The pulp is juicy and yellow when it is fully ripe, but it is in a better condition for eating before it arrives at that stage of maturity. When it is gathered before ripeness and baked, the pulp is white and mealy, very nutritious, and resembles wheat bread. The usual practice is to cut the fruit into three or four slices, and bake them in an oven. Sometimes the people of a village join to make a huge oven—a pit twenty or thirty feet in circumference—in which several hundred bread-fruits are baked at once on heated stones. Baked in this mode, the bread will keep good for several weeks. The tree produces two or three crops in a year. It has been introduced into the West Indies with some success. The timber, which is light and of a rich yellow color, is used in building houses and for other purposes, but if exposed to the weather is not very durable. A sort of cloth is made of the fibrous inner bark. The tree abounds in a glutinous milky juice, which, when boiled with cocoanut oil, is used as a cement and as bird-lime.

Bread Fruit.

Bread-Nut, the fruit of the *Brosimum Alicastrum*, a tree of the order Artocarpaceæ, is a native of Jamaica. It is allied to the bread-fruit. The genus *Brosimum* has male and female flowers on separate trees in globose catkins. Its fruit is a 1-seeded drupe, which is edible, and is used instead of bread after it has been boiled or roasted. The tree has ovate, lanceolate, evergreen leaves, and abounds in a gummy milk.

Break'water. An artificial barrier designed to *break* the force of waves in sea-ports and harbors and thus to protect shipping from damage; but more commonly to *create* a harbor or a secure anchorage where none existed before. Among ancient works the piers of the ancient Piræus and of Rhodes may be denominated Breakwaters, as also similar modern structures projected from the shore and called *piers* or *moles;* but the term *Breakwater* has of late years been considered as more peculiarly appropriate to large insulated aggregations of stone, whether of regular masonry or sunk promiscuously in rough masses, so placed as to form an artificial island across the mouth of an open roadstead, and thereby, in obstructing and breaking the waves of the sea, to convert a dangerous anchorage into a safe and commodious harbor for the reception of ships of war or merchantmen. In this sense of the term the Breakwater of Cherbourg (Fr. "Digue de Cherbourg") was the first work entitled to the name,[*] and it remains still the *greatest.* It had long formed a favorite project of the French government to establish a great maritime port in this quarter of the kingdom, in order to counterbalance in some measure the great naval station of Portsmouth, situated on the opposite side of the Channel, and the whole coast had been frequently surveyed and examined by the most celebrated engineers for that purpose, but nothing definite was done until the year 1712, when a plan was proposed to the Minister of Marine to construct a detached mole or breakwater, in order to protect the roadstead of Cherbourg. The subject was dropped till 1777 when M. de la Bretonniere, a distinguished naval officer, proposed a plan to construct a detached breakwater, 2000 toises or 12,792 English feet long, having three openings, viz. one in the centre and one at each end: these breakwaters or moles he proposed to make by sinking the hulls of vessels filled with stone, in order to form a nucleus or base for the work in the first instance (similar to the plan which had been adopted at Rochelle by Cardinal Richelieu in the year 1629), and then to cover the hulls of the vessels with loose angular blocks of rubble stone or *pierre perdue*, so as to form one continued breakwater. He proposed this plan of commencing the work because he was fearful that the undercurrents and waves during storms were so strong that it would be impossible for the rubble to lie without some nucleus of the kind to bind it together in the first instance. The objections made to the plan of M. de Bretonniere were, First, that it would require a number of vessels which France could not furnish in ten years. Secondly, that there would be great difficulty in getting a sufficient number of workmen. Thirdly, that although the plan had succeeded very well at Rochelle, yet there was no similarity between the two cases; for whilst at Rochelle there were only from 5 to 6 feet at low water, at Cherbourg there were generally 40 feet, and in some places more, and as the moles at Rochelle were attached to the shore, the difficulties were comparatively trifling to what they would be at Cherbourg, where they would be isolated. Fourthly, that the upper part of the breakwater would be so much exposed that it would not withstand the shock of the waves. Fifthly, that it was not high enough to give sufficient protection to the shipping within.

In 1781 the matter was referred by the Minister of Marine to M. de Cessart, an engineer of reputation for hydraulic constructions of this character. M. de Cessart entertained great doubts of the probability of making a continuous mole of such gigantic dimensions, composed only of loose rubble stone, sufficiently strong to be able to withstand the effects of the waves and currents, the more so as the only similar work at Rochelle had failed just after its completion in 1628; he therefore conceived the idea of breaking and destroying the effects of the waves in the first instance by a series of 90 detached cones, made of wood and filled with stone, sunk in the line of the proposed breakwater, touching each other, or at such distance only from each other as would be sufficient to break and disperse the waves without allowing them to pass bodily through between the cones, by which he considered that sufficient tranquillity would be produced within, so as to form a safe and secure roadstead. The plan of M. de Cessart was approved and adopted and himself appointed the Chief Engineer of the work. The cones were proposed to be 142 feet diameter at the base 113 feet diameter at the top, the sides inclining at an angle of 60°, and 65 feet high: the total weight of each was 2,000,885 lbs., and would displace 27,418 cubic feet of water; and in order to give as little resistance as possible, and to render it more buoyant, he proposed to attach to it 68 great casks, 12 feet long and 7 feet diameter: it was calculated that in calm weather it would require 250 men in boats to tow out one of the cones;

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[*] Mr. George Rennie in his letter of Dec. 31, 1835, concerning the proposed Madras Breakwater (Engineering Oct. 18, 1872) enumerates many other ancient and modern works as "breakwaters." It is evident enough, from the tentative process by which the Cherbourg advanced, that no previous work furnished adequate information as to the principles of such constructions and hence that none was entitled to be named with these hereafter described. The numerous "moles" he mentions differ from such breakwaters in many respects besides their connection with the land.

this operation would occupy five or six hours, and the sinking 36 minutes; the depth of water where they were to be sunk was from 6 to 7 fathoms, and the rise of tide at ordinary springs 18 feet, so that the upper part of the cone would be from 8 to 10 feet above high water. Immediately after the caisson was sunk, it was to be filled with stone, viz. rubble to the level of low water and masonry above. Eighteen of these 90 cones were put in place at an expense of about £14,000 each. Their expense and the repeated damage occasioned to them by storms induced the Committee of Direction to abandon the plan of M. de Cessart, notwithstanding his dissent and strong remonstrances against it. No more than eighteen cones were deposited, the last being placed on the 19th of June, 1788, and they subsequently adopted the plan of throwing down nothing but rubble, wholly against the advice of M. de Cessart, who said that the rubble alone would never be able to resist the force of the sea, and that it would be utterly impossible to construct the mole or digue in that manner. Fortunately, however, the advice of M. de Cessart was not taken, and the contrary opinion prevailed.

The foregoing is interesting as showing that the fundamental knowledge of the force and action of waves upon such structures being unknown at that day, how feeble and groping were the efforts to design an efficient breakwater. Says Sir John Rennie,—("Theory and Construction of British and Foreign Harbours") "The well-known principle, that all materials take their angle of repose more or less according to the density, tenacity, and gravity of their component parts, combined with the external forces acting upon them, does not appear to have inspired M. de Cessart with sufficient confidence to trust to the rubble alone; and the moles at Rochelle, which he seems to have studied with great care, did not inspire him with greater confidence, although the small rubble of which they were composed, the steep slope at which the rubble was laid, and the heavy sea to which they were exposed might readily have suggested to him the cause of their failure. It is still more extraordinary (if he doubted the efficiency of the small stones which he employed, weighing only from 30 to 100 lbs. each), that he did not employ blocks of much larger size, as he was doubtless aware that they would be moved with much greater difficulty by the sea; in fact, by the mere inspection of the sea-shore he would have found that within the range of the waves it invariably takes the angle or inclination according to the materials composing its surface; for example, sand lies at an angle of 1° 30′, or 40 to 1; beach, or loose pebbles, at angles of 11° or 8°, or 5 and 7 to 1; and heavier materials at a steeper angle, or almost perpendicular; but, abandoning the simple laws of nature, he went out of his way to invent the expensive unwieldy cones, which were no sooner fixed in their places, than nature, as it were, deriding his feeble efforts, at once destroyed and overturned them."

The cones having been abandoned small rubble continued to be thrown in until 1790 with an inside slope of forty-five degrees, and, outside, one upon three. In 1792 a commission of the French government reported that the digue had hitherto been constructed with small stones only one-fifth of a foot cube each, and that these had undergone considerable alteration as to the form of the mass, to the depth of 16 feet (English) below low water of the lowest tides, so that it was impossible to construct a permanent mole with such small materials; but they found in a small portion, 50 toises long, where blocks of 20 cubic feet had been employed, that they maintained their position tolerably well, and preserved the small blocks within them, although where there were only smaller blocks, they were sensibly damaged and removed, and displaced, *particularly near the cones*, which, although cut down to low water, materially increased the shock or recoil of the waves, while they acted with greater force upon the small loose rubble near them. They therefore came to the unanimous conclusion, that as blocks of from 15 to 20 cubic feet would withstand the effects of the waves, still greater durability would be obtained by employing larger blocks. The question as to the height to which the mole should be carried, in order to ensure the necessary tranquillity within the roadstead, was much more difficult to determine: it was found that the action of the waves was most sévere two hours before and two hours after high water, or when the tide had risen about 16 feet; and at such times, during gales of wind, vessels riding within the breakwater suffered great inconvenience, so that it was necessary to raise the breakwater or digue at least to that height; but even this would not ensure sufficient tranquillity to enable boats to communicate from the shore with vessels in the roadstead at all times; and considering that this great advantage would only be obtained by raising it to the height of 9 feet above the level of the highest tides, so as to place it beyond the general reach of the waves, they finally resolved to recommend that it should be carried to that height.

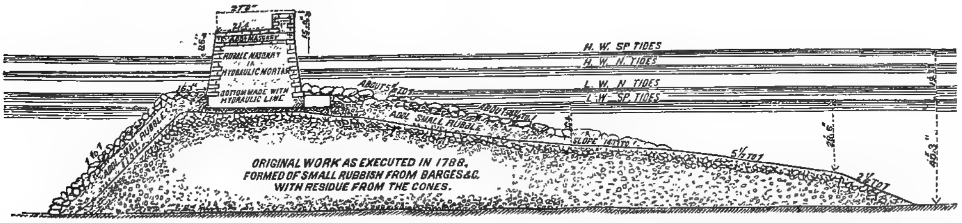
In the year 1802 the work which had at different times been raised nearly its whole length to the level of low water of spring tides, had been lowered by the violence of storms to a depth of from 12 to 15 feet below low water: the inner slope was 1 to 1, or 45°; the exterior 1½ to 1, or 33°, from the bottom to 18 feet above it; and from thence to within 6 feet of low water of spring-tides it had assumed the slope of nearly 8 or 10 to 1, or an angle of 7° and 5°, at which it seemed to be permanent. Such being the state of the work, notwithstanding the employment of larger blocks of stone, great difficulties were anticipated in constructing a battery upon it, which the Government nevertheless determined to do.

For the next six years operations appear to have been confined to the enlargement and raising of the central part of the dike and construction of the battery. Several severe storms occurred in this period doing great damage. The most severe was Feb. 12, 1802, when the sea covered the whole platform of the battery, and the barracks with 60 men were swept away. The mass, properly speaking, of the battery suffered but little, although the pavement was torn up and the blocks were wedged into fresh slopes with great regularity, as if they had been cemented together by the hand of man. The real effect of the storm was generally to consolidate the mass of the work more firmly together. New wooden barracks were erected, and after this repair the battery remained in a good condition throughout the war.

Thereafter until 1830 little was done except to preserve the central battery and to raise the remainder by means of rubble to low water level; but finding it extremely difficult to maintain it in that position, and feeling that, in order to secure the desired tranquillity within the roadstead, it was necessary to raise the superstructure at least from 9 to 10 feet above high water of spring-tides, it was finally resolved, at the recommendation of several engineers, to construct a wall of solid masonry, with almost vertical sides, from low water upwards, upon the top of the rubble base: this upright wall extends from thence up to the full height of 6 feet above the level of high water of spring tides; it is composed of rubble masonry faced with granite ashlar or dressed stone, in horizontal courses from 18 inches to 2 ft. thick, and 3 to 4 ft. wide, set in mortar. This part of the work is 36 feet 3 inches wide at the base, and 29 feet 3 inches wide at the top, the outer slope being ⅕ to 1, and the inner slope nearly the same: on the outside of this superstructure there is a solid parapet 8 feet 3 inches thick, 6 feet high, and eight feet six inches wide at the top. The exterior base of this wall is founded on a bed of beton or concrete, set in wooden boxes or cases 10 feet long, 6 feet 6 inches wide, and 3 feet 3 inches deep dove-tailed together, and well bedded in and covered with large blocks of rubble stone.

No sooner was this vertical wall raised above the level of high water than it presented such a sudden resistance to the waves, rolling upwards along the rubble slope, that they broke against the face of the vertical wall with the greatest violence, and rising perpendicularly against it, fell down upon the rubble, undermining the base of the vertical wall and threatening to overwhelm it entirely. To obviate this. it became necessary to raise the rubble slope still higher, and to case the surface with large heavy blocks, well wedged together: still this only partially remedied the evil, for, notwithstanding this casing, during

FIG. 1.



heavy N. W. and N E. gales at high water the waves beat with such violence against it, that heavy masses of water wash over the top, so as to render it both difficult and dangerous to walk along it, although nearly 10 feet above high water of the highest tides; and it has been proposed (1850) to carry the rubble slope still higher in front of it, also to raise the wall 8 feet higher.

Sir John Rennie from whose great work on Harbours the foregoing is taken draws the following "conclusions":

First. The plan of making the digue or breakwater isolated or detached from the shore is the best, and, if carried into effect with greater judgment, would have been more advantageous to the harbor.

Secondly. The cone system, although ingenious, was inapplicable and failed.

Thirdly. The rubble system for the mass of the work is correct, and if blocks of greater size had been employed, the result would have been more advantageous in economy of time, labor, and materials.

Fourthly. The vertical wall system is inferior to the flat slope.

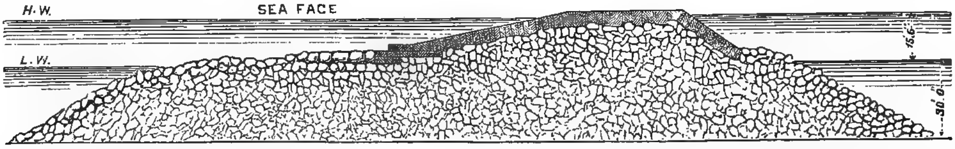
The history of the Cherbourg Breakwater has been thus given in some detail, since, being the first work of the kind, the experience derived has furnished *data* for subsequent works.

The next great breakwater in order of time and importance is the "Plymouth," intended to render Plymouth Sound a safe roadstead for ships of war. It was recommended by Messrs. Rennie and Whidby as the most practicable and best mode of constructing this great work, to heap together promiscuously large blocks of stone, which were to be sunk in the line of the intended breakwater, leaving them to find their own base,* and take their own position; and it was conceived that stones of the weight of from one and a half to two tons each would be sufficiently large to keep their places, without being rolled about by the tremendous swell which, in stormy weather, is thrown into Plymouth Sound; and thus avoid the inconvenience as well as loss of time and labour which the French had experienced at Cherbourg by throwing down small rubble stones. It was thought, that, in those places where the water was five fathoms or thirty feet deep, the base of the breakwater should not be less than seventy yards broad, and the summit ten yards, at the height of ten feet above the low water of an ordinary spring-tide; in other words, that the dimensions of the breakwater in these places should be forty feet high, thirty feet across the top, and 210 feet wide at the foundation. There are in this work about 900,000 tons of stone of which in blocks

	Tons.
Of one ton each stone, and under	423,904
Of one to three tons each	309,706
Of three to five tons each	150,593
Of five tons and upwards	12,760

The cost of the work was £364,000; a little over eight shillings per ton of stone. More recently the surface above low water has been covered (or "paved") with blocks of stone of great size, of regular dimensions, and closely and smoothly laid. The work has completely answered the expectations of its advocates.

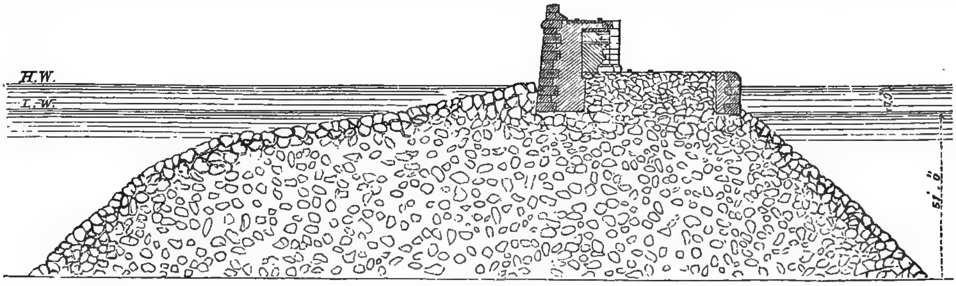
FIG. 2.



The PORTLAND Breakwater, designed to create a harbor of refuge, commenced in 1849, has recently been finished. It commences with a pier projecting from the shore, of 1900 feet in length. Then follows a gap or opening of 400 feet to admit vessels of the largest class, coming from the Southward. Beyond this gap the breakwater proper commences, and extends seaward 6000 feet. The pier is formed by a rubble mound, composed of stone of all sizes, from 6 and 8 tons down to small chippings; and this mound is carried up to a few feet above the level of high water of spring tides. When it has been washed by heavy seas, a trench is excavated within the body of the mound to the level of low water of spring tides, and a wall of masonry erected. The face course is formed by large ashlar blocks, the body of the wall being of heavy rubble work set in mortar made of blue lias lime and pozzuolana. The ashlar face courses up to about 6 feet above high water are of granite, all the remainder of the stone employed being from the quarries in Portland. The sea wall is strengthened by counterforts placed 20 feet apart, and an arch being turned between each, a platform is obtained 15 feet wide, exclusive of footway and parapet. Instead of throwing overboard from vessels, the deposit of stone and other operations were carried on from a timber staging, the rubble stone being conveyed in waggons drawn by locomotive engines, a mode introduced by the late Mr. Rendel, C. E., which proved entirely successful. Guided by results obtained elsewhere, it was decided when the work was commenced to keep all the horizontal timbers of the staging at least 12 feet above high water of the highest tides; and experience proved that this was necessary to ensure safety. The breakwater proper is simply a rubble bank, the material of which it is formed being for the most part the "cap-stone" which covers the valuable Portland stone, but which of itself is valueless, except for this purpose. The rubble, as in the pier, includes stones of all sizes, from large masses down to chips, which latter the action of the water has driven in between the larger blocks until (as is said) they have become united into a compact and almost solid mass.

During the construction the 400 feet opening was bridged by a staging, which withstood the severest storms. It was designed by Mr. Rendel and consisted of piles formed of creosoted logs. To the lower end a Mitchell screw was attached which was screwed 6 or 8 feet into the clay. These, about 80 feet apart, supported the platform to which of course they were strongly bolted and bound. The cost of this work exceeded £1,000,000.

FIG. 3.



Portland Breakwater.

The works just described illustrate the most common mode of breakwater construction, *i. e.* the *"pierre perdue,"* "long slope," or (as we call it) the "rip-rap" system. This is simply the deposit in the sea of a vast amount of loose rubble stone, rising to about the level of high water, allowing it to take its own level and to be acted upon by the sea, until its section assumes the permanent form which this action gives it. The seaward side obeys the laws of ordinary sea-beaches, and forms itself into a long sloping shore, involving the employment of an enormous amount of material before the mound reaches the height to give the required protection. Such a system is only applicable where stone is abundant, and can consequently be deposited at a cheap rate. But stone is not everywhere to be had, especially in large blocks, and experience has shown that unless blocks of considerable magnitude are applied to the upper portions, permanence cannot be ensured. Hence a substitute has been found in large blocks of concrete (Fr. *béton*). M. Poirel (see his "*Mémoire sur les Travaux à la Mèr*") was the first to introduce this system in the construction of a mole at Algiers, which he constructed at first wholly of blocks of béton of 10 cubic metres, or about 22 tons each, launched into the sea as *pierre perdue*. M. Poirel states that although the profiles "differed somewhat from each other, yet they gave generally for the slopes at which the artificial blocks arranged themselves, a rate of 1 base to 1 perpendicular (45°) for the exterior, and of ½ base to 1 perpendicular (57°) for the interior side." He adds "that it appears, on a comparison of the cubic contents of the mole as given by these profiles, with the account kept of the quantities contained in the blocks immersed, that the interstices are very nearly one-third of the solids; or, which is the same thing, that the voids are equal to one-fourth of the whole mass." In prolonging the mole, since 1847, the French had adopted a cheaper system, by forming the mass from the bottom with blocks of natural stone, which were brought up till the uniform depth of 33 feet under water was attained at slopes of 1 to 1. This method was subsequently employed in forming the new port of La Joliette, at Marseilles; and, more recently, for the jetees forming the artificial harbor of Port Saïd at the entrance to the Suez Canal.

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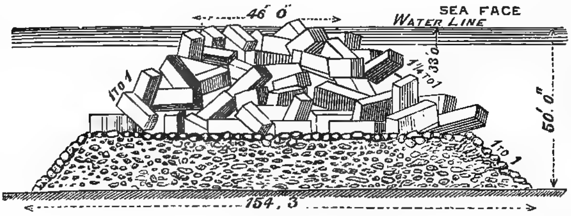
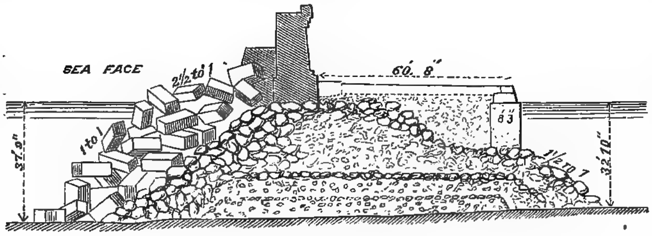
* It is stated by Mr. Rennie (see latter hereafter) that the original section was triangular with outer slope of 18°.

FIG. 4.



Mole at Algiers.

FIG. 5.

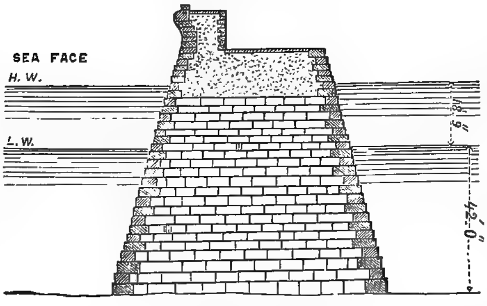


Mole of Joliette at Marseilles.

In other situations destitute of suitable stone, another form, the vertical-wall system, is adopted. In this mode the walls are built upright from the bottom, and as all the material below low-water is put in place by diving apparatus, and is of an expensive nature, the cost of a work executed in this way is very great. The Dover breakwater is the most prominent example. It is built up solid from the bottom of the sea, the exterior facing being of ashlar granite blocks, and the hearting of rectangular blocks of concrete, built in the same way as ashlar masonry up to the level of high-water, above which it is filled in with concrete.

Concrete blocks are a costly substitute at best for rough quarry stone (when that is at hand), and with a system of construction which requires each block to be "laid" (under water), the expense must be very great. The Dover Breakwater has cost over £400 per lineal foot.

FIG. 6.



Dover (West) Breakwater.

It has been a subject of discussion whether the "long slope" or the "vertical wall" system were preferable: waves in deep water are chiefly oscillatory in their character, the fluid having little progressive motion in itself, and consequently exerting but little force on objects opposed to it; but when deep sea waves approaching the shore, feel the influence of gradually shoaling depth, they assume an entirely different character, acquire progressive motion, and become waves of *translation*, in which the fluid is carried bodily forward in a horizontal direction, and in consequence it strikes any body opposed to it with great percussive force. Vertical walls, therefore, which rise from the deep water, being only subject to the oscillatory movement of the waves, are least exposed to the destructive effect of storms. The evidence taken before the Royal Commission in 1859 seemed to be conclusive on this point, and the opinions of the Commissioners, as developed in their report, may be considered to have set this subject at rest. But whatever difference of opinion there may still be upon this matter, there can be no question as to the vast saving of material by vertical walls, and of the great economy which would result, provided a simple and easy mode of construction could be adopted. The vertical system has, besides, the great advantage of being applicable in many cases as quays for vessels lying alongside to load and discharge, which may be turned to valuable account both for commercial purposes, and in times of war, for the rapid shipment or debarkation of troops, stores, and other materials. (See Paper by D. Miller, "C. E. and Arch. Journal," 1865.) But it is implied that the wall *springs from deep water; i. e.* fifteen feet at least, the experience at Cherbourg, Alderney, Portland, and Holyhead having shown that the sea did not disturb rubble at a depth of 15 feet below low water; and, hence, there may be a combination of the vertical wall and slope, which is nearly equal to a vertical wall;—as when a nearly perpendicular wall is built upon a rubble mound, as near to the edge of the slope as was consistent with the safety of the foundation; the surface of the mound being 15 feet below low water, and the slope being the natural one of about 1 to 1.

It is to be observed that the vertical construction on the Cherbourg breakwater, instead of springing from great depth, commences at *low-water* mark—an arrangement which we believe is now generally condemned. (The Civil Engineer and Architects' Journal of 1865 furnishes graphic sections of the different works alluded to and of others, as of Cette, La Ciotat, Cassis, Vendres, with interesting discussions as to the form and cost of breakwaters.)

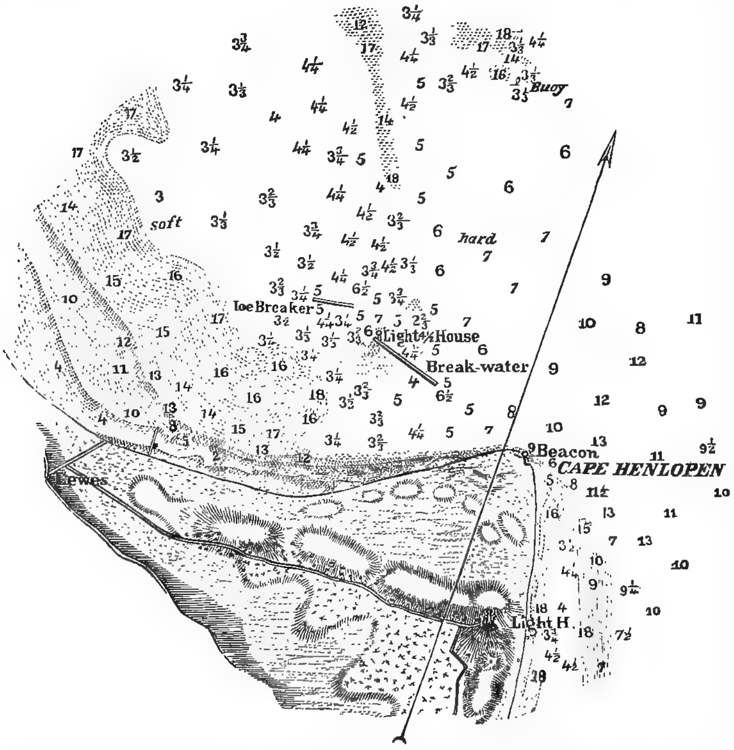
In the construction of a sub-aqueous mass on the "riprap" system, whether for a breakwater or a foundation, a question arises as to the size of the material to be used. The Cherbourg work was first constructed wholly of very small stones; it was subsequently found necessary to cover its more exposed surfaces with large blocks. In the Plymouth, the system at first was to use the largest stones obtainable from the quarries. At Portland and at Holyhead the large and small stones were used promiscuously, even the quarry rubbish being deposited for the purpose of filling up the interstices. The French engineers, on the contrary, considered the best system of employing rubble was not to mix the small with the large blocks. In one of their best constructed moles, that of La Joliette, at Marseilles, this method has been strictly adhered to. The large blocks being only used where required, were not unnecessarily wasted in the heart of the work. Small pieces of stone mixed with large rubble, far from consolidating the work, very often had the effect of allowing the larger masses to be more readily displaced. Stones weighing 5 tons and even 7 tons are thrown out of place by the waves, in consequence of the small stones getting in between them, and keeping them in motion during every storm. If, however, heavy blocks only are employed, so as to remain stationary under the greatest action of the waves, nothing would be gained by the interstices being filled up.

M. Cachin deduces from the experience of Cherbourg, as developed by observations after exposure to the severest tempests, the following facts concerning the natural slopes assumed by the exposed face of the breakwater. Above the highest storm tides the talus assumes a slope of 1 upon 1.8; between extreme high and low water 1 upon 5½; between the level of lowest storm-tides and a plane 5 metres (16½ feet) below this level, 1 upon 3; thence to the bottom 1 upon 1¼. Hence it is generally assumed that at three fathoms below low water the force of the waves is insignificant. Hence the nucleus of a breakwater may be constructed to that height of small stones, say of blocks of ½ ton down to quarry rubbish. Larger stone is required above this, say from 2 to 5 tons; but if the surface is to be finished with loose blocks, alone, those of the outer coating must be of large dimensions. The French engineers, in the construction of the new mole at Algiers found by experience that blocks of 10 metres cube, or about 22 tons, were requisite to withstand the shock of the waves. At Marseilles and at Cette the beton blocks weighed 25½ tons; but at Cassis, in a more exposed situation, with very deep water outside, and a long stretch of sea, the outer face of the mole required blocks of 20 metres cube; for on trial, blocks of 10 and even of 15 metres cube were found insufficient.

The experience at Cherbourg gives about the same results; a block of beton of 4 metres × 2.25 × 1.40, or 12.60 cubic metres volume and 28,980 kilogrammes weight, lying loosely and exposed, resisted the most violent tempests. M. Cachin estimates the force required to move this stone at 3900 kil. per sq. metre (or 800 lbs. per square foot) of *exposed surface.* At Skerryvore stones of 5 tons were swept over the top of the rock and Mr. Stevenson's Dynamometer measured pressures of 6000 *lbs. per sq. foot;* and this extreme pressure has been confirmed in a few instances elsewhere (see a remarkable instance in the Journal Des Ponts et Chausées April, 1859).

It remains to allude to our own great work, the Delaware Breakwater. This, unlike those of Plymouth and Cherbourg, mainly undertaken in reference to naval aggrandizement of the respective nations, was designed solely for the benefit of trade and commerce and the preservation of life. The need of a *harbor of refuge* near the mouth of the Delaware Bay was early recognized. Commissioners appointed by Congress in 1828 selected Cape Henlopen as the site. They said "the objects to be gained by an artificial harbor in this roadstead are to shelter vessels from the action of the waves caused by the winds blowing from east to north-west round by the north, and also to protect them against injuries arising from floating ice descending from the north-west." Having these objects in view, the commissioners proposed two works—the breakwater proper, to secure the first object; and the ice-breaker, an auxiliary to the breakwater but chiefly to accomplish the second purpose. The first mentioned was designed with a length of 1200 yards. The ice-breaker was designed with a length of 500 yards.

Fig. 7.



As now constructed the length of the breakwater proper is 2589 feet and the ice-breaker nearly 1500 feet long. In designing the work the Commissioners had the two great examples which we have described before them,—Cherbourg and Plymouth—both, originally, on the "rip-rap" system. Adopting that system they copied the slopes from the first but fixed a width on top 8 feet less than that of Plymouth. The great mass of the breakwater consists of blocks ranging from ¼ ton to 3 tons; the seaward slopes being coated with stones of from 1½ to 7½ tons. The *exposure* is by no means so severe, owing to the shoals off the mouth of the bay, as at others we have noticed. Blocks of 6000 lbs. weight have been moved several feet, as in the gale of March, 1843; but the injuries inflicted by the waves have been but slight.

In an official report of the writer when (1853) in charge of this work, occurs the following passage: "I consider the profile and the principles upon which it is based radically vicious. They are to trust to the isolated mass of each block of stone, exposed on the surface, to retain its position, while at the same time an accumulated mass is heaped up twice as great as necessary to resist the total effort of the waves. Though little attention has been paid to the recommendation of the Commissioners as to the arrangement and mass of stone above low water, the breakwater has resisted every storm which has yet spent itself upon it; and if occasionally a block of considerable dimensions has been moved from its place, it has been utterly disconnected from the mass of the work, and generally on unfinished portions over which the sea swept with all its violence."

* * * * * * * *

. . . "in the future arrangement of the work I should urge that, from the extreme low water line, the work should consist of dimension stone carefully laid in courses of headers to the sea, having dimensions of at least nine feet in length, and two by three on the head, and that the top should be capped with stone twelve feet in length, covering the whole with such blocks as would, even if isolated, be able to maintain their stability when thus placed lengthwise to the sea."

The method of construction above recommended in 1853 has been sanctioned by the practice at all the more recent works at Holyhead, Portland, Alderney, etc., which have vertical walls starting *from low water.* But not only is wave action developed with all its violence by a sloping surface reaching from low water to 2½ or 3 fathoms but it is these long slopes which render the total rip-rap mass so great. The vertical wall should therefore extend *below* low water to the region of comparative quiescence. The Delaware Breakwater contains 900,000 tons (very nearly) of stone costing (all expenses included) an average of $2.35 per ton. Previous to 1839 when 835,000 tons had been placed the average was $2.27—the average has subsequently been over $4.00. Assuming an average depth of 5 fathoms (30 ft.) and that the "rip-rap" is only raised 15 feet above the bottom, with 30 feet width at top, an inner slope of 1 upon 1 and an outer as gentle as experience might prove to be necessary, the total length, 4000 feet (about), of breakwater and ice-breaker would not, with large allowance for sinking into the sand, consume more than 300,000 tons which, at the earlier rates, would have cost $675,000. A wall with 20 feet base and rising 25 feet with 15 feet width at top built of quarried dimension stone in large blocks may be laid (without mortar), even at present more than doubled prices, at $10 per ton. For a length of 4000 feet there would be needed say 120,000 tons costing $1,200,000, and making the total cost say $1,875,000. The actual cost is officially reported to have been $2,123,505. The vertical-wall construction would, of the two, probably be the least expensive, while, instead of presenting to the violence of wave-action a collection of loose isolated blocks it would, with regularity of shape, possess the strength derived from the union of its elements in mutual support, into an integral mass. It would also serve as a quay wall alongside which vessels could haul, if through damages received at sea, it were necessary to remove portions of cargo or ballast. A recent work, the Manora Breakwater (Scinde, see "Engineering" May 3, 1872), more properly speaking, a "Jetty," is referred to in illustration of the *principle* of construction just sketched and which was contemplated in the report of 1853.

The general principle of that breakwater is that of a bank of rubble stone laid upon the natural bottom and brought up to a level of 15 ft. below low water, but near the shore, where the original depth is less than this, to 10 ft. below low water. Upon this bank of rubble stone a superstructure is raised, consisting of blocks of concrete each 12 ft. × 8 ft. × 4½ ft., and weighing 27 tons, set upon the narrowest side, so that the whole superstructure consists of two blocks in width and three in height, forming a solid wall, with vertical sides 24 ft. wide and 24 ft. high. The blocks are set in place by means of an overhanging crane. (See Fig. 9.)

The peculiar form of structure adopted for the Manora Breakwater has the advantage, under these circumstances, that it does not depend for its strength on bonding or lateral connection of the several blocks as in ordinary masonry. Any security that this bonding may afford while the foundation holds good is at once lost when the foundation yields and the superstructure sinks unequally. In the present case, if the foundation under one block fails, that block and those immediately over it must drop, but those on either side are in no way affected.

"It has been determined, on data based on experience, that the most favorable depth for the foundations of the superstructure is 15 ft. below low water, and for the future the rubble base will be in the first instance kept down to that level so that little or no dredging or excavation by the divers will be required; and if, under these more favorable circumstances, the foundations can be prepared—as it is expected they may be—there is no reason why 300 ft. of breakwater should not be built in each month of the working season."

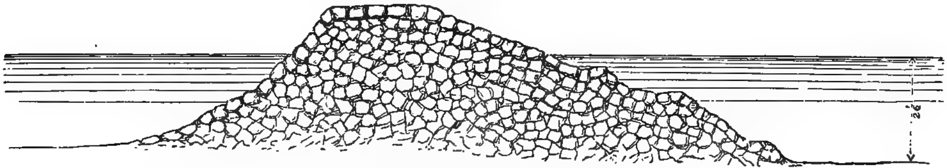
The "Monsoons" blow with great violence at Manora, and the wave action is described as only somewhat less than at Alderney, but none of the blocks on the sea-side have ever been forced out.

Mr. Rennie in the letter already referred to, after stating that the Plymouth work was "originally designed to be on the triangular system with interior slope of 45° and exterior of 18° or 1 upon 3¼ (by which in 20 ft. depth the base would be 250 ft.) was changed (see section) in consequence of the top having been swept away by the storm of 1829, "thus pointing out the necessity of a further augmentation of the base and a change in the slopes;" so that the base became (in that depth) 350 ft. "The above form has been found to answer most effectually, and to remain undisturbed during the greatest storms. A casing of cut granite has been put over a considerable part of the surface, and the previous filling the interstices between the large stones with quarry rubbish has tended to consolidate the whole into one great mass." Doubtless with "a casing of granite" the "long slope" system may be made stable; but *that* casing, in the case before us, consumes more large dimension stones than the hypothetical wall I have mentioned in connection with the Delaware Breakwater.

A *mean* section (for it is very irregular) of the Delaware Breakwater is given below. In the language of an official report already referred to the "harbor of refuge" which it creates is in no sense a work "of mere local interest. It was constructed for, and is resorted to by, the floating commerce of the *nation*, and in this light only should it be regarded. It has been the means of saving millions of property and countless lives from destruction; property whose owners or underwriters are as widely distributed as are the merchants and ship-owners of the nation, and lives whose preservation is a duty which a nation owes to humanity." Its utility is best exhibited by the statement that since 1833, 246,011 vessels have taken refuge from storm under its protection, of which 17,307 in the year 1871 alone. "Let a threatening sky foretell the approaching storm, and a few hours will suffice to fill a previously vacant harbor. Let a north-easterly storm continue a day or two, with severity, and the harbor becomes crowded entirely beyond its capacity. The fleet of vessels which now fill it are seen to come in, in rapid succession, from the seaward; and there is no single fact more capable of impressing on the mind the magnitude of our coasting trade than the great number of vessels which a few hours' time will, under the above circumstances, congregate at this point." *Jetties*, such as the interesting works at Port Saïd; at the sea termination of the North Sea Canal of Holland; and those recently constructed to form a new mouth to the river channel to Rotterdam and also at the Sulina mouth of the Danube have much in common with breakwaters, but in general their direction, normal to the shore, saves them from the severe exposure of breakwaters. They will be mentioned in the article HARBOR; and reference is made to a Report on the North Sea Canal of Holland, Prof. Papers, Corps of Engineers, No. 22. (Works to be consulted: "Theory and Construction of British and Foreign Harbours," by Sir John Rennie; "La Digue de Cherbourg" (Cachin); "Cours de Construction des Ouvrages Hydrauliques des Ports de Mer" (Minard); "Mémoire sur les Travaux à la Mer" (Poirel); "Civil Engineer and Architects' Journal;" "Annales des Ponts et Chaussées;" "The Engineer;" "Engineering," etc. etc.)

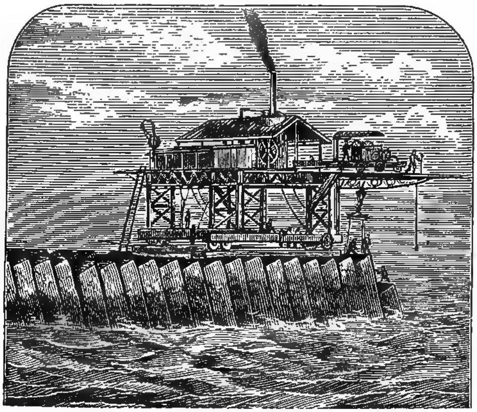
J. G. BARNARD.

FIG. 8.



Delaware Breakwater (section).

FIG. 9.



Manora Breakwater.

Bream [Fr. *brème*], a name given to several species of fishes. One is a fresh-water fish of the family Cyprinidæ, the *Abramis brama*. It is found in many rivers and lakes of Europe. Several true breams occur in North America. The name sea-bream is given to various European fishes of the genera *Pagellus, Cantharus, Brama*, etc. Among these are the black bream (*Cantharus griseus*) and the *Pagellus centrodontes*. Bream is also a synonym of the *Pomotis vulgaris*, or sunfish, a fresh-water fish of the U. S., which is remarkable for its beautiful colors, and is esteemed for food. It constructs a curious nest, and is abundant throughout a great part of the U. S.

Breast. See MAMMARY GLANDS.

Breast, Ab′scess of, chiefly arising from overloading of the breast with milk, following child-birth. It is best prevented by a brisk purge, quinine, and febrifuges and the unloading of the breast, thorough rubbing, and inunctions of warm camphorated oil. When abscess is formed, it must be poulticed or incised.

Breast Wheel, in hydraulics, the name given to a water-wheel so placed as to be struck by the stream of water nearly on a level with the axle, the lower quadrant of the circumference on the side opposed to the stream being placed in a race or channel concentric with the wheel, through which the water is conducted in its descent from the higher to the lower level.

Breast′work, in fortification, is a hastily-constructed earthwork, generally without a banquette. It is sufficiently high to afford shelter to the soldiers standing on the level of the ground and firing over the crest. It is usually a pile of earth, but may be formed of gabions, bags of sand, or bales of cotton. It is intermediate in size and importance between a parapet and an *épaulement*.

Breath. See RESPIRATION.

Breathitt (JOHN), born near New London, Va., Sept. 9, 1786, removed in youth to Kentucky, where he was a surveyor and teacher, and was admitted to the bar in 1810, He was a zealous Jacksonian Democrat, and was lieutenant-governor of Kentucky (1828–32) and governor (1832–34). Died at Frankfort, Ky., Feb. 21, 1834.

Bre′ccia, an Italian word applied by geologists to a collection of angular fragments of any hard rock cemented into a compact mass either by carbonate of lime or other natural cement. Rounded fragments under similar circumstances form conglomerate or pudding-stone. The Potomac marble, of which some columns of the Capitol at Washington are made, is a breccia composed of marble, sandstone, etc.

Bre′chin, a town of Scotland, in Forfarshire, on the left bank of the South Esk, 38 miles by rail S. S. W. of Aberdeen. It stands on an abrupt declivity, and some of the streets are very steep. It has a cathedral, part of which was built in the thirteenth century, now used as a parish church. Adjacent to this church is a remarkable round tower eighty-five feet high, and surmounted by a spire of twenty-five feet. Here are manufactures of linens and sailcloth, bleaching-works, etc. It is the seat of an Anglican bishop. Pop. of Parliamentary borough, in 1881, 5083.

Breck (Daniel), LL.D., born at Topsfield, Mass., Feb. 12, 1788, graduated at Dartmouth in 1812, and became a lawyer of Richmond, Ky., in 1814. Besides holding other offices of responsibility, he was associate justice of the Kentucky court of appeals, the highest court of the State. He was a member of Congress 1849–51.

Breck (Samuel), born at Boston, Mass., July 17, 1771, removed to Pennsylvania in 1792; was many years in Pennsylvania legislature and Philadelphia city government; member of Congress 1823–25; member of Pennsylvania Historical Society; published historical sketch of Continental paper-money. Died at Philadelphia Sept. 1, 1862.

Breckenridge, on R. R., capital of Summit co., Col. (see map of Colorado, ref. 3–D, for location of county), is near the base of the Rocky Mountains, 70 miles W. S. W. of Denver. Rich gold-mines abound here. Pop. in 1885, 957.

Breckenridge, R. R. junction, capital of Wilkin co., Minn. (see map of Minnesota, ref. 6–A, for location of county), on the Red River of the North, 217 miles W. N. W. of St. Paul. Steamers ply between this point and the Manitoba settlements. Pop. of township in 1885, 996.

Breckenridge, capital of Stephens co., Tex. (see map of Texas, ref. 2–G, for location of county). Pop. in 1880, 497.

Breckenridge (John), a native of Virginia, born in 1760, removed to Kentucky. He was elected to the U. S. Senate in 1801, and was appointed attorney-general by President Jefferson in 1805. Died Dec. 17, 1806.

Breckenridge (John), D. D., born at Cabell's Dale, Ky., July 4, 1797, graduated at Princeton in 1818, was an eminent Presbyterian preacher, an able polemic writer, and chaplain to Congress 1822–23. He was prof. of theology at Princeton 1836–38; pres. of the African Colonization Society, and at the time of his death president-elect of Oglethorpe University, Georgia. Died Aug. 4, 1841.

Breckenridge, or **Breckinridge** (John Cabell), a statesman and general, a grandson of John, first noticed above, was born near Lexington, Ky., Jan. 21, 1821. He studied law, which he practised at Lexington, and was elected to Congress by the Democrats in 1851. He was chosen Vice-President of the U. S. in 1856, when James Buchanan was elected President. In 1860 he was nominated for the presidency by the Anti-Douglas Democrats who seceded from the convention that met at Charleston. His competitors were Abraham Lincoln, John Bell, and Stephen Douglas. Breckenridge received seventy-two electoral votes, being supported by all the Southern States except Virginia, Kentucky, Tennessee, and Missouri. Having been elected to the U. S. Senate, he took his seat in Mar., 1861, but he joined the Confederate army in the autumn of that year. He served as major-general at the battle of Stone River, which ended Jan. 2, 1863, and at Chickamauga, Sept. 19 and 20 of that year. In May, 1864, he defeated Gen. Sigel at Newmarket, in Virginia. He became secretary of war at Richmond in Jan., 1865, visited Europe about five months later, and returned to the U. S. in 1868. Died May 17, 1875.

Breckenridge (Robert Jefferson), D. D., LL.D., an eminent Presbyterian minister, born at Cabell's Dale, Ky., Mar. 8, 1800, was an uncle of the preceding. He graduated at Union College in 1819, and practised law in Kentucky eight years (1823–31). Having preached for some years in Baltimore, he removed to Lexington, Ky., in 1847, and became professor of theology at Danville in 1853. He published "Travels in Europe" (1839) and several works on theology. His principal work is in two volumes, "The Knowledge of God, objectively considered" (1857), and "The Knowledge of God, subjectively considered" (1859). He was a loyal friend of the Union in the civil war. Died at Danville, Ky., Dec. 27, 1871.

Breck′inridge (Gen. James), born in Botetourt co., Va., Mar. 7, 1763, was a soldier of the Revolution, graduated at William and Mary College in 1785, and became an eminent Federalist lawyer and a public-spirited citizen of Virginia. He was a member of Congress (1809–17), and co-operated with Jefferson in establishing the University of Virginia. He was one of the originators of the Chesapeake and Ohio Canal. Died in Aug., 1846.

Brec′on, or **Breck′nockshire,** an inland county of South Wales, has an area of 719 square miles. It is bounded on the N. by Radnor, on the E. by England, on the S. by Glamorgan, and on the W. by Caermarthen. The surface is occupied by several mountain-ranges and deep, beautiful, and fertile valleys. The highest point of this county is Brecknock Beacon, which has an altitude of 2862 feet. Old red sandstone underlies the southern and middle parts of the county, and Silurian rocks are found in the N. The chief rivers are the Wye (which forms the N. E. boundary), the Usk, Elan, and Tawe. The staple products are oats, barley, wheat, and cattle. It has extensive iron-works. The climate is moist, but temperate and salubrious. Capital, Brecon. The other principal towns are Builth, Crickhowell, and Hay. The Welsh language is still that of the peasantry and of the middle class. Pop. in 1881, 57,735.

Brecon, Brecknock, or **Aber-Honddu,** a town of Wales, the capital of the above county, is finely situated in a valley on the river Usk, at the mouth of the Honddu, 38 miles by rail W. S. W. of Hereford. It has beautiful promenades, an old castle, a collegiate church, and a college; also considerable manufactures. Pop. in 1881, 6372.

Breda′, a fortified town of Holland, in North Brabant, is situated at the confluence of the navigable rivers Aa and Merk, 16 miles S. S. E. of Dordrecht. It is connected by railway with Antwerp and The Hague. It has a castle built in 1350, a Gothic cathedral, the spire of which is 362 feet high, and a magnetic observatory; also manufactures of linens, carpets, hats, soap, leather, etc. This town can be protected against an invading army by inundating the country around it. It is celebrated as the scene of the "Compromise of Breda," by which the patriots protested against the tyranny of Philip II. in 1566. Pop. in 1879, 17,109.

Bree (Mathieu Ignace), an eminent Flemish historical painter, born at Antwerp Feb. 22, 1773. Among his works are "Rubens dictating his Last Will," and "Van der Werff addressing the Famished Populace during the Siege of Leyden, 1574." Died Dec. 15, 1839.

Breech, the end of a gun which is farthest from the muzzle; the solid part behind the bore. The breech of a cannon is made very massive, to enable it to resist the shock caused by the explosion of the powder.

Breech′ing of a naval gun or carronade is a strong rope by which the recoil of the gun is checked at such a point that the muzzle is brought wholly within the porthole, where the seamen can sponge and reload it. Breeching or breech-band is a part of the harness of a carriage-horse, by means of which he can push the carriage backward or support its pressure in going down hill.

Breech-loading Firearms are those which are loaded by putting the cartridge directly in at the breech, instead of ramming it in at the muzzle. It is said that breech-loading guns were used early in the reign of Henry VI. of England, and it is certain that they were used in Scotland about that time. There are several ancient specimens in the Tower of London. Many attempts to improve this kind of arms have been made, and of late with much success. Among the most celebrated weapons of this character are the Armstrong and Whitworth guns, the Krupp steel guns, the *mitrailleuse*, and among small-arms the needle-gun and the Chassepot, Sharps, Snider, Spencer, Ward-Burton, and Remington rifles. These will each be described under its own name.

Breed, a variety produced in any animal species in consequence of domestication by changes somewhat analogous to those which occur in cultivated plants. The changes originated by breeding (artificial selection) are in some species, as in the dog and pigeon, very marked, producing external, and even structural, differences, which, if they were permanent and originated by natural and unexplained causes, would confessedly be regarded as sufficient to establish difference of species. But the fact that thoroughbred animals, when neglected or allowed to go wild, tend to revert to the original type, and the not less important fact that animals of the most widely different varieties of the same species will (with a few possible exceptions) breed freely with each other, producing fertile young (which is rarely the case with those of different species), are by many held to show a radical difference between varieties or breeds and species. The study of the variations produced by domestication seems to have suggested to Mr. Darwin his doctrine of the origin of species by natural selection. (See DARWINISM, by Profs. E. L. YOUMANS and J. H. SEELYE.)

Some of the results of artificial selection on animals are truly marvellous. The numerous varieties of the dog and the pigeon have been, to a great extent, produced by design; animals being bred to develop certain desired peculiarities, the principle being that "like produces like," or that certain qualities possessed by the parent may be perpetuated and increased in the offspring. The milk-producing qualities of the Ayrshire cow, the butter-making excellence of the Jersey breed, the long-wooled Cottswold sheep, and the new breeds of easily fattened swine afford illustrations of the industrial importance of this remarkable plasticity or adaptability of the various domestic animals—an adaptability which has only of late been scientifically studied, and the limitations of which are as yet not well known. (See DARWIN, "Domesticated Animals and Cultivated Plants," 1867.) CHAS. W. GREENE.

Breed (WILLIAM P.), D. D., born in 1816, at Greenbush, N. Y., removed in childhood to New York City, graduated in 1843 at the University of New York, and has held Presbyterian pastorates in Steubenville, O. (1847–56), and in Philadelphia. He wrote numerous religious works.

Breede, the deepest river of Cape Colony, South Africa, flows first N. W. and then S. E., emptying into the ocean at Port Beaufort. It has a bar at its mouth.

Breese (KIDDER RANDOLPH), U. S. N., born April 14, 1831, in Philadelphia, entered the navy as a midshipman Nov. 6, 1846, became a passed midshipman in 1852, a lieutenant-commander in 1862, and a commander in 1866. At the close of 1861 he was placed in command of the third division of Porter's mortar flotilla, and took part in the bombardment of Forts Jackson and St. Philip prior to and during the passage of Farragut's fleet by the forts on its way to the capture of New Orleans, and participated in the attacks on Vicksburg during June and July, 1862. In Oct., 1862, he was appointed to the command of Admiral Porter's flag-ship, the Black Hawk, and in her took part in nearly all the severe engagements on the Mississippi and its tributaries during 1863 and 1864. In Sept., 1864, when Admiral Porter assumed command of the North Atlantic blockading squadron, he selected Breese as his fleet-captain, in which capacity Breese took part in the Fort Fisher fights, and in the fight with Fort Anderson; and in the naval assault on Fort Fisher of Jan. 15, 1865, he commanded the storming party. His services throughout the civil war are thus honorably mentioned by Admiral Porter in his "commendatory despatch" of Jan. 28, 1865: "Lieutenant-Commander K. R. Breese, my fleet-captain, has been with me nearly all the time since the rebellion broke out. In command of a division of the mortar flotilla which opened the way to New Orleans, he made his first record there. In the Mississippi with me for two years, engaged in harassing and dangerous duties, he always acquitted himself to my satisfaction. In charge of the mortars at the siege of Vicksburg, he helped to hasten the surrender of that stronghold. At Fort Fisher he led the boarders in the assault, and though we were not successful in getting into the fort in the face of equal numbers, yet that assault gained the day, as is generally admitted on every side. Our troops obtained a footing without much resistance, and then nobly maintained what they had won. Lieutenant-Commander Breese did all he could to rally his men, and made two or three unsuccessful attempts to regain the parapet; but the marines having failed in their duty to support the gallant officers and sailors who took the lead, he had to retire to a place of safety. He did not, however, leave the ground, but remained under the parapet in a rifle-pit, using a musket until night favored his escape. He is a clever, gallant officer, and I strongly recommend his immediate promotion to a commander." D. at Newport, R. I., Sept. 13, 1881. FOXHALL A. PARKER.

Breese (SAMUEL L.), REAR-ADMIRAL, was born in New York in 1794, entered the navy in 1810, served against Great Britain and Mexico, became captain in 1841, and rear-admiral in 1862. Died Dec. 17, 1870, at Mount Airy, Pa.

Breese (SIDNEY), born at Whitesboro', Oneida co., N. Y., July 15, 1800, graduated at Union College in 1818. In 1821 he was called to the Illinois bar, and attained great distinction, was an officer in the Black Hawk war, U. S.; was State attorney 1822–27, when he was appointed U. S. attorney for Illinois; U. S. Senator from Illinois (1843–49), and was speaker of the Illinois legislature in 1850. He was made circuit judge in 1835, and again in 1855, becoming chief judge of that bench. He was one of the originators of the Illinois Central R. R. Died at Pinckneyville, Ill., June 27, 1878.

Breeze, a soft wind, a gentle gale. *Land and Sea Breezes.*—In a fair day, near the sea-shore, an hour or two after sunrise, a gentle wind begins to blow from the sea towards the land, gradually increasing in force during the day. With the declining sun the sea-breeze loses its power, and dies out before sunset. A lull then ensues, after which a land-breeze sets in from the land towards the sea, and continues all night until before sunrise, when another calm occurs. The cause of these alternate winds is to be found in the fact that the land is more readily heated by the rays of the sun, and more quickly cooled in their absence, than the sea. In an island, for instance, in proportion as the sun rises above the horizon the land becomes warmer than the neighboring sea. Their respective atmospheres participate in these unequal temperatures; the fresh air of the sea rushes from all directions in the form of a *sea-breeze*, which makes itself felt along the whole coast, and the warmer and lighter air of the island will ascend into the atmosphere. During the night it is the reverse. The island loses heat by radiation, and cools quicker than the sea. Its atmosphere having become heavier, flows into that of the sea in the form of a *land-breeze;* and this interchange lasts until the temperature, and consequently the density, of the two atmospheres have again become the same. This is the phenomenon observed almost daily on nearly all the sea-boards.

Mountain-Breezes.—Similar alternate breezes are observed to play between the great mountain-chains and the neighboring plains, as in the Alps. On a fair day strong breezes rush up the valley towards the overheated mountain-slopes, and descend with equal force during the night; for during the day the mountains absorb more heat than the neighboring free atmosphere, and radiate more during the night. (See WINDS, CIRCULATION OF.) ARNOLD GUYOT.

Brehm (ALFRED EDMOND). See APPENDIX.

Brem′en, a free city of Germany, situated on both sides of the river Weser, about 45 miles from the sea and 60 miles S. W. of Hamburg; lat. 53° 4′ 36″ N., lon. 8° 48′ 54″ E. It is divided into the old and the new town, the former of which is on the right bank of the river, and has narrow, crooked streets. The new town, which is connected with the old by two bridges, is more regular. The old ramparts have been levelled and converted into beautiful promenades and pleasure-grounds. The most remarkable edifices are the cathedral, built about 1100; the fine old Gothic town-hall, with a famous wine-cellar; the exchange, the museum, and the observatory of Olbers. Bremen has a large public library, a normal school, a theatre, and a hospital, also manufactures of woollen and cotton goods, paper, starch, and cigars. As a commercial city this is one of the most important of Germany, having an extensive foreign trade, especially with the U. S. It is connected by railway with Hanover, Bremerhafen, and other towns. Vessels drawing seven feet of water can ascend to this point, and large ships stop at Bremerhafen. The trade of Bremen has increased rapidly in the last fifteen years. The chief articles of export are woollen goods, linens, glass, hemp, hides, rags, wooden toys, and wool. The imports consist of cotton, coffee, sugar, rice, tobacco, wines, dyewoods, oil, tea, etc. Shipbuilding is carried on here extensively. The imports in 1880 amounted to 161,000,000 marks, and the exports to about 251,000,000 marks. The number of emigrants that embarked here from 1875–1880 was 111,697. The total produce imported here from the U. S. in 1880 was valued at 184,000,000 marks. Pop. in 1880, 112,158.

Bremen was founded before 788 A. D., and was made a bishopric by Charlemagne. It was one of the chief towns of the Hanseatic League. In 1815 it was admitted into the Germanic confederation by the Congress of Vienna. The government of this city and the territory attached to it (with an area of 98 square miles) is a nominal republic, the total pop. of which in 1880 was 156,229. It is governed by four burgomasters and twenty-four senators, who are elected for life. A. J. SCHEM.

Bremer (CHARLES). See APPENDIX.

Bremer (FREDRIKA), a popular Swedish novelist, born at Abo, in Finland, Aug. 17, 1801. She was educated at Stockholm, and became in early youth familiar with German literature. Among her first works was "The Neighbors," a novel (1842), which Mrs. Howitt translated into English. She afterwards produced "The Home" (1843), "The President's Daughters," "Nina," "Brothers and Sisters," and "Hertha" (1856), which were translated into English, French, and German. She visited the U. S. in 1850, and after her return published "The Homes of the New World" (1853). Died Dec. 31, 1865. (See "Life, Letters, and Posthumous Works of Fredrika Bremer," edited by her sister Charlotte, New York, 1868.)

Bre merha'fen, a town and port of Germany, on the right bank of the Weser, near its mouth, about 35 miles N. N. W. of Bremen. It is a part of the republic of Bremen, and was built by the citizens of Bremen (1827–30) for the accommodation of large ships which cannot ascend the river. It has an outer and inner harbor. Pop, 14,239.

Bren'ham, R. R. junction, city, and capital of Washington co., Tex. (see map of Texas, ref. 5–I, for location of county), 95 miles E. of Austin City. It is in a fertile region adapted to the growth of cotton, has a seminary for ladies, and several manufactories. Pop. in 1870, 2221; in 1880, 4101.

Bren'ner (Elias), born in 1647, was a Swedish antiquary and artist, and was appointed miniature-painter to Charles XI. Died in 1717. (See Ersch und Gruber, "Allgemeine Encyklopadie.")

Brenner (Henrik), born in 1669, was a Swedish scholar and historian. He translated into Latin the "History of Armenia" of Moses Chorenensis and wrote an account of the expedition of Peter the Great against Persia. Died in 1732.

Bren'ner Pass, the lowest pass in the main chain of the Alps, is on the route between Innspruck and Botzen, and is 4775 feet above the level of the sea. The mountains on each side rise about 7500 feet above the pass, which is open at all seasons of the year. In 1867 a railway was opened through this pass from Innspruck to Botzen, at which point it connects with the railways of Germany and Italy. At the summit of the pass is the small village of Brenner.

Bren'nus [Celtic *bran*, a "chief." *Bran*, as a proper name, is well known both in Cymric and Erse tradition], a famous chief of the Senones, a tribe of ancient Gauls who crossed the Apennines in 390 B. C., invaded the Roman state, and defeated its army. Brennus then captured Rome, except the Capitol, which he besieged for about six months. During this siege he attempted to surprise the garrison by night, but he was repulsed by Manlius, who was awakened by the cackling of some geese. The Romans purchased peace by the payment of one thousand pounds of gold. To increase the price, Brennus is said to have thrown his sword on the scale. (See, on this subject, Arnold's "History of Rome.")

Brennus, a Gallic chief who invaded Greece with a large army about 280 B. C., and ravaged Macedonia and Thessaly. He was defeated at Delphi by the Greeks, who were said to have been aided by an earthquake.

Brent (Nathaniel), born in Warwickshire in 1573, was an English jurist and writer. He translated into English and Latin Paul Sarpi's "History of the Council of Trent." Died in 1652.

Brenta'no (Clemens), a German novelist and dramatist, born at Frankfort-on-the-Main Sept. 9, 1778. He was a brother of Goethe's friend, Bettina von Arnim. He produced dramas entitled "Ponce de Leon" (1804) and "The Foundation of Prague" (1816). Among his admired novels is "The History of Caspar the Brave and the Fair Annerl." In conjunction with Arnim he published the collection of ballads called "Des Knaben Wunderhorn" (1806–08; 2d ed. 1815). Died July 28, 1842.

Brentano (Lorenz), a German jurist, born at Mannheim in 1812. He was actively engaged in the Baden revolution of 1848, and afterwards removed to America, and became in 1860 editor of the "Illinois Staatszeitung" at Chicago. He sold his interest in the "Illinois Staatszeitung" in 1867, and returned to Germany soon after. In 1868 he was elected a presidential elector on the Grant ticket.

Brent'ford, a market-town of England, the capital of Middlesex, is on the Thames, at the mouth of the Brent, 7 miles W. S. W. of London. It is connected with Kew by a bridge across the Thames, has large gin-distilleries, and the works of the West London Water Company. It consists mostly of one long street. The town is rich in historical interest, and has frequently been alluded to by Shakspeare and other dramatists. Pop. 11,808.

Brenton (Capt. Edward Pelham), born in 1774, an English naval officer, was brother of Jahleel Brenton, and wrote "Naval History of Great Britain from 1783 to 1822." Died in 1839.

Brenton (Sir Jahleel), a British rear-admiral, born in 1770, was brother of Edward Pelham Brenton, and published "The Hope of the Navy" (1839), etc. Died in 1844.

Brenton (Samuel), born in 1810 in Gallatin co., Ky., became a Methodist Episcopal preacher in 1830, and subsequently a lawyer. In 1841 he returned to the ministry, but having become disabled by paralysis, he again left the profession. He was a member of Congress from Indiana 1852–57, and at the same time president of Fort Wayne College. Died Mar. 25, 1857.

Brenton (William) emigrated to Boston from Hammersmith, England, held important offices in Massachusetts and Rhode Island, where he was several times lieutenant-governor. He was president of Rhode Island (1660–61), and governor (1666–69). Died at Newport in 1674.

Brents'ville, capital of Prince William co., Va. (see map of Virginia, ref. 4–H, for location of county), on the Occoquan Creek, 104 miles N. of Richmond. Pop. of district in 1870, 937; in 1880, 1285.

Brenz (Johann), [Lat. *Brentius*], a German Reformer, born at Weil, in Swabia, June 24, 1499, was educated at Heidelberg, and became a Protestant under Luther's influence. He was a popular preacher at Halle, but in 1530 had to flee to Stuttgard, to the protection of Duke Ulrich of Würtemberg against Charles V. There he died Sept. 11, 1570. He was a man of great ability, and wrote much, chiefly expository lectures on the Bible. These writings are still highly prized. He taught that the Lord's body is everywhere present, hence his followers are called Ubiquitarians, but in the main his doctrines are those of Luther.

Bres'cia, a province of Italy, is bounded on the N. by the Tyrol, on the E. by Lago di Garda and Verona, on the S. by Cremona, and on the W. by Bergamo. Area, 1784 square miles. The soil is fertile. Silk and wool are among the staple productions. It has manufactures of woollen goods, firearms, and cutlery of superior quality. Capital, Brescia. Pop. in 1879, 470,746.

Brescia (anc. *Brixia*), a handsome city of Italy, in Lombardy, capital of the above province, is pleasantly situated on a wide plain and on the river Garza, 62 miles by rail E. N. E. of Milan. It is on the railway which connects Milan with Venice. It has an old cathedral, a mediæval structure, and a new marble cathedral (Duomo Nuovo) commenced in 1604; also many churches richly adorned with works of art by celebrated masters, an episcopal palace, a college, a good public library, a museum of antiquities, a botanic garden, and a theatre. Here are manufactures of cutlery, silk, linen, and woollen fabrics, paper, and wine. The streets and public squares are adorned with numerous fountains. Brixia was a very ancient town, and was the capital of the Cenomanni, a Gallic tribe. It was plundered by Attila, but soon recovered from this injury. The emperor Otho I. declared it a free city about 936. It was bombarded and taken by the Austrian general Haynau in 1859. Pop. in 1881, 43,354.

Bres'lau, or **Breslaw** [Lat. *Bratislavia;* Polish, *Wraclaw*], a large city of Prussia, the capital of Silesia, is situated on the river Oder, at the mouth of the Ohlau, and on the railway from Berlin to Vienna, 221 miles by rail S. E. of Berlin; lat. (of observatory) 51° 6′ 56.5″ N., lon. 17° 2′ 18″ E. It is, next to Berlin, the most populous city of Prussia. It is divided by the Oder into the old and new towns, which are connected by numerous bridges. The new town has wide and regular streets. It is the seat of a Roman Catholic bishop. The most remarkable edifices are a cathedral founded in the twelfth century, St. Elizabeth's church, the theatre, the Rathhaus, exchange, mint, and university buildings. The university has a library of 350,000 volumes. Breslau contains other public libraries, an observatory, a botanic and zoological garden, four gymnasia, and numerous other schools of different kinds. It has an extensive trade, and is the greatest market for wool in Germany. It has manufactures of woollen, linen, cotton, and silk fabrics, broadcloths, lace, jewelry, soap, earthenware, starch, and ardent spirits. The number of distilleries in it is about 100. Railways extend to Dresden, Posen, Warsaw, and Vienna. Breslau is first mentioned by Ditmar, the chronicler, in 1000 A. D., and it seems to have been founded a little earlier than that date. It became the seat of a bishop in 1052, and the capital of an independent duchy in 1163. Reduced to ashes by the Mongolians in 1241, it recovered, and in 1261 joined the Hanseatic League. In 1335 it came under Bohemia, and after the battle of Mohacz it passed to Austria. In 1741 it was taken by Prussia. Pop. in 1880, 272,912.

Brest [Lat. *Brestum*], an important fortified city and seaport of France, department of Finistère, 314 miles W. of Paris, is said to be the strongest military port in France. It is on the N. shore of the Road of Brest, in lat. 48° 23′ N., lon. 4° 29′ W. Its outer harbor is one of the best and most capacious in the world, having ample room for 500 ships of the line. The harbor or road communicates with the ocean by a single channel called the Goulet, which is 1750 yards wide. In the middle of this channel are the Mignan Rocks, which render the entrance of hostile ships very difficult and dangerous. The outer harbor or roadstead is about 6 miles long, and is defended by powerful batteries. The inner harbor is also secure and spacious. From its natural advantages and the strength of its defensive works, Brest is considered one of the first naval stations of Europe. Here are five large basins, extensive quays, an arsenal, vast magazines, large barracks, and a prison, the Bagne, which can accommodate 4000 convicts. Brest is the western terminus of a railway which extends to Paris *viâ* Rennes and Le Mans. The city is built on the slopes of several hills, and is divided into two parts, which can communicate only by boats. Is is encircled by ramparts, which, being planted with trees, form pleasant promenades. It has a naval school, a medical school, a communal college, besides numerous other schools, a public library, a botanic garden, an observatory, etc. This port has little trade except for the supply of the naval department, and its industry is confined to the equipment of the navy. This place was not of much importance until Cardinal Richelieu commenced in 1631 the fortifications, which were completed by Vauban. A submarine telegraph cable connects this harbor with Duxbury, Mass. Pop. 66,110.

Brest Litowsk′, a town of Russia, in the government of Grodno, 92 miles S. of Grodno. It has several factories, and is the seat of a United Armenian bishop. Pop. 38,672.

Bretagne [Lat. *Britannia Minor*], usually called **Brit′tany** by the English, or **Little Brittany,** a former province of France, is an extensive peninsula, bounded on the N. by the English Channel, and on the W. and S. W. by the Atlantic Ocean. It is now comprised in the departments of Finistère, Côtes-du-Nord, Morbihan, Ile-et-Vilaine, and Loire-Inférieure. It was divided into Haute-Bretagne (Upper Brittany), capital, Rennes, and Basse-Bretagne (Lower Brittany), capital, Vannes. Among the other towns are Brest, Quimper, and St. Malo. The surface is partly mountainous, and the scenery wild and beautiful. This province, which in ancient times was called *Armorica*, was settled by the Cymri, a Celtic race to which the ancestors of the Welsh belonged. It contains large tracts of heath nearly uncultivated, and extensive forests. The outline is indented with numerous bays and inlets, which afford facilities for navigation and commerce. Brittany abounds in ancient monuments and cromlechs, which are ascribed to the Druids. The modern Bretons are tenacious of their ancient customs and peculiarities, and are generally Catholics. They are more loyal and devout than the majority of the French. Their language (the Armorican) is peculiar, and closely resembles the Welsh. This region and its people have a special interest for antiquarians. It became subject to the Franks in the time of Charlemagne. In 848 A. D., Nominoé, an Armorican chief, assumed the title of king of Bretagne, and defeated the army of King Charles the Bald. The Normans conquered it in the tenth century.

Geoffroi, count of Rennes, became in 992 the first duke of Bretagne, which continued to be an almost independent feudal duchy until it was annexed to France in 1531. Pop. in 1881, 3,071,868. (See Daru, "Histoire de Bretagne," 1826; Courson, "Histoire des Peuples Bretons, etc.," 1847.)

Brethren. See Plymouth Brethren (so called); also Dunkers and United Brethren.

Brethren and Sisters of the Free Spirit, a sect of extremely pantheistic and immoral semi-monastic enthusiasts, who probably originated in the sect of Almericians, followers of Amalric of Bena, who died in 1209. They suffered much from the severity of the authorities, but became very numerous in Germany, France, and Italy. The sect lasted till about 1450. They were otherwise known as *Homines Intelligentiæ* ("men of understanding"), also as Adamites, Turlupins, Schwestriones, Picards, etc.; and it is believed that the immoral "Adamites" now existing in Bohemia are their descendants.

Brethren of the Christian Schools, an order in the Roman Catholic Church founded in 1679, at Rheims, by the Abbé La Salle, and confirmed in 1725 by Benedict XIII. Its members are not allowed to enter the priesthood. They devote themselves to teaching, and especially to the instruction of the poor, mostly in rudimentary branches, but sometimes in more advanced studies. They are numerous in France, Ireland, Italy, the U. S., and most other countries. They are a branch of the Jesuits.

Brethren of the Common Life [Lat. *Fratres Vitæ Communis*], an association of pious clergymen founded in Holland by Gerhard Groot in 1384. They soon were joined by many laymen, who were associated closely with the priests, but had separate habitations. A semi-monastic discipline was maintained, generally according with the rule of Saint Augustine, without lifelong vows. The order spread to Germany, and "Sisters of the Common Life" afterwards appeared. The Brethren became partly identified with the Canons Regular. Thomas à Kempis, Wessel, and Erasmus were educated by them. Luther and Melanchthon esteemed the brotherhood highly, and many of them became Protestants, others connected themselves with the Jesuits and other Roman Catholic orders, and before 1650 the fraternity was extinct.

Breton (Jules-Adolphe), a French artist, distinguished for his serious and sympathetic treatment of subjects connected with the rural life of France. He was born at Courrières (Pas-de-Calais). His most important pictures are "Blessing the Wheatfield," 1857, "The Calling Home of the Reapers," 1859, both in the Luxembourg Gallery; "A Girl Guarding Turkeys," 1864; "Young Girls Guarding Cows," 1872. Clarence Cook.

Brett (Philip Milledoler), D. D., born in New York City July 13, 1817, graduated at Rutgers College, New Brunswick, N. J., was ordained to the Dutch Reformed ministry in 1838, held pastorates at Nyack, N. Y., St. Thomas, W. I., and at Mount Pleasant and Tompkinsville, N. Y. He was very influential, and greatly beloved by his denomination. Died of cancer Jan. 14, 1860. A volume of his sermons has been published.

Breu′ghel (Jan), a famous Flemish painter, born at Brussels in 1568, was called Velvet Breughel, in reference to the material of his clothing. He painted landscapes, animals, flowers, and small figures, which are finely finished. Among his chief works are "Adam and Eve in Paradise" and "The Four Elements." The figures of these were painted by Rubens. Died in 1625.

Breughel (Pieter), a Flemish painter, the father of the preceding, was born at Breughel, near Breda. He painted with success village festivals, comic subjects, and the amusements of rustic life. Died in 1569.

Brevard (Ephraim), M. D., born in Mecklenburg co., N. C., graduated at College of New Jersey in 1768; was educated for a physician, and practised at Charlotte, N. C.; became secretary of the noted Mecklenburg Convention on May 17, 1775, and as one of the committee to prepare resolutions produced the declaration of independence which was adopted by that convention nearly a year before the Declaration by Congress. Died near the end of the Revolution.

Brevard, capital of Transylvania co., N. C. (see map of North Carolina, ref. 3–C, for location of county), about 240 miles W. S. W. of Raleigh. Pop. in 1880, 223.

Breve, in music, a note formed thus , or , or , and equivalent to two semibreves. The note for a whole bar in modern notation is called a semibreve. The breve is now only used in *à la capella* movements, psalm-tunes, and fugues, or at the close of a composition.

Breve, in printing, is a curve marked over a vowel to indicate that it is short, as *ĕ*.

Brevet′, a French word signifying a patent, a warrant, a license, a commission, a royal act in writing conferring some privilege or distinction.

Brevet is also a military term used in England and the U. S. In the British army it is a promotion of officers which takes place on such special occasions as a coronation or the termination of a great war. By this promotion the officers obtain an increase of pay, even if they have never served in a campaign. On these occasions lieutenant-generals, major-generals, colonels, lieutenant-colonels, majors, and captains receive a promotion of one grade. Each colonel, for instance, becomes a major-general. Officers below the rank of captain are excluded from the benefit of this brevet, which applies to the navy as well as the army, so that commanders become captains, captains become rear-admirals, etc. Besides this general promotion by brevet, there is (in England) brevet rank conferred on individual officers for special services. This does not entitle them to an increase of pay, but only to hold a rank next above that which their commission specifies. This kind of brevet is not used in the navy, and it does not apply in the army to other officers than captains, majors, and lieutenant-colonels. In the army of the U. S. a brevet is a commission giving an officer a nominal rank higher than that for which he receives pay. A brevet major, for instance, only receives the pay of a captain or of a lieutenant. These honorary titles are given for meritorious services.

Bre′viary [Lat. *breviarium* (from *brevis*, "short"); Fr. *bréviaire*], an abridgment or epitome; also a book containing the daily service of the Church of Rome or of the Greek Church. It is so called, probably, because it was abridged from another service-book, called *Plenarium officium*, the "full service." The Roman Catholic Church has several breviaries, some being used in particular dioceses or in special monastic orders, but the *Breviarium Romanum* ("Roman Breviary") is the most generally used, and is rapidly taking the place of the others throughout the Latin rite, and it has been translated into some of the Eastern rites. It is in four parts: the Psaltery, or psalms for canonical hours, recited daily by all the beneficiary clergy; the *Proprium de Tempore*, for festivals in honor of Christ; the *Proprium de Sanctis*, for festivals of special saints; and the *Commune Sanctorum*, for other days. The Greek Breviary (ὡρολόγιον) or "dial" is used in the Greek Church and the Roman Catholic churches of the Greek rite. (See Canonical Hours and Liturgy.)

Brevier′, in typography, a type which is larger than minion and one size less than bourgeois. (See Type.)

Brevipen′nes [from the Lat. *brevis*, "short," and *penna*, a "wing"], or **Brevipennates** (*i. e.* "short-winged"], a term applied in the system of Cuvier to that tribe of the order Grallatores which comprises the ostrich, cassowary, emeu, rhea, apteryx, and perhaps the extinct dodo. They have wings so short that they are not fit for flight, but they serve to accelerate the speed with which the birds run on the ground. Some ornithologists give them the name of Struthionidæ, and some rank them among the gallinaceous birds. Their sternum (breast-bone) has no keel or ridge. The gigantic *Dinornis* and some other fossil birds exhibit the characters of the brevipennes. Birds of this tribe flourish only in solitudes and deserts, and are perhaps destined to extinction, as the progress of population is hostile to their increase or existence. (See Cursores.)

Brewer (Thomas M.). See Appendix.

Brewer (William Henry), born at Poughkeepsie, N. Y., Sept. 14, 1828, was educated at the scientific school of Yale College and at the universities of Heidelberg and Munich, was professor of chemistry and geology in Washington College, Pa. (1858–60), first assistant in the geological survey of California (1860–64), professor of chemistry in the College of California, and professor of agriculture in the Sheffield Scientific School, New Haven, Conn., since 1864. He has prepared a work on the "Botany of California," and various scientific papers.

Brewerton (Henry), LL.D., an American officer, born Sept. 25, 1801, at Newburg, N. Y., graduated at West Point 1819, colonel Corps of Engineers April 22, 1864, served as assistant professor at the Military Academy 1819–21, in constructiom of fortifications 1821–32, Cumberland road 1832–36, improvement of Hudson River 1836–42, building Fort Montgomery, N. Y., 1841–45, superintendent of the Military Academy 1845–52, constructing defences of Baltimore harbor 1852–64, of the Delaware 1862–64, of Point Lookout, Md., 1864–65, and of Hampton Roads 1864–70, improvement of harbors in Maryland 1852–64, and member of engineer and other boards 1839–67. Brevet brigadier-general Mar. 13, 1865, for long, faithful, and meritorious services, and retired from active service Mar. 7, 1867. D. at Wilmington, Del., Apr. 17, 1879. George W. Cullum.

Brewster (Benjamin Harris), born in New Jersey Oct. 13, 1816, graduated at Princeton 1834; studied law, and was admitted to the Philadelphia bar 1838, and was soon appointed by President Polk to pass upon the claims of the Cherokee Indians against the U. S.; was in 1867 appointed attorney-general of Pennsylvania, holding the place two years. In Dec., 1881, he was appointed by President Arthur attorney-general of the U. S.

Brewster (Sir David), LL.D., D. C. L., F. R. S., an eminent British natural philosopher and writer, born at Jedburgh, Scotland, Dec. 11, 1781. He was educated at the University of Edinburgh, and became in 1808 editor of the "Edinburgh Encyclopædia," for which he wrote many articles. He received in 1815 the Copley medal of the Royal Society for an "Essay on the Polarization of Light by Reflection." He invented the kaleidoscope in 1816. In conjunction with Professor Jameson he founded the "Edinburgh Philosophical Journal" in 1819. As his relations as an editor brought him into frequent communications with the most eminent scientific men, and he was naturally one of the first to recognize the benefit which would accrue from regular intercourse among laborers in the same field, he, in articles in the "Quarterly Review," threw out a suggestion which became the cause of the formation of the British Association for the Advancement of Science. It held its first meeting, at York, in 1831, and Brewster and Herschel had the chief part in shaping its constitution. About this date the Royal Society awarded to him the Rumford gold and silver medals for his discoveries in optics. He was knighted in 1832, and elected in 1849 one of the eight foreign associates of the French Institute. In 1850 he invented the stereoscope. Among his works are a "Treatise on Optics" (1831), "More Worlds than One" (1854), and "Memoirs of the Life and Writings of Sir Isaac Newton" (2 vols., 1855). In 1859 he was chosen principal of the University of Edinburgh. His wife was a daughter of Macpherson, the author of Ossian's poems. Died Feb. 10, 1868.

Brewster (James), born about 1785, was a prominent merchant and philanthropist of New Haven, Conn. He founded in that city Brewster Hall, the Franklin Institute, and the Orphan Asylum, and was the active promoter of many benevolent and business enterprises. Died Nov. 22, 1866.

Brewster (William), one of the Pilgrims of Plymouth, born at Scrooby, England, in 1566, was educated at Cambridge, entered the public service, became a non-conformist, and in 1607 was imprisoned at Boston, Lincolnshire. He was liberated with great expense and difficulty, and went to Leyden, where he taught English. In 1620 he came to America on the Mayflower's first voyage. He was an elder of the Church, preaching frequently, but never administering the sacraments. Died at Plymouth, greatly venerated, April 16, 1644.

Brewster, R. R. junction, Putnam co., N. Y. (see map of New York, ref. 7–K, for location of county), 53 miles from New York. It has fine mines of magnetic iron ore. Great quantities of milk are sent to market from this point. Pop. in 1880 not given in census.

Brewton, Ala. See Appendix.

Brezo′wa, a town of Hungary, in the county of Neutra, 19 miles N. W. of Leopoldstadt, on a small river of the same name. It has important tanneries, and no less than 248 distilleries. Pop. in 1880, 5540.

Brialmont (Alexis Henri), a distinguished Belgian officer, engineer, and military writer, born May 25, 1821, at Venloo, Province of Limburg, the Netherlands; entered the military school of Brussels in 1839, from which he graduated as *sous-Lieutenant du Genie* (Engineers) in 1843. Entered the staff corps (*d'Etat major*) as Captain, 1855, and passing through successive grades became Colonel, 1868, Chevalier of the Order of Leopold, 1846—officer, 1859, "Commander," 1870, and maj.-gen., Mar. 25, 1874. Member of the Belgian Academy of Sciences of Stockholm in 1865. As an officer of Engineers he participated in the fortification of Antwerp and Diest, and when the present magnificent system of fortifications was decided upon he had the distinguished honor of planning works "unrivalled in Europe in the intelligent application of true principles of art to a great practical example." Colonel Brialmont became an acknowledged authority on the *modern* art of fortification—his military publications are numerous; among the most important may be named, "*Précis d'Art Militaire,*" 1850, 4 vols., 12mo, *Considerations Politiques et Militaires sur la Belgiques,*" 1851–52, 3 vols., 8vo, "*Histoire du Duc de Wellington,*" 1856–57, 3 vols., 8vo, "*Etudes sur la Defense des Etats et sur la Fortification,*" 1863, 3 vols., 8vo, with atlas, "*Etudes sur l'organization des Armées,*" 1867, 1 vol., 8vo, "*Traité de Fortification Polygonale,*" 1869, 3 vols., 8vo, with atlas, "*La Fortification à Fossés Secs,*" 1872, 3 vols., 8vo, with atlas; "*Études sur la Fortification des villes Capitales*" (1873), besides minor works and a great number of pamphlets upon current military or political topics; and he was author of the article on Intrenched Camps in the present work. D. 1885. J. G. Barnard.

Brianchon's Theorem, in conic sections, is the reciprocal of Pascal's theorem, and was first discovered by Brianchon. It is thus enunciated: "The three diagonals of every hexagon circumscribed to a conic meet in a point."

Briançon (anc. *Brigantium*), a town of France, in the department of Hautes-Alpes, on the river Durance, 56 miles S. E. of Grenoble, and near the Italian frontier. It is strongly fortified, is the principal French arsenal among the Alps, and is considered almost impregnable. Pop. 5439.

Briansk′, a town of Russia, in the government of Orel, on the river Desna, 74 miles W. N. W. of Orel. It has several churches, a cannon-foundry, an imperial building-yard, and a manufactory of small-arms. Pop. 14,657.

Bri′bery [from the Fr. *bribe*, a "piece of bread," or a gift to a beggar], in criminal law, the offence of taking or offering any gift or reward to influence one's behavior in a public office, whether executive or judicial. It is an offence at common law. It also includes the case of influence or attempting to influence, by money, voters at an election to Parliament. The crime may be committed though it turn out that the person whose vote is thus solicited has no right to vote. It is an offence in any case to offer the bribe, though it is not received. The U. S. Constitution brands it as a crime of magnitude by declaring that the President and other civil officers are liable to impeachment for "treason, bribery, and other high crimes and misdemeanors." It is usual to pass statutes in the States extending the cases to which bribery as an offence may be applied, and fixing the punishment.

Brick, a species of artificial stone made by moulding plastic clay into blocks, and burning them. A very inferior quality of bricks is made by simply drying the blocks in the sun. The earths most employed in brickmaking are (1) the plastic clays, composed principally of silica and alumina in varying proportions; (2) the loams or sandy clays; and (3) the marls, which are either sandy, clayey, or calcareous, according as silica in the form of sand, alumina, or carbonate of lime preponderates in the mixture. These brick-clays almost always contain a small percentage of oxide of iron, carbonate of lime, soda, and carbonate of magnesia. The purer clays contain about 1 part of alumina to 2 of silica, with a percentage of water varying greatly among the different clays. They all mix up freely with water in either large or small proportions, and are characterized by a tenacious plasticity. If moulded and baked, they shrink and warp greatly out of shape, and crack. Hence, these rich clays all have to be tempered with sand, ashes, or cinders before they can be used for bricks. Some clays contain too much sand, and are weak and brittle after burning; these must be mixed with the richer clays. From the greatly varying character of the raw material, it results that the methods pursued in brickmaking must vary among different localities. Some clays require but very little change in the natural proportion of their ingredients, and but very little labor to prepare them for moulding into bricks, it being merely necessary to add the requisite quantity of water to render the clay plastic; while others, such as the fire-clays and some of the marls, have to be pulverized by machinery before they can be reduced to a sufficiently plastic condition. The red color of burnt bricks is caused by the presence of a small percentage of oxide of iron, generally the protoxide. When there is more than 10 per cent. of iron oxide present the clay burns to a blue and almost a black color. A large percentage of iron, if lime also or an excess of silica be present, renders the clay fusible. Some clays contain lime and very little or no iron. These burn white, and require a less intense heat than any other clays to produce hard brick, the lime being a flux on the silica. When carbonate of lime, whether as chalk, marl, nodules of calcareous petrifactions, or in any other form, is present in the clay, it is converted into quicklime in burning, and only such portions of it will combine with the silica and alumina as come into actual contact with them. The balance remains quicklime, which will slake when the bricks become wet, and destroy them. Hence clay containing too much carbonate of lime is unfit for bricks. Other clays contain iron and lime with an excess of the latter, in which case the bricks burn to a light dun or a whitish color. Magnesia generally produces a brown color.

The presence of iron pyrites is objectionable, for the burning expels the sulphur, leaving oxide of iron or a basic sulphate, which occupies less volume than the original pyrites, and makes the bricks porous and weak. Vegetable remains, such as roots, grass, etc., should be excluded for a similar reason.

It is impossible to ascertain, by chemical analysis alone, whether or not a given clay or any mixture of two or more clays will make good bricks. The best chemical tests will furnish only a close approximation. The composition of four clays—two suitable for common bricks and two for fire-brick—are given below. Nos. 3 (from Stourbridge, England) and 4 are the fire-brick clays:

	No. 1.	No. 2.	No. 3.	No. 4.
Silica	50.40	49.44	51.80	58.40
Alumina	24.00	34.26	30.40	35.78
Oxide of iron		7.74	4.14	3.02
Carbonate of lime	2.70	1.48	—	2.72
" of magnesia	1.30	5.14	.30	
Water, etc	21.60	1.94	13.11	
	100.	100.	99.75	99.92

Some of the fire-clays contain as high as 65½ to 66 per cent. of silica, 27½ to 26½ per cent. of alumina, and 5½ to 6 per cent. of oxide of iron, the balance being the alkalies and water.

Fire-bricks are used for lining furnaces, kilns, ovens, etc. subjected to an intense heat that would destroy common bricks or stone. The Stourbridge fire-bricks are noted for their excellence. The clay is dug up and exposed from three to eighteen months, according to the weather, in "spoil heaps," spread over as large an area as practicable, until thoroughly disintegrated by weather and frost; in winter three months will suffice. The clay weighs six tons to seven cubic yards, and some of the spoil heaps contain 10,000 tons. After weathering, the clay is ground in a circular pan under two cylindrical stone rollers, each weighing two and a half to three and a quarter tons, and faced with iron. After grinding, the clay is carried on an endless band to a "riddle" of 4 or 6 meshes to the inch for fire-bricks, 6 to 10 meshes for fine cement clay, and 12 to 14 meshes for glass-house or pot clay. After passing the riddle the clay is tempered with water to a suitable degree of plasticity, and is then passed through a cylindrical cast-iron pug-mill, where it is cut and stirred by revolving helicoidal blades, which force it out through an opening at the bottom in the form of a bar, which is received and carried by an endless band to the moulding shed. The fire-bricks are moulded by hand in the usual manner, dried in artificially heated sheds at a temperature of 60° to 70° F., or by the sun in clear weather. They are burned in circular domed kilns or cupolas called ovens, where they remain from eight to fourteen days, being subject to the intensity of flame or white heat for about four days and three nights. In burning, the heat is slowly increased and gradually lowered, and the burnt contents require seven days to cool. Most of the kilns contain 12,000 bricks—some, exceptionally, 30,000 to 35,000. The chimney-stack is on the outside, and the flame burns with a down draught, descending through holes in the floor. Coal is used for fuel.

Excellent fire-bricks are made in New Jersey at Perth Amboy, Woodbridge, South Amboy, Trenton, and other places in the vicinity. The process of manufacturing is essentially the same as for common bricks. The fire-clays of these localities contain generally more alumina and less silica than those of Stourbridge, England, and are therefore richer, the alumina reaching in some cases as high as $37\frac{1}{10}$ to $39\frac{7}{10}$ per cent., with only $43\frac{2}{10}$ to $45\frac{3}{10}$ per cent. of silica. The composition of the bricks consists of about ⅝ raw clay, ⅛ cement, ⅛ kaolin, and ⅛ fine sand. The cement is fire-clay that has been burnt; the kaolin is a clay consisting of very fine sand, mica, and fire-clay, found in the vicinity, and the fine sand is clean coarse, angular-grained quartz, found remarkably pure near by.

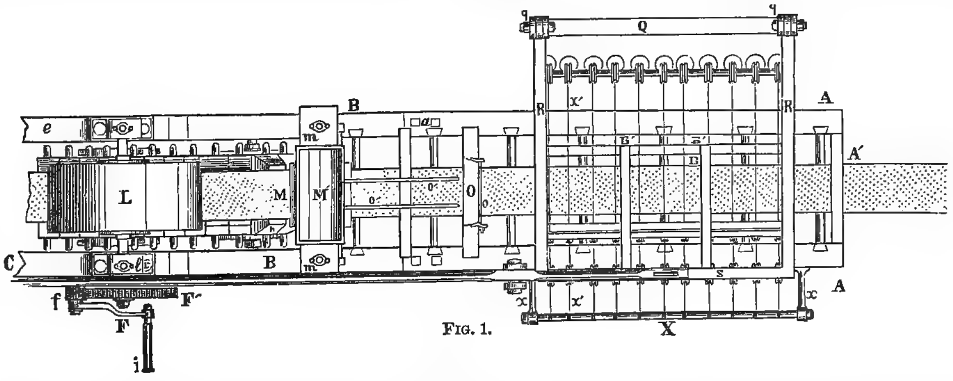


FIG. 1.

Many machines have been employed for making bricks, of which two that have proved to be successful will be described. In the French machine, invented by M. Terrason-Fougères, the frame is composed of two side-pieces A B (Figs. 1 and 3) from sixteen to twenty feet long, framed together as shown in the figures, and mounted on wheels to permit of its being easily moved from place to place. The clay, being previously moistened, is fed to the pug-mill Y (Fig. 3) by means of an endless chain Z, the chain and mill being both operated by a sweep worked by from two to four horses. The clay, on feeding out of the pug-mill, is received upon a plank *k* (Figs. 2 and 3) supported on rods, and sanded to prevent adhesion. The width of the plank is equal, or nearly equal, to the length of the bricks to be made.

Three pairs of rollers D, E, G (Fig. 3) fastened underneath the frame give movement and direction to two endless belts H (Fig. 3) by means of a crank and pinion on the shaft E. On each belt is riveted or screwed a series of wooden blocks *h* (Fig. 3) exactly equal in size. Each block has a hole bored in it near the belt, through which the rods pass from side to side. The distance between the two belts can be regulated by sliding the rollers on their shafts, so that the space between the blocks *h* may be adjusted to the length of brick required. In the intervals between D, E, G the belts are supported on friction-rollers *i* (Fig. 3). Motion is given to the belt by means of the teeth *e* (Fig. 2), which take hold of the projecting ends of the rods *h'*.

The endless belts being put in motion, the plank *k*, loaded with clay, is drawn forward under the cylinder L (Figs. 1, 2, 3), which just grazes the top of the blocks *h*. The clay is thus pressed between the plank *k* and the cylinder L, and is prevented from spreading laterally by the blocks *h*. When one plank has advanced sufficiently, another is added, and so on.

The prism of clay, constantly advancing, comes next under the cylinder M (Figs. 1 and 3), which compresses it down to the thickness required, while two wires *n* (Fig. 3), one on each side, cut it to the desired width.

Passing through the die O (Figs. 1 and 3), the prism is brought to its accurate calibre. When working a prism two bricks thick the die contains a wire *o* (Fig. 3) which cuts the mass horizontally.

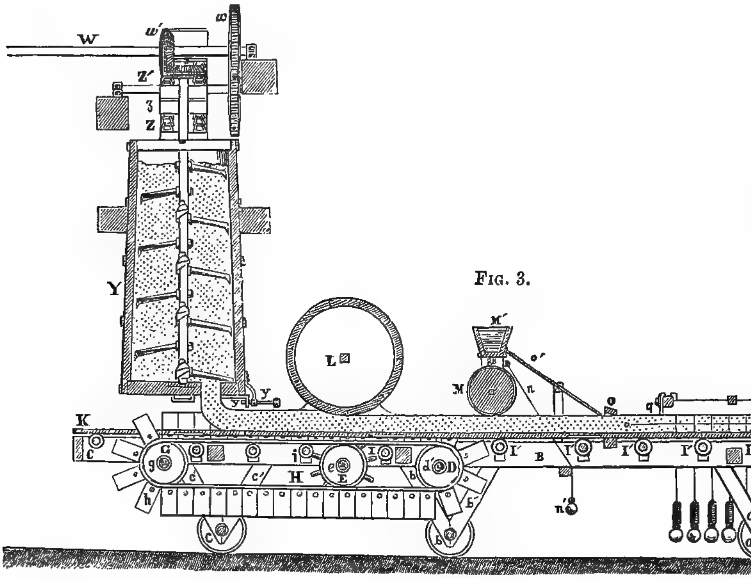


FIG. 3.

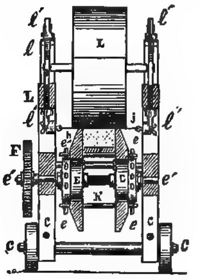


FIG. 2.

The cylinder L is of wood; a wire *j* (Fig. 2) stretched between its lower surface and the top of the blocks H prevents the clay from adhering to it. The cylinder M is also of wood, but is surfaced with felt, kept constantly moistened. The die O is also supplied with a small stream of water from the same source, at its upper corners, through the tube *o'* (Fig. 3).

When the prism, after passing through the die, has advanced sufficiently far, a small chock upon the plank *k* rings a bell P, upon which the man who is turning the crank stops, and by means of a lever, not shown in the figure, allows the frame R R (Fig. 1) turning on the hinges *q q* to drop, and by means of the wires which it contains to cut off a certain number of bricks of the proper width.

By means of this machine 4800 bricks per hour may be turned out—48,000 per day of ten hours. The actual daily production, however, rarely exceeds 20,000 to 25,000, unless the crank is relieved.

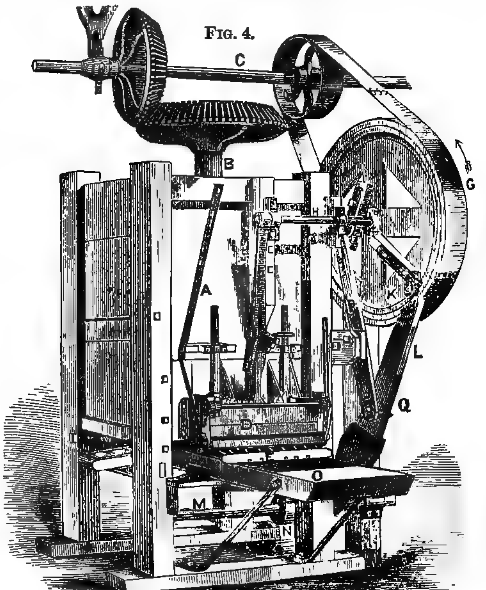
In the drawing the pug-mill is represented as feeding directly into the machine. As, however, the mill can rarely supply the machine fast enough, it is usually detached, and a proper quantity of clay prepared beforehand, and then shoveled on to the machine as required.

The leading type of the machines used at Haverstraw, N. Y., and vicinity for the manufacture of common bricks, where about 2,000,000 per day are made during the working season, is shown in Fig. 4, and is known as the "Vervalen machine." The object of this machine is merely to fill the moulds more rapidly than could be done by hand, and not to produce a pressed brick.

A is a wooden box or tub about 3 feet 4 inches square inside, and from 4 feet 6 inches to 5 feet high, into which the clay to be moulded is cast. B is a vertical iron shaft about 5 inches in diameter, geared with the engine shaft C, which imparts to it a horizontal rotary motion. The lower end of B is provided with a heavy casting, shaped like the letter S, called the *wiper*, which sweeps the clay through a lateral opening in the front side of A into the cast-iron box D.

The shaft B is provided with a number of projecting arms, from fourteen to twenty-two, which clear the sides of the tub by about one inch, and serve to mix the ingredients before they are expelled by the wiper. When, however, the clay is previously mixed by a tempering wheel, these arms are removed, leaving only the wiper, and the tub then serves merely as a hopper. The bottom of the cast-iron box D is provided with six openings, through which the prepared clay is forced into corresponding openings in the mould E. A sort of rectangular piston works up and down in the box D by means of a connecting rod F run by a drum G. A crank at the end of the drum-shaft H communicates a stroke of about seven inches to the piston, which stroke, however, can be diminished at pleasure by shifting the position of a pin at the lower extremity of F. The bottom of the piston does not come nearer than about six inches to the bottom of the box D.

FIG. 4.



The action of the machine will now be readily understood. The prepared clay is swept by the wiper out of A into D, whence it is expelled by a down stroke of the piston into a mould placed under it. While this mould is being filled an empty one is inserted behind it through the aperture I. The drum G continuing its revolution in the direction of the arrow, a cam K strikes the lever L, throwing it forward, as shown in the figure. It carries with it the shaft M, which by means of a horizontal rod attached to two cranks (one of which is shown partially in the figure at N) and passing behind the empty mould, forces it forward, thrusting out the full one upon the table O, and placing the empty mould in position to be filled. The drum G continuing its revolution, another cam, placed so as to clear the top of the lever L, strikes the upper arm of the lever P, causing it, by means of the projection Q, to return L to its primitive position. A chock prevents L from falling too far back. And so on.

Whenever the nature of the materials used admits, the mixture of the ingredients is made by the pug-mill working in the tub. In this case a rectangular pit is prepared directly behind the machine, capable of containing the amount of clay required for a day's work. The clay is placed over night in this pit, and is wet down with a certain amount of water, varying according to the nature of the clay used. In the morning the other ingredients, consisting of sand and anthracite coal-dust, are carted to the pit and roughly mixed by two spaders, who afterwards throw it up into the tub, where the pug-mill completes the mixing.

The proportion of sand used varies according to the quality of the clay and the relative proportions in which the two are found in the bank. It may be taken, on an average, at one-third sand to two-thirds clay. The Haverstraw sand is of excellent quality, and, more than the clay, gives the bricks of this locality their peculiar character. Coal-dust is used in the average proportion of 3 pecks to the 1000 bricks. For burning properly in the kilns, a certain number of what are called *double-coal* bricks is required, in which the proportion is about 5 bushels of dust per 1000 bricks. When mixed in a circular pit by means of a "tempering wheel," the clay and coal-dust are disposed in alternate layers and cut up by the wheel. The sand is then added, and incorporated by the wheel. This operation consumes the entire day.

When the moulds, which are made mostly of cherry or locust wood, and contain six bricks each, are thrust from under the press upon the table, they are placed on trucks and wheeled under the drying shed. The bricks are thrown out upon the flat. When sufficiently dry they are "edged up" by means of an instrument called an *edger*, then "spatted," or tapped with a flat board called a "spatter," to give them a clean edge, and then "hacked up," or placed in long and narrow rows on edge. When dry enough—that is, in one to three days, according to weather—they are built up in "arches," set on edge in the order called "three over one." The arches contain 28,000 to 35,000 bricks each, and are 6 bricks or 4 feet wide, about 44 bricks or 30 feet deep, and from 45 to 55 courses high. Each arch has an opening at the bottom—hence the name—in the centre of its width, in which the wood used in baking is placed. On the outside are placed the "double-coal" bricks, to the number of about 3000 per arch. Bricks containing only the usual proportion of coal would not burn properly at this distance from the fire.

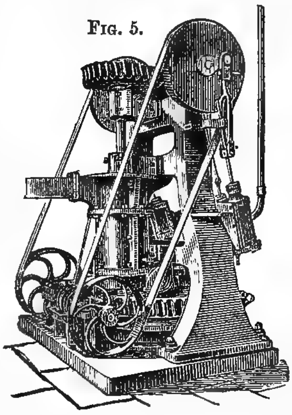
A number of arches, five, ten, or more, are built up contiguously, so as to form a solid mass. The whole is then covered with a dry wall of baked bricks, the lower courses being one brick thick, and the rest half a brick. At the bottom they leave a vacancy between the wall and the face of the arch, which gives a batter to the covering wall, and affords a better draught. Arch-irons or cast-iron frames having an opening of about one square foot are inserted in the openings, and the whole is smeared over with clay. The heap so prepared is called a kiln. This system of burning is pursued rather than that with permanent kilns, on account of the greater number of bricks which may be burned in a given space. At Haverstraw, yards controlling only 200 feet frontage can thus make from 5,000,000 to 6,000,000 bricks per season of 150 working days.

About four cords of wood are used per arch, and the burning requires six days, fires being lit on Monday morning and drawn on Saturday evening. Moulding is usually carried on during the forenoon of each day—about five to six hours—the rest of the day being spent in "hacking up," etc.

The machines above mentioned turn out, in ordinary working, ten moulds or sixty bricks per minute, or 18,000 to 20,000 per forenoon. They require the following plant and help per machine: 25 moulds, 4 trucks, and 8 men. If operated by steam, a machine turning out 18,000 per day requires eight horse-power nominal, high pressure.

The standard of full work in this section is to turn out 1000 bricks per day for every soul employed, from the time the clay is dug till the bricks are loaded in the vessels. Thus, an establishment employing forty hands, all told, should turn out 40,000 bricks per day. The Morand brick-machine, Fig. 5, consists essentially of a pug-mill, under which revolves a horizontal iron table, in which there are eight openings or moulds of the size of a brick. The mill mixes the clay, and forces it downward by its helicoidal arms through a slot in the bottom of the mill, thus filling the moulds as they pass under the slot. Each mould then passes under a pressure-plate, which confines the clay on top, while a movable plate, which closes the mould at the bottom, is forced up by passing over a cam. This compresses the plastic brick, forcing out the air and excess of clay through a small hole in the pressure-plate. After passing the pressure-plate the bricks are thrust up to the top of table, and then moved automatically to an endless band, which carries them away. From the band they are loaded upon cars, which convey them into drying-ovens. They go to the kiln the next day. Q. A. Gillmore.

Fig. 5.



Brick, Archæology of. This material has in recent times attracted much archæological interest. The Bible mentions brick as the material of which the tower of Babel was made: "Go to, let us make brick and burn them thoroughly" (Gen. xi. 5); and it is precisely in this region, the valleys of the Euphrates and Tigris, that the most interesting archæological remains of this character are found. The Babylonian bricks were usually burned in a kiln, while those of Nineveh were more frequently sun-dried. We learn also from the Bible that sun-dried bricks were extensively employed in Egypt; and that it was one of the principal employments of the enslaved Israelites to make such bricks, in which straw was mingled with the clay so as to increase the durability of the mass. But Egyptian buildings made of unburnt brick, even without straw, are still standing in good preservation. Some of these buildings are with confidence referred to the remotest periods of history. Similar though scarcely parallel examples of the durability and excellence of unburnt bricks are afforded by the *adobe* buildings of Mexico, New Mexico, and Arizona, many of which were erected by the natives long before the advent of the white race. Adobe buildings erected for public uses in Santa Fé, New Mexico, by the Spanish authorities long before the foundation of the English colonies of North America, are still in use, having stood for more than three centuries with but the most insignificant repairs. This durability, however, both in Egypt and Spanish America, is largely due to the dry weather which prevails in both regions, and is not observed in brick made from inferior clays. The ancient Peruvians made bricks of the greatest excellence, as well as sun-dried bricks of good quality. The Chinese have for ages made excellent bricks, to some of which they give a glazed surface, like that of porcelain. The people of India make bricks—those of some regions finely ornamented, and superior in quality to the bricks of Europe and America. The old ruins of Farther India and Java attest the antiquity of the art of brickmaking in those regions.

But the great discovery of the secret of the cuneiform writing has of late attracted renewed attention to the bricks of Babylon, each of which bears at least the name of some king (notably that of Nebuchadnezzar), the writing having been in most cases made upon the soft clay by a stylus of iron. This practice of marking bricks with some name, as that of the ruler or the manufacturer, has prevailed in other countries, notably in ancient Rome. The Romans made many public and private buildings of brick, often of excellent character; but in some of their subterranean water-courses, recently cleared out, the brick lining has disappeared, leaving a honeycomb of projecting mortar. It has been assumed that Roman brickmaking was derived from that of Greece, in the latter country a very important and extensive industry in ancient times; and the Greeks, it is stated, learned the art of brickmaking from the Egyptians. But if it were necessary to find any such origin for so universal an art in such countries, the Greeks might perhaps be imagined to have acquired it from the Assyrians in Cyprus, for there the two civilizations had a point of contact. Charles W. Greene.

Brick Church, N. J. See APPENDIX.

Bricks'burg (LAKEWOOD P. O. and station), Brick township, Ocean co., N. J. (see map of New Jersey, ref. 5–D, for location of county), 44 miles S. by W. of New York. It is a thriving settlement, and has manufactures of lumber, sash and blinds, brick, etc. Considerable capital is invested in raising small fruits for market. It has a ladies' seminary and a fine public-school building. Pop. not given in census of 1880.

Bridesburg, a former township of Philadelphia co., Pa., now in limits of Philadelphia. It is about 7 miles N. by E. of the State-house, and contains a U. S. arsenal (the Frankford), which is an arsenal of construction and laboratory for metallic cartridges, caps, and primers for cannon.

Bridewell, a name sometimes given to a house of correction for offenders. This name was originally applied to a well which was dedicated to Saint Bride in London, and a hospital founded on that site by Edward VI. Henry VIII. also built here about 1522 a palace called Bridewell, which Edward VI. gave to the city of London to be used as a workhouse and house of correction "for the strumpet and idle person, for the rioter that consumeth all, and the vagabond that will abide in no place." It was formally taken possession of in 1555 by the lord mayor and corporation.

Bridge. (*The etymology of the word is obscure; but, according to Richardson, its derivation is believed to imply that which reaches, stretches, or extends;* i. e. *from bank to bank, across a river, from side to side, point to point—anything built, raised, and stretched or extended across.*) If, as defined by Rankine (see ENGINEERING) the engineer "is he who by art and science makes the mechanical properties of matter serve the ends of man," it may further be said that the form of matter which earliest presented the problem of its reduction to subservience to his purposes was the *surface of the earth.* To a social being—a member of communities in which civilization has made any advances—paths of communication from place to place are among the earliest felt necessities; and in connection with them the surmounting, by bridges, of the barriers presented by ravines, rivulets, and rivers. In a rude state of society the most obvious and simple bridge is a tree thrown across the stream (if but a rivulet), and hence, says Rankine, "the first man who bridged a torrent with a fallen tree had in him something of the engineer;" putting bridge building among the very first exhibitions of the engineering art. Nor should it be overlooked that from the engineer's art, as exhibited in bridge-building, was derived the title of the Roman high priest; a title transmitted to the Roman *Bishop* and now symbolizing to the faithful of the Roman Church, the successor of St. Peter, the infallible head of the Church of Christ, otherwise styled THE POPE. The word "Pontiff," says Webster, is "said to be derived from *pons,* a bridge, and *facere,* to make, because the first bridge over the Tiber was constructed and consecrated by the high priest."

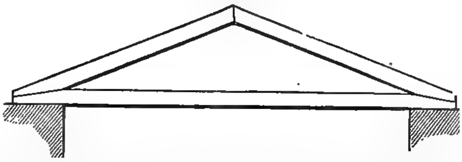
We have indicated the fallen tree as the rudest and, most probably, the earliest bridge. Singularly the next step in bridge-building seems to have been one which, in its full development, involves the refinements of the constructive art and of the mathematical science. "Another step in advance (Tomlinson's Encya. of the Useful Arts) is to stretch across a river a number of ropes, made of rushes or leathern thongs, secured on the opposite banks between trees and posts, and connected and covered, so as to form a slight bridge. This method is practised in some of the mountainous districts of South America. The ropes are formed of thongs of ox-hide, consisting of several strands, about six or eight inches in thickness, and across these, in a transverse direction, sticks are laid, and these are covered with a flooring of branches of trees. In other cases, an ox-hide rope is extended from one side of the river to the other, and is secured to each bank by means of strong posts. On one side is a kind of wheel, or winch, to straighten or slacken the rope, from which hangs, by a clue at each end, a kind of leathern hammock, capable of holding a man. A rope fastened to either clue, and extended to each side of the river, is used for drawing the hammock to the side intended. A push at its first setting off sends it quickly to the other side. Mules are carried over in this way."

To use these cables in pairs and to suspend from them a flooring is all that is needed to make a suspension bridge. "Such bridges are very numerous in various parts of the world. In China, where the germ of nearly everything connected with the Useful Arts is found, suspension bridges are formed of five parallel chains with links one foot in diameter, on which a loose bamboo flooring is laid. Another form is described as consisting of two parallel chains four feet apart, suspended over stone piers about eight feet
high on each bank. The ends of the chains pass
from thence, turn obliquely, and are bedded in the
each being fastened round a large stone, which is
down by a mass of smaller stones laid upon it. A p
about eight inches wide, extending across the river, is
pended from the chains by bands made of roots, of
length that the path is four feet below the chains in
middle of the length of the bridge. The suspending b
are renewed every year, and the planks are loose, so
any part can be prepared separately. The length of
of these bridges is described as being 59 feet. It is
used for foot-passengers; but it is a proper suspen
bridge, with a horizontal platform suspended from
main chains."

But to return to the "fallen tree." Instead of "felli
a tree in place, the transition to stretching the trunk
tree, a "log" or "beam," over a ravine with suitable,
ever rude, artificial bearing-points, or "abutments," is
ural and obvious. As the art of "Carpentry" devel
itself, and as a more scientific knowledge of the "Stre
of Materials" was acquired—particularly in its applicat
to the resistance to flexure and stress of beams, the "
ber Bridge" becomes the natural development of the f
tree. It would soon be discovered that the simple "be
stretched between two bearing points would receive
maximum bending strain at its middle point; that the
towards each abutment the strain would rapidly dimi
Hence, to get the greatest strength, with the least we
(for *its own weight* is the preponderating cause of str
the obvious expedient of making the beam thicker in
middle.

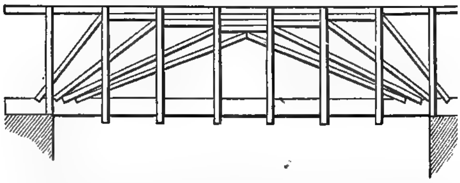
Again, the discovery would soon be made that the u
or top fibres of a beam are compressed and those at
bottom extended, while the middle ones are comparati
without strain; and the transition to the truss or fra
girder in which the lower or tie-beams, alone, suffer
tension—the upper, or brace timbers, are compressed.

FIG. 1.



In applying the above to long spans it becomes neces
that the lower or tie-beam (which may indeed be mad
of more than one piece "fished" together) should
points of support intermediate between the two abutme
also that the upper (or *thrust*-bearing pieces) should
stiffened by the application of intermediate bearing poi
To meet these requirements the truss assumes more c
plicated forms, thus:

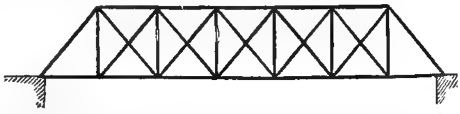
FIG. 2.



The latter figure exhibits nearly the principles of
struction of the celebrated bridge over the Rhine at Sc
hausen.

Since, in a bent beam it is found that the top fibres
compressed, the bottom ones extended, while the mi
ones, neither compressed nor extended (*longitudinally*) s
to bind the other parts together, an artificial beam o
large scale may be made by uniting the top and bot
longitudinal pieces by a web of diagonals which shall s
the purpose of the middle fibres of the pure beam. Th
accomplished in the various kinds of "trusses" in w
the upper and lower members are connected by diffe
systems of diagonal bracing combined with vertical t
as in Fig. 3.

FIG. 3.



Hence, also, the "lattice bridge" so much in use for
dinary road bridges in this country, and for some of
earlier railroad bridges.

The principles and qualities of the Town lattice (Fig. 4) are too well known to need description. Its cheapness and the facility of its construction adapted it for universal use in a country like ours, where the roadways which they are t carry over the numerous streams are themselves, for th most part, only the earth thrown up and consolidated. O our earliest railways they were naturally resorted to, but being deficient in strength, other combinations of timber were resorted to, especially the arch, which (the Burr) truss (Fig. 5) is exemplified in some of our older existing railway bridges, and in the well-known road-bridge at Trenton, built in 1804. Other forms of timber bridges (see p. 581), though admirable for their extent and the ingenuity employed in their construction, were likewise deficient in the rigidity essential for railway purposes.

Fig. 4.

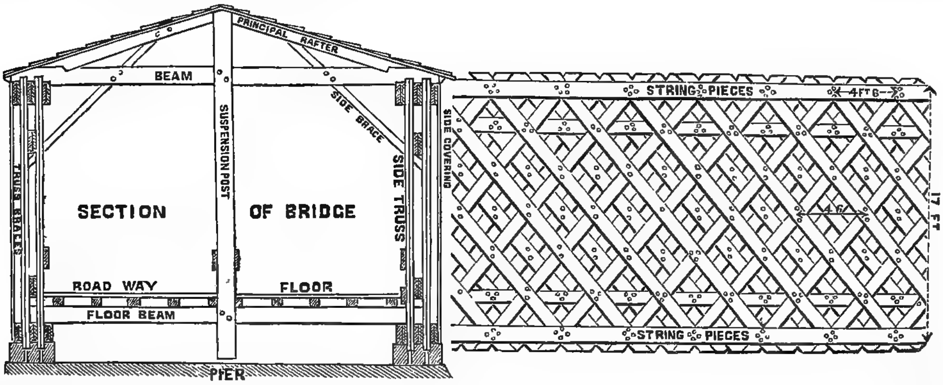
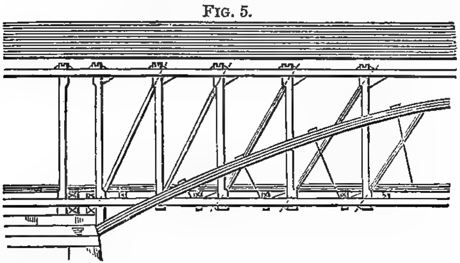


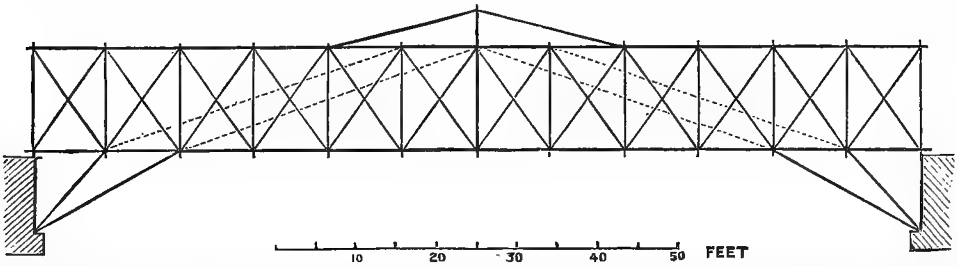
Fig. 5.



It fell to the part of Col. S. H. Long, U. S. Engineers, in his capacity of chief of the board of engineers of the Baltimore and Ohio R. R., in the year 1828 to devise a suitable timber bridge for the uses of that great undertaking. He aimed at a structure simple in its character, requiring only the skill of a good house-carpenter or joiner, and hence to be of timber, which, both strong and of little weight, is generally procurable upon the route, and is susceptible of rapid replacement in case of destruction by fire or flood, and of which the first cost is very small. The first bridge on this plan, on the Washington road at its intersection with and over a deep cut of the Baltimore and Ohio R. R., 2¼ miles from Baltimore, is thus sketched and described by the inventor (Fig. 6):

"The length, or span, of the bridge is 109 feet; its width from out to out, 24 feet; and its height from bottom to top of its posts is 15¾ feet. It is supported by a double truss-frame on each side, furnished with arch braces from beneath only, the upper arch-braces not being required in a bridge of that length. The exterior string-pieces of each string are only 6 inches square, and the exterior 6″ × 8″. The posts at the ends and at the centre of the bridge, as also the arch-braces, are of the size last mentioned. The other posts and the main braces are 6 inches square. The counter and lateral braces are only 5 inches square.

Fig. 6.

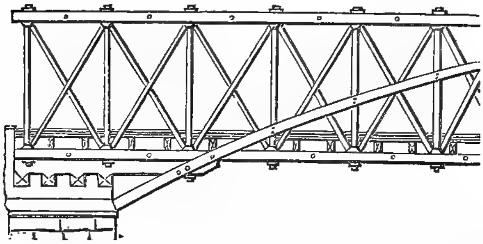


"The whole of the timber, except the keys, is white pine, with no other seasoning than what it might have acquired in six weeks, during which time the work was in progress, having been framed and raised in that time by six workmen only. Independently of the abutments and exterior covering of the bridge, its cost, inclusive of materials and workmanship of every kind, was only $1145. . . .

"Agreeably to the most approved rules for computing the strength of similar structures, it will sustain on every square foot of its floor, in addition to its own weight, at least 120 pounds, or, equably distributed over the entire surface of its floor, about 110 tons weight."

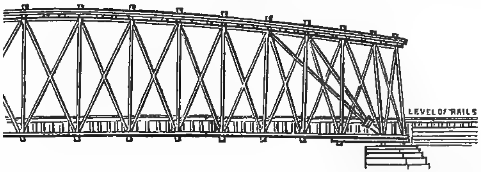
It was intended by Col. Long that the ravine now spanned by the Carrollton viaduct, so called, and the deep valley of Gadsby's Run, should be crossed by bridges of timber on this plan, and the road bridge, before described by Col. Long, was constructed by him and erected for the purpose of showing that his trussed frame would furnish the desideratum then sought—viz. a structure of timber of sufficient strength and rigidity to meet all the requirements of a railroad bridge, and at a very moderate cost. Subsequently, however, the company changed its policy, and the Carrollton viaduct was built of stone at enormous cost; while the valley of Gadsby's Run was raised to grade by a stone structure and heavy embankment.

Fig. 7.



More recent forms of timber bridges for railroads, built under the Howe patent (Fig. 7), McCallum (Fig. 8), and other trussed-frame bridges, derive their origin from that of Col. Long, the first in this country, at least, who applied

Fig. 8.



the rectangular trussed frame, pure and simple, to bridges for railroads.

The first bridge built of the Long truss was in 1838 for Capt. W. H. Swift, U. S. Engineers, when engineer of the Western (now Boston and Albany) R. R., at Warren Village, Mass., and under the specifications entered in the patent of Col. Long. The second bridge built by Mr. Howe was on his own plan, over the Connecticut at Springfield, under Major Whistler, then engineer of above road (1841–42).

Our great trunk railroads are no longer hampered by the want of capital which generally forbade bridge construction over large rivers and estuaries, yet wooden bridges must prevail in our new railway enterprises, and hence this reminiscence of their early adoption, though anticipating what we have to say in connection with the more general history of timber bridges, is deemed appropriate.

Although the "fallen tree" and its development, the timber bridge, must have been the earliest of bridges yet with the exception of drawings made by Palladio and others from the description given in Cæsar's Commentaries of his bridge over the Rhine, we have no satisfactory account of any ancient bridge.*

This famous bridge has been cited in the works of the most celebrated engineers and architects as worthy of record. It was constructed over the lower Rhine somewhere between Emerich and the Wesel, perhaps (and quite probably when the situation of Cæsar's camp at that time is considered) at the very place where the city first named is now built. Its length must have been somewhere between 550 and 650 yards. Cæsar (according to Rondelet) describes his own work as follows:

"Urged by these powerful motives Cæsar resolved to cross the Rhine with his army. The use of boats offered no sufficient security for such an operation, and, moreover, a resort to this means seemed to him unworthy of his glory and of the honor of the Roman name. On the other hand the establishment of a bridge presented great difficulties on account of the width, depth, and velocity of the current. He persisted nevertheless in regarding this as the only fit means; and the bridge was executed in the following manner in accordance with the idea of it conceived in his own mind.

"Timbers of a foot and a half thickness, sharpened at the foot, and of a length corresponding to the depth of the river, were assembled in couples, allowing an interval of two feet between them. Thus united by means of suitable apparatus, they were let down into the water, not vertically like ordinary piles, but inclined in the direction of the current, and thus driven. Another couple with opposite inclination was then fixed (or driven) 40 feet below the first. These double pieces, thus disposed, received at their extremity a beam of 2 feet thickness which filled the interval between the pieces of each pair, and which was thus supported at each end by double ties.

"This frame-work composed of pieces inclined in opposing directions, strongly connected with each other, formed a very solid combination; for the property of such a disposition of materials is that the force of the current adds to its stability by exerting a strong pressure on the assemblage.

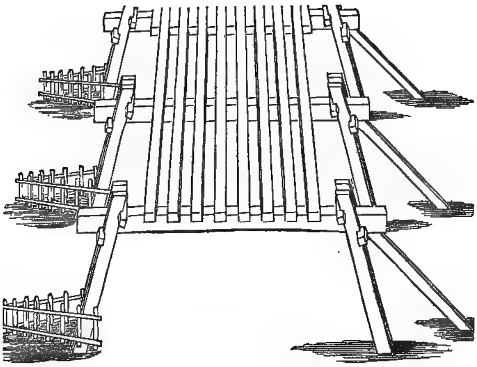
"After making a number of similar structures, placed at equal distances and extending from shore to shore, a continuous flooring was added composed of beams covered with fascines. Besides these arrangements inclined (brace) piles were driven on the lower side and connected with the rest of the work, forming a *whole* capable of resisting the greatest impetuosity of the current.

"The same was done above to protect against floating trees or boats which the enemy might send down the stream with a view of destroying the structure.

"The tenth day after the cutting and assembling of the timbers, the bridge was entirely finished and the army accomplished its passage."

Rondelet gives two "restorations" (as they may be called) of this interesting bridge (see Plate XCVIII. "Art de Batir"), of which the sketch herewith is one;* but the foregoing description is, like all the works of its great author, so lucid as to scarce need pictorial illustration.

Fig. 9.



Among the earlier wooden bridges of which we have record the boldest and most ingeniously constructed was that at Schaffhausen on the Rhine.

A stone bridge that had spanned the Rhine here having fallen, and the project of rebuilding it being found impracticable, Ulric Grubenmann, a common carpenter of Tueffen, produced a model for a wooden bridge, supported only by one pier and the abutments on the banks of the river. After some hesitation of the committee of Schaffhausen, his proposal was adopted, and he completed this truly extraordinary work in the year 1758. The total length of the bridge was 364 feet, and its breadth 18 feet. It was eight feet out of a straight line, the angle pointing down the river; and 171 feet from the town abutment. This magnificent and ingenious bridge was destroyed by the French in April 1799.

Fig. 10.

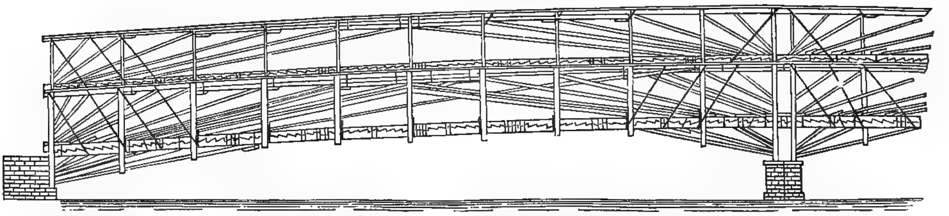


Fig. 10 represents a single span of the bridge.

Still more worthy of admiration, though less known, was the bridge of Wettingen over the Limmat, near Baden, constructed by the same Ulric jointly with his brother John Grubenmann. Its span was 366 feet, without intermediate support. This bridge too was destroyed in the campaign of 1799. "The destruction of these bridges," says Rondelet, "would have been an irreparable loss, not only to the public but more especially to the Art of Carpentry had not the plans and details, the knowledge of which cannot be too widely disseminated, been carefully preserved."

Fig. 11 represents a half span.

In our own country, until the comparatively recent introduction of iron, timber has been *almost* exclusively employed in Bridge-building, the early history of which describes many noteworthy structures. The most remarkable of these was that over the Schuylkill at Philadelphia, styled by its builder, Lewis Wernwag, "The Colossus of Fairmount." It is thus described by Cresy.

"It was a beautiful piece of carpentry, composed of a single arch, the span of which was 340 feet, and it had no other support than that of the two abutments; the versed sine was 38 feet, and the breadth of the carriage way 30 feet. The principal timbers, which were of large dimension, were all sawn down the middle, for the purpose of ascertaining whether they were perfectly sound; and when applied to the bridge they were placed at a sufficient distance to allow the tenons of 29 king-posts, which radiated to the centre, to pass, without any mortises being cut to receive them; by this means the air circulated freely round all the timbers, and dry rot was prevented: the main ribs consisted three double rows of timber, laid three deep, or one above › other, the whole bound together strongly with wrought n. Between the tops of the king-posts straining beams were introduced, which kept the heads from approaching each other, and in addition two other timbers, placed diagonally like St. Andrew's cross, were inserted in each of the

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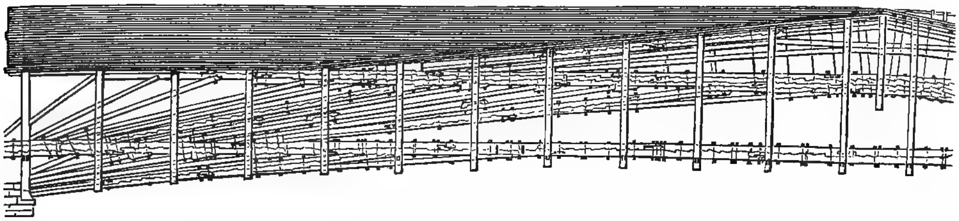
* The oldest wooden bridge on record is the Pons sublicius which existed at Rome 500 years B. C. It is celebrated for the combat of Horatius Cocles, a Roman knight, who saved the city by his noble defence of this bridge. The word *sublicius* is believed to imply wooden piers or piles.

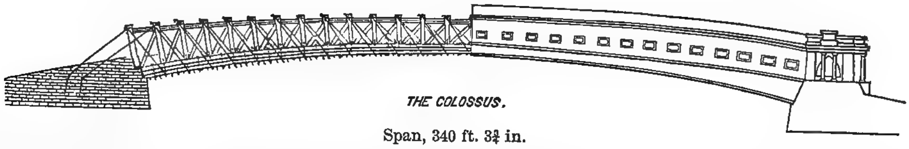
* There is also one in the book of Thomas Pope, cited hereafter.

Fig. 11.



isions, strutting the king-posts more firmly and prevent- : the arch from springing. The abutments, against ich the timber arch pressed, were of solid masonry, and ried up considerably higher than the top of the arch. ə floor of the bridge was upon girders, laid upon should- formed in the sides of the king-posts, to which they were ıly bolted: on the tops of the kings, and in the direction the transverse girders, were the tie-beams of the roof; se latter not only served to maintain the roof securely, but also the heads of the kings in their perpendicular and proper position. The roof was lightly formed, and the sides of the bridge were close boarded, so that the timbers, or the principles of their construction, could not be seen." Fig. 12 exhibits the arrangement described; its great simplicity compared with the two just before described is striking. The builder asserts that he can build to 500 feet span "by making the ribs of more pieces in depth and thickness and all the parts in proportion."

Fig. 12.



Span, 340 ft. 3¾ in.

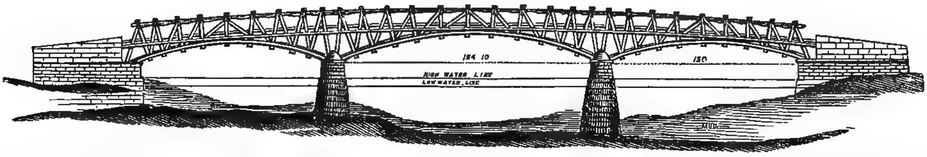
'his beautiful structure was compared by Fanny Kemble ıer "Journal," to "a scarf rounded by the wind and g over the river."

he writer is informed that the upper part of the west tment had yielded (receded) three or four inches under thrust of the arch but, apparently, without detriment tability. On one occasion an unusual load (a heavy e) was allowed to pass over this single stretch of 340 3¾ inches (the accurate lineal span) which had been refused passage over the Market street triple span bridge. (See Fig. 13.)

Like its famous predecessors of Schaffhausen and Wettingen, this beautiful structure has ceased to exist; not like them a victim of "man's ravage," but of the arch enemy to all wooden monuments—accidental combustion (1838).

Another notable bridge was thrown over the Schuylkill at a much earlier period of which a sketch is given herewith. It is described by Thomas Pope* as follows:

Fig. 13.



It is composed of three arcs of wood, supported by two e piers, with two abutments and wing-walls. The ern pier is sunk in an astonishing depth of water, per- ı greater than ever any bridge pier was before sunk, in part of the world; the surface of the rock on which it laced being forty-one feet nine inches below common tides. The piers were built with coffer-dams. The for the western pier was curiously constructed, from a ŗn furnished by Mr. William Weston, a celebrated 'aulic engineer of Gainsborough, in England. We may some conception of its magnitude when we are told eight hundred thousand feet of timber were employed "

*   *   *   *   *   *   *

Che eastern abutment and wing-walls are founded on a Those on the western side are built on piles. There ıpwards of seven thousand five hundred tons of ma- r in the western pier. Many of the stones composing piers weigh from three to twelve tons. A number of ive chains are stretched in various positions across the . These are worked in with the masonry, the exterior ıich is clamped, and finished in the most substantial vorkmanlike style.

'he frame of the superstructure was designed and :d by Timothy Palmer of Newburyport, Massachusetts. a masterly piece of workmanship, combining in its iples that of king-posts and braces with that of a stone Half of each post, with the brace between them, will the voussoir of an arc, and lines through the middle h post would describe the radii or joints."

ɔther notable bridge is described by the same author .ows:

ISCATAQUA BRIDGE. In the year one thousand seven 'ed and ninety-four, a bridge was built over the River ;aqua, seven miles above Portsmouth. Its length is y-six hundred feet; of which twenty-two hundred feet are planked. The greater part of this Bridge is built of piles driven into the bed of the river in the common way. But that part which engages the attention of travellers, is an arc nearly in the centre of the river, uniting two islands, over water forty-six feet deep. This stupendous arc of two hundred and forty-four feet on the chord, is allowed to be a masterly piece of Architecture, planned and built by the ingenious Mr. Timothy Palmer of Newburyport. This bridge cost the proprietors sixty-eight thousand dollars."

This bridge is alluded to in the Edinburgh Encyclopædia as one over the "Portsmouth River;" and by Col. Douglass in his work on military bridges, who says: "It was put together with wooden keys, on Price's method of construction, applied to a larger span, except that there is some difference in the form of the keys." The writer observes that the arch is extremely flexible, and that diagonal braces would be an improvement in it. Also that if the three ribs had been placed close above one another, and firmly connected together, the bridge would have been much better adapted to resist any unequal load, because, in such case, they would have formed a solid beam, equal in depth to the sum of their depths.

And even Tredgold treats of it, saying "it would have been still better to have made the same quantity of timber into two ribs, with cross ties and diagonal braces between them; that the method of connecting the parts by means of dove-tail keys' is objectionable, as the timber must be greatly weakened by such large mortices, and a very slight degree of shrinkage renders them useless; that it is still more objectionable as applied to the radial pieces, which would have been much better notched on in pairs, and bolted through."

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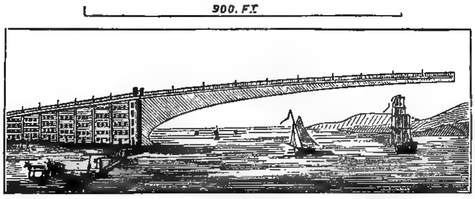
* "A Treatise on Bridge Architecture," New York, 1811. A very curious, and, as a history of bridge-building up to that date, valuable book. The Society and Mercantile Libraries possess copies.

The special object of the work of Thomas Pope was to promulgate the project of a "Patent Bridge" of his own. "A model was built to illustrate a Bridge suitable to span the East River at New York, with a single arc, the chord of which would be 1800 feet, the altitude or versed sine 223 feet, the abutments were built in the form of so many warehouses, and the whole was erected by a scale of $\frac{3}{8}$ of an inch to one foot; the length of model of half bridge, in real measure, is nearly fifty feet. The weight that the unsupported arm of this diminutive Model bore at one time, since finished, has been ten tons; and which has astonished the mind of every beholder."

"The Shipwrights of New York" (among which we find the well-known names of HENRY ECKFORD, Christian Bergh, Adam and Noah Brown, Joseph Webb, &c., &c.) certify to the effect that "we have no hesitation in asserting as our joint opinion, that the strength thus furnished is more than equal to all that can be needed."

The plan is not without merits; but the time when "Rivers North and East may have a Bridge," waited for a Roebling. The inventor gives his plan of construction in great detail, together with a view twice repeated of the entire bridge spanning "the spacious Hudson." But inasmuch as it was to be projected out from its abutments without aid of centreing or "false works," he has given a view (Fig. 14) of the *half* bridge thus projected, with the motto:

FIG. 14.



"Like half a rainbow rising on yon shore
While its twin partner spans the semi o'er
And makes a perfect whole that need not part
Till time has furnished us a nobler art."

But the frontispiece exhibits the "perfect whole" striding the "Broad Hudson," with the more ambitious motto:

"Let the Broad Arch the spacious Hudson stride,
And span Columbia's Rivers far more wide,
Convince the world America begins,
To foster Arts the ancient work of Kings."

Of recent wooden bridges, the Railroad bridge at Bellows Falls, and the Susquehanna Bridge erected by the Philadelphia, Wilmington, and Baltimore R. R. Co., are the most notable—the former with spans of 250 feet has been standing since 1850, and has proved as efficient as any of less dimensions, though it has been subject to uncommon trials. The centre deflection, when this bridge was tested by three heavy locomotives, drawing a freight train at a speed of 25 miles to the hour, was nine-tenths of an inch, the permanent set remaining being about one-sixteenth of an inch. This bridge was designed and built by Parker, and was the first timber bridge for a railroad of so long a span, erected in this or any other country.

The Susquehanna Bridge, also designed by Mr. Parker, is thus described by him:

"The structure between the shores of the river is about three thousand five hundred feet in length. It has thirteen supporting piers and two guard piers at the draw, and two abutments. The piers are built in water varying from t to forty-five feet in depth. The spans are two hundr and fifty feet in length between bearings. The draw sp is one hundred and seventy-six feet long. Height of sup structure twenty-five feet. The superstructure is an i proved form of the Howe truss. When completed ea truss is to be encased entirely in iron, thus making it fi proof and free from exposure to the weather. The pecu arity of the hydraulic engineering connected with tl work is the disuse of the Coffer dam.

"Instead thereof water-tight wrought-iron caissons ha been used.

"The whole cost of the magnificent structure has be something less than $2,000,000.

"The bridge is approached from the main road on t east side by a track laid over heavy trestle work, fourte hundred feet long. This trestle work is but temporai and, as soon as practicable, will be replaced by an ear embankment, supported by retaining walls of appropria masonry. At the end of this is a firm abutment of stroi masonry, handsomely constructed of granite from t quarries in the vicinity of Port Deposit, only six mil from the structure. This granite is of a dark color, elegant appearance when worked, and is said to be t hardest and heaviest in the world—heavier by three poun to the cubic foot than that of the famous Egyptian Py amids. There is one of these abutments in each en similarly constructed.

"The bridge is secured to the piers by means of bol three inches in diameter, which pass through holes drill for that purpose to near the surface of the water, whe they are, by means of a ring at the end, attached to similar horizontal bar that passes through the sides of tl pier." The upper ends of these perpendicular bars pa through a heavy oak bolster, and are fastened with a n at the top, by means of the screw, upon which they can tightened if occasion should require.

"The timber of this structure has been very careful selected. It has also gone through the process of Burne tizing, by which its durability is not only increased least two-fold, but by which it is rendered indestructib by fire. This treatment was applied by Mr. Charles Bent, who has an establishment for the purpose at Perr ville, and several others upon railroads in different States

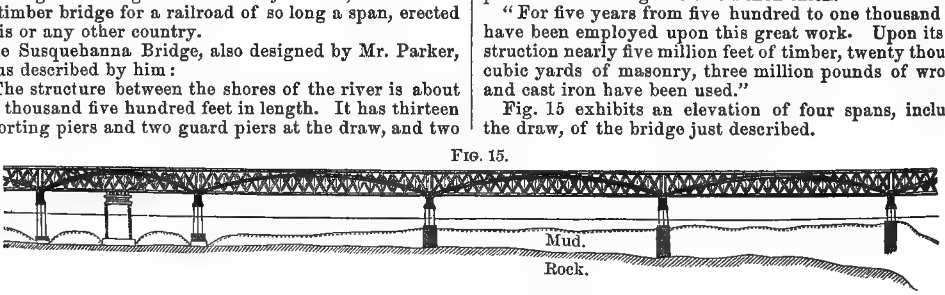
"This process is familiar to our readers, and consists removing air, etc., from the fibres of the wood, by placi it in an exhausted vessel and then injecting chloride zinc."

"The timbers of the bridge are secured by means of ir bars and butt seats. These bars are about twenty-five fe long, and vary in thickness from one to three inches, tl largest weighing seven hundred pounds. In the constru tion of the bridge nearly seventeen hundred of these ba are used. The immense weight of the structure may estimated from the fact that there is used upon each sp about two hundred tons of wood and iron. Iron is mu more extensively used than is common in timber structure As an instance, the bottom chords, where most exposed a tensile strain, are entirely sheathed on the sides wi plate iron three-eighths of an inch thick."

"For five years from five hundred to one thousand m have been employed upon this great work. Upon its co struction nearly five million feet of timber, twenty thousa cubic yards of masonry, three million pounds of wroug and cast iron have been used."

Fig. 15 exhibits an elevation of four spans, includi the draw, of the bridge just described.

FIG. 15.



To convey an adequate idea of the relative merits of the different kinds of "truss" for wooden bridges (known as Burr's, Long's, Howe's, "McCallum's inflexible arch," etc.) would require more space than can be devoted to it in a work not professedly technical. The clearest description and analysis of merits will be found in Spon's Dictionary of Engineering, or Cresy's Encyclopædia.

Although, as we have seen, suspension bridges of a simple character are among the primitive structures of mankind, yet their development into important structures capable of meeting the needs of civilized intercourse, demanded an advance in the scientific knowledge of materials and the principles of construction, which has only been made within the last two or three centuries. Bridges of rope or cordage are described in works on Military Engineering early in the 17th century; and in 1741 the fir European Chain Bridge was built in England across tl Tees. It was a rude work attracting no attention at tl time; and not until 1814 did English engineers app themselves to their construction. In our own country, reality, was the Suspension or (as it was called) tl "Chain Bridge" first introduced. Thomas Pope stat that a "Patent Chain Bridge" was patented by James Fi lay in 1808 and that there existed eight of these bridge In the "Portfolio" of June, 1810, is the following descri tive notice of four of the eight:

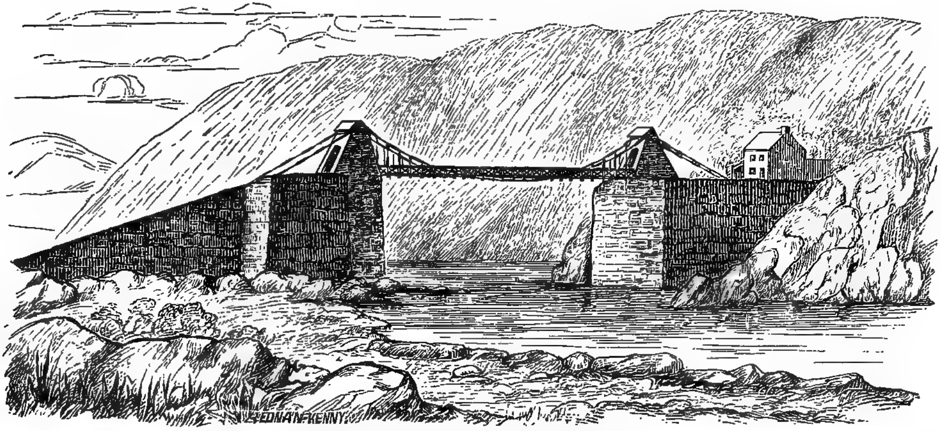
First bridge erected on this plan in 1801 was on Jacob Creek, 70 feet span, 12½ feet wide, and warranted for years (all but flooring), cost $6,000. Exclusive right s cured by patent 1808. Largest at Falls of Schuylkill, 3 feet span, aided by intermediate pier; passage 18 feet wide, supported by 2 chains of 1½ inch square bar.

One at Cumberland, Md., supported by two chains of 1¼ inch bar; span 130 feet, 15 feet wide.

Another over the *Potomack* above the Federal city of nearly the same dimensions as at Cumberland. (Fig. 16.)

The "Portfolio" mentions besides the foregoing (making up the eight of Thomas Pope):

Fig. 16.



One over the Brandywine at Wilmington, 145 feet span, no pier, thirty feet wide, supported by four chains of inch and three-eighths bar. Two carriage-ways and one foot path.

One at Brownsville, Fayette County, one hundred and twenty feet long, eighteen feet wide, one inch and a quarter bar.

One near the same place, one hundred and twelve feet long, fifteen feet wide, one inch and a quarter bar.

Finlay says that he entered into an agreement with John Templeman* of Georgetown, Md., concerning the disposition of his patent right, and hence we presume the attributing of the *Powtowmack* bridge to the latter in some publications, as he was probably its *builder.*

This latter bridge has a history: it was standing in the beginning of 1839 when the writer, in company with the present Quarter Master General of the U. S. Army, who has kindly furnished these items of information, crossed it. Not long after it was carried away by a freshet, replaced by a truss bridge (Long's probably), and that by two spans of iron (by Geo. Thom) which fell before completion; when Randolph Coyle built a wooden bridge over the *whole* Potomac bed, doing away with the *causeway* which, in restricting the flood-water area, had caused the destruction of the original "Chain Bridge." This last is thus alluded to in the "Report on the Defenses of Washington." (Prof. Papers, Corps of Eng'rs., No. 20.)

"The Chain Bridge (for the *name* still holds) owed its name to a former suspension structure, long since carried away by floods. It had been replaced by a fine timber trussed bridge of over four hundred yards in length, resting on masonry abutments and seven masonry piers. At ordinary stages the river, rapid and unfordable, flowed beneath the single span next the Virginia shore; the rest of the bed being dry and strewn with fragments of rocks of large size. At high stages the whole width spanned was swept over by a furious flood. This was the sole existing bridge between Washington and Harper's Ferry at the breaking out of the war, the one formerly existing at Berlin having been destroyed by fire. It connected Washington with the Leesburg Turnpike and neighboring parts of Virginia. Its ordinary uses ceased with the outbreak of the war, but it immediately acquired a high military importance. Though not strictly necessary to a mere passive defence of Washington, it had, nevertheless, a high incidental utility as a means of maintaining communication with the Virginia theatre of war, and of throwing forces on the flank of an enemy menacing the lines of Arlington."

The former timber trusses have decayed, and have been replaced by others of iron.

In 1814 Telford undertook a course of experiments upon the tenacity of malleable iron, prompted by the necessity of such knowledge to the testing of the feasibility of such bridges with large spans, and thus epitomizes his results:

"From these experiments I had reason to be satisfied that English iron made with wood charcoal, had sufficient tenacity to bear itself, and a portion to spare equal to the purposes of a bridge across an opening of 1000 feet, and therefore considered myself justified in proceeding to form designs."

The Menai Bridge, commenced in 1819, and finished in 1826, was the culmination of Telford's labor in this connection; but several smaller suspension bridges had been previously erected in England, among others that across the Tweed at Dryburgh Abbey on the system of "inclined wires." In 1818, six months after the completion of the bridge, a violent gale of wind caused so great a vibration of the chains that the longest chains broke, the platform was carried away and the whole bridge destroyed. The vertical motion of the roadway was said to be, just before breaking, as great as the horizontal motion, and sufficiently violent to have thrown a person off the bridge.

The Menai Bridge has a clear span between the summits of the main pyramids of 579 feet 10½ inches.

The deflection of the chains in the middle	43 ft. 0 in.
The clear height of the roadway above high water	102 ft. 0 in.
Breadth of the platform	28 ft. 0 in.

The main chains are on Capt. Brown's plan of straight bars, united by coupling bolts. The main chains are 16 in number, each containing a series of links composed of 5 wrought-iron bars, 9 feet 1¼ inch long, 3¼ inches broad, and 1 inch thick. They are disposed, four chains one under the other, on each side of the central footpath, and four at each outside of the platform. So that there are in all 80 bars in the main chains, and their united section is $80 \times 3\frac{1}{4} = 260$ square inches of iron. The bars are united by coupling plates 16 inches long, 7½ inches broad, by 1 inch thick, and screw-bolts 3 inches diameter, each bolt weighing 56 lbs.

This bridge was seriously injured by a violent gale and has been strengthened.

The Conway Bridge completed at the same time differs but little in construction from the Menai. Its span is but 327 feet.

The Brighton Chain-Pier on the same plan consisted of four spans each of 225 feet running out into the sea 1014 feet from its origin in the esplanade wall and was built in

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* John Templeman subsequently constructed the Chain Bridge over the Merrimac three miles above Newburyport. This was a much superior work to those just described. The span was two hundred and forty-four feet, and width thirty feet, with two roadways of fifteen feet each. The abutments were of masonry forty-seven feet long and thirty-seven feet high, upon which supporting towers were erected. Ten chains, three at each outer edge of the bridge, and four in the centre, were made to bear, with perfect safety, five hundred tons. This bridge broke down about 1 A. M. Feb. 6, 1827. It was built of very heavy timber, and at the time had large quantities of snow and ice upon it. Two men were crossing at the time of the accident with an ox-team, six oxen, and two horses, drawing a very heavy load. Five of the chains which supported the bridge snapped in different places. At the instant of the crash the light evolved by the friction of the chains resembled the varied streaming of a meteor. Various reasons were assigned for the accident, but none more probable than that the united effect of the incumbent pressure of the immense body of snow and ice upon the bridge, and the frost which had contracted the particles of iron, produced, together, an extraordinary strain. This bridge was built in 1810, and was believed to be the second or third chain bridge in the U. S., and probably the first that has met a similar accident. The men and horses were saved; the oxen were drowned. The bridge was immediately rebuilt in two separate sections, hung in chains of the same pattern and size as before, each part being supported by six chain-cables, making twelve for the whole bridge where there were but ten before. It has always been called the Essex-Merrimac bridge. (See Newburyport "Herald" of Feb. 7, 1824, and Coffin's "History of N. Port.")

1822–23. "It withstood the shock of many a violent tempest; but at length, in November, 1836, it yielded to a gale of wind. The roadway of the pier gave way half an hour after mid-day of the 29th, about which time Osler's anemometer recorded the pressure caused by the wind's force at Birmingham as equal to 11½ pounds on the square foot. The barometer at Greenwich had sunk to 29.24; the wind's force there also being denoted by 11½ lbs. There was a double motion in the pier, for both chains and roadway oscillated laterally, and undulated longitudinally; but the latter movement increased greatly, whilst the former diminished, just before the fracture took place. It was probably owing to this double motion that half the upper part of the roadway, and half the under part, were visible to the spectators at the same instant. As soon as the side rails gave way the undulations greatly increased, and almost immediately afterwards the roadway broke. It was remarked at the time that, had the side-railing been a trussed rail, the pier would probably have withstood the force of the storm."

The Suspension Bridge over the Esk at Montrose, completed in 1829, had a span of 432 feet and a deflection of 42 feet. The iron work built by Capt. Brown was mainly the same as in the two bridges just described. There were no joints to the suspending rods, and the main-chains rested upon detached cast-iron saddles, built into the masonry of the towers, and their ends were secured by cast-iron plates let into the masonry 10 feet under ground. The roadway of this bridge, which weighed 203 tons 9 cwt., was destroyed on the 11th of October, 1838, when the platform fell in one mass, in consequence of the failure of the suspension rods, which having no joints were twisted off close to the floor by the undulatory motion. It was afterwards repaired, when suspension rods of 1⅝ inch diameter were introduced, with flexible joints at the level of the platform.

We need mention but one other European Bridge—a harbinger of our own more magnificent construction in that form of the suspending material which was declared by Roebling the only fit one for such structures—the bridge of Freyburg, in Switzerland, completed in 1834. This bridge has a span, from pier to pier, of 870 feet, and is suspended at the height of 167 feet above the river which flows under it. It is thus 319 feet longer than the Menai Bridge, and 65 feet higher. It is supported on 4 cables of iron wire each containing 1,056 wires, the united strength of which is capable of supporting three times the weight which the bridge will ever be likely to bear, or three times the weight of two rows of wagons extending entirely across it.

It was completed at an expense of about $125,000, and, in 1834, was subjected to various severe trials, to prove its strength. First, 15 pieces of artillery, drawn by 50 horses, and accompanied by 300 people, passed over it at one time, and were collected in as close a body as possible, first on the centre and then at the two extremities, to try the effect of their concentrated weight. A depression of 39½ inches was thus produced in the part most weighed upon; but no sensible oscillation was occasioned. A few days after, the bridge was opened by the bishop and the authorities of the town, accompanied by about 2000 persons, who passed over it twice in procession, preceded by a military band, and keeping step. On this occasion a slight horizontal vibration was produced; but it is very improbable that the bridge, in its ordinary service, will ever receive such a multitude at once.

"The first wire bridge," (says Stuart) "*an American invention,* was over the Schuylkill," and was constructed by Charles Ellet, whose name should be associated with that of Roebling as a pioneer of the wire suspension principle. It succeeded the famous wooden "Colossus" of Lewis Wernwag which we have described. This bridge, of 408 feet span, has been replaced, though still in good condition, by an iron-truss bridge of greater capacity.

In 1846, continues the same writer, in his sketches of the "Civil and Military Engineers of America," the attention of Mr. Roebling[*] was invited by him (Stuart) to the erection of a railroad bridge across the Niagara River, who, in response, states: "Although the question of applying the principle of suspension to railroad bridges has been disposed of in the negative by Mr. Robert Stephenson, when discussing the plan of the Britannia Bridge over the Menai, on the Chester and Holyhead Railway, I am bold enough to say that this celebrated Engineer has not at all succeeded in the solution of this problem. That a suspension bridge can be built to answer for a railroad, is proven by the Monongahela Bridge, which is only intended for common travel, but with some additional expense could be made stiff enough (it is strong enough) for railroad trains at a moderate rate of speed. Castings of ten tons weight, suspended to two pairs of large timber wheels, have lately been hauled over this bridge; the six-horse coal trains which pass over it hourly weigh seven tons."

"It cannot be questioned that wire cables, when wel made, offer the safest and most economical means for the support of heavy weights. Any span within fifteen hundred feet, with the usual deflection, can be made perfectly safe for the support of railroad trains as well as common travel."

* * * * * * * *

"I maintain that wire cable bridges, properly constructed will be found hereafter the most durable and cheapest railroad bridges for spans over one hundred feet."

To Mr. Roebling, we think, must be conceded the claim of *practically establishing* the sufficiency of the suspension principle for railroad bridges and of developing the manner of their construction. His first great work—the Niagara Bridge—is so well known as to need little description in this place. The span is 821 feet 4 inches from centre to centre of the towers; it forms a slightly curved hollow beam or box of a depth of 18 feet, width at bottom of 24 feet, and at the top of 25 feet, the lower floor of which i used for common traffic, whilst the upper is devoted to the railway. The two floors are connected by two trusses of simple construction, so arranged that their resisting action operates both ways, up as well as down. The suspenders are 5 feet apart. The beams of the upper and lower floor are connected by posts arranged in pairs, leaving a space between for the admission of truss rods. The ends of the posts are secured between the beams, in a manner that no par is weakened, and that any amount of strain can be thrown upon them without injuring or loosening their connections There are no joints to work loose; and if the timber should shrink, the truss rods simply require tightening. The depressing action of any loads is by these posts transmitted from one floor to the other.

From the end of each pair of posts a truss rod extends each way to the fourth pair of posts, at an angle of 45 degrees. The rods therefore cross each other, and form a diamond figure; they are 1 inch in diameter, with screw ends of an inch and an eighth; by these rods the pressure upon any pair of posts is spread 40 feet apart. All the nuts work on cast-iron plates placed above or below the posts.

Without adding much to the weight of the structure, a considerable degree of stiffness has been obtained by this simple construction. The pressure of an engine and whole train of cars is so much distributed that the depression caused by a light freight or ordinary passenger train is scarcely perceptible. A freight train of twelve loaded cars, with a 2 ton engine, covers about half the length of the floor; and its effect is more noticeable than either a smaller or large train. When in the centre, the camber is a little flattened but when near the towers, where the grade forms nearly a straight line, the depression is from 3 to 4 inches. A longe train, of greater weight in proportion, disturbs the equilibrium less, as it covers a greater extent. Passenger train of fifteen long cars, which frequently cross the bridge, mak so little impression that the eye can scarcely detect it.

The height of the railway track above the middle stag of the river, is 245 feet.

The Cincinnati and Covington Bridge over the Ohio completed in 1867, was erected by the same Engineer From his report, as quoted by Stuart, the following particulars are extracted:

"The floor of the bridge is formed of a strong wrought iron frame, overlaid with several thicknesses of plank, an suspended to the two wire cables by means of suspender attached every five feet, arranged between roadway an footpaths; the latter seven feet wide, and are protected by iron railings towards the river. The roadway is twenty feet wide, forming two tracks of four lines of iron trams on which the wheels run, each tram being fourteen inche wide, to accommodate all kinds of gauges. The whol width of the floor between the outside railings is thirty-si feet. No stays or other obstructions are put up below th floor, such as may be seen under the Niagara Bridge. N such means to prevent the floor from rising was used i this work; its security and stability are provided for b other appliances. The rock under the Niagara Bridge afforded a very cheap mode of anchorage; it would hav been a great oversight on my part not to avail myself o under-floor stays in such a favorable locality. But in th Ohio River no such appendages were admissible.

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[*] Mr. Roebling had previously constructed four *Suspension Aqueducts* on the Delaware and Hudson Canal of 115, 144, 145, 170, feet span, and one for the Pennsylvania Canal over the Alleghany River of seven spans of 162 feet each; also the wire suspension bridge over the Monongahela at Pittsburg, of eight spans of 188 feet each.

After the abandonment of the trans-montane portion of the Pennsylvania Canal the aqueduct mentioned fell into ruins (1856–59). The stones of its piers were subsequently used in the Fort Wayne R. R. Bridge.

"Great doubts are yet entertained by many engineers, particularly in Europe, in regard to the fitness and safety of suspension bridges for railway purposes. By an additional expenditure of fifty thousand dollars, and a railroad track laid down in the centre of the floor, the Ohio bridge could have been made serviceable for the passage of locomotives and trains at the highest speed. Let any person who doubts this, observe the very slight tremor which is produced on this bridge by a long line of heavily loaded teams, frequently ten in a row, and he will readily understand that but a small addition of rigidity is wanted in order to pass railroad trains."

The principal dimensions are given by Mr. Stuart as follows: "Main span, from centre to centre of towers, one thousand and fifty-seven feet. Side spans, from abutment to centre of tower, two hundred and eighty-one feet. Total length between abutments, one thousand six hundred and nineteen feet. Elevation of floor above low water at tower, ninety-one feet. Elevation of floor above low water at centre, one hundred and three feet. Length of Cincinnati approach from Front street to abutment, three hundred and forty-one feet. Total length, including approaches, two thousand two hundred and fifty-two feet. Number of cables, two, each twelve and one-third inches in diameter. Number nine wires, in each cable, five thousand two hundred. Ultimate strength of one cable, four thousand two hundred and twelve tons. Weight of main span between towers, one thousand five hundred tons. Number of stays in main span, seventy-six—strength of each, ninety tons. Weight of main span between towers, as far as supported by cables, one thousand three hundred tons. Deflection of cables in main span, eighty-nine feet. Permanent tension to strength, one-eighth. Ordinary working tension to strength, one-seventh. Maximum tension to strength, one-sixth. Section of each anchor chain in square inches, one hundred and ninety. Area of each foundation in square feet, eight thousand two hundred and fifty. Cubic contents of masonry of each tower, four hundred thousand feet.

Although not vieing in importance with the bridges just named yet from its for a long time unrivalled span, and its peculiar site, Clifton Bridge, Niagara Falls, deserves a notice.[*] The end of the bridge resting on the right bank is situated in Porter's Grove, at the foot of Niagara street, 300 yards below the American Fall. The end resting on the left bank, lands upon the main road running along the bank of the river, and is 100 yards below the Clifton House, and about three quarters of a mile below the great Horse-Shoe Fall on the Canada side.

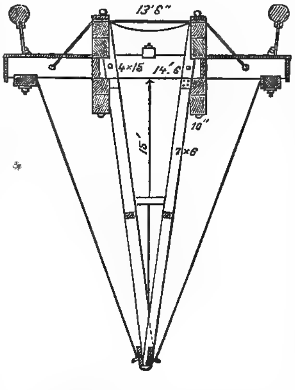
A section of the river on the line of the bridge gives a distance of 1190 ft. from rock to rock at the top cliff, and 850 ft. at the water's surface. The rock on the left bank is 175 ft. above the water, and on the right bank 180 feet. The American Fall is 164 feet. On the Canada side the rock is covered with 2 ft. of earth. It falls off perpendicularly 54 ft. to the débris which covers the fort and slopes away to the water's edge. On the American side it is covered with 20 ft. of drift (clay, sand, and gravel), which, when removed to make room for the towers, exposed a water-worn surface. Here the rock overhangs some 10 ft., and the plumb line strikes the débris at a distance of 80 ft. from the surface.

The span between the points of suspension, or centres of towers, is 1268 ft. 4 in. The deflection of the cables at centre, or greatest depression below the horizontal line, varies from 89 ft. in winter to 92 ft. in summer. The difference of 3 ft. is owing to the effect produced upon them by the changes of temperature, ranging through 100° Fahr. The road way is suspended at an elevation of 183 ft. above the water on the Canada side, and 188 ft. on the American side, while the centre, according to the season, varies from 190 to 193 ft., there being a rise of 4 ft. in the curvature of the bridge in summer, and 7 ft. in winter. The tops of the towers being in the same horizontal plane, are therefore 105 ft. high on the left bank, and 100 ft. high on the right bank. The length of the cables at medium temperature is 1286 ft. between centres of towers; 1828 feet between the anchor pins, where they are connected with the anchor chains, and 1888 ft. in all, between the anchors embedded in masonry on either side. The prolongation of the cables under ground is effected by anchor chains of Lowmoor iron 30 ft. in length, made in links of 10 feet each, firmly built in hydraulic masonry.

But the crowning example of the suspension bridge—the last great work of John A. Roebling—is found in the East River Bridge, connecting the cities of New York and Brooklyn—the stupendous piers of which (themselves wonderful monuments of the engineering skill of the age) were built, and the bridge completed in 1883, under the direction of Col. W. A. Roebling, the son of the deceased projector. The superstructure is described in the article Brooklyn. Under the heading Foundations will be found a further account of this work.

As a part of the history of American engineering, a notice of the design of Roebling for the Kentucky River crossing of the Lexington and Danville R. R.—a suspension bridge 1236 feet span, 275 feet above the bottom of the gorge—is necessary. The towers and anchorages were built under Col. J. W. Adams, chief engineer, Roebling being contractor, when (1857) the company failed. In the same locality the Baltimore Bridge Co. has recently built a truss bridge of three spans, 375 feet each (*R. R. Gazette*, Jan. 19. 1877). The peculiarities of the design, for economy's sake mainly, are noteworthy. The truss and roadway of Roebling's design consisted of two deep, built-up oak stringers, *one under each rail.* These were supported by cross-bearers placed in pairs at intervals of say 4 or 5 feet, having a length of the width of the bridge—say, 15 feet. To the outside ends of these were attached the suspenders to the cables. To each of the oak stringers, as upper chords, were framed posts of light scantling, converging at a depth below the cross-bearers of 15 feet, and also framed with longitudinal sill, serving as a kind of lower chord, and these stringers or chords were connected by a web of iron rods below the bridge-floor, forming a *single* vertical truss as a stiffener to the flooring, thus:

Fig. 17.



There was an ample supply of under-floor stays, as also over-floor; in fact, without these it would have been a most precarious support for a railroad train, even with the light engines (10 or 12 tons) then in use.

But the pioneer railroad suspension bridge was one (builder unknown) which in 1852 crossed the Kentucky River at Frankfort; span, 600 feet; cables of straight wire wrapped at intervals by smaller wire. Instead of rollers on pier-tops, a pendulum link was used. The bridge, though capable of longer use, was replaced (1852) by Col. Adams with a 2-span truss.

A transition from the suspension to the iron *tubular* railway bridge is proper here, owing to controversies which have prevailed among engineers as to the relative merits of the two constructions. The suspension principle was condemned by Mr. Stephenson in discussing the project of a bridge over the Menai Straits; and to this engineer is due the merit of the original *conception* of the tubular bridge, though it was owing to "the determined perseverance" of Mr. Fairbairn (to use his own expression) "that Mr. Stephenson's original conception has been carried into execution." The first work of the kind was the bridge at Conway on the line of railway from Chester to Holyhead. But *the* great typical work of this character is the Bridge over the Menai Straits on the same great railway route (from London to Dublin), eighteen miles distant from Conway. It owed its creation to the necessity imposed by the Lords Commission of the Admiralty of preserving a clear height of water-way of 105 feet from pier to pier. There are two spans over the straits each of 460 feet; and two shorter (230 feet) for the land connections.

The history of the experimental development and actual construction of this celebrated bridge has been so fully and so often given that we content ourselves with simply giving a cross section of one of the tubes. (Fig. 18.)

But the most stupendous structure (considering merely *magnitude*)—probably the *last* of the kind—is the Victoria Bridge, over the St. Lawrence at Montreal, on the line of the Grand Trunk Railway to Portland, Maine. It contains twenty-five openings of two hundred and forty-two feet, with the exception of the extra span, which is three hundred and thirty feet, hence the length of tube is six thousand six hundred feet, approached by embankments, the Montreal end being one thousand two hundred feet, the southern shore of eight hundred feet, which, including the abutments, makes a total of nine thousand and eighty-four feet, or one and three-quarter miles nearly. The abutments are, at the base, each two hundred and seventy-eight feet long, divided into cells of twenty-four feet, with intervening tie-walls of five feet, but at the top they correspond exactly with the length of a tube two hundred and forty-two feet in length, and indeed are carried up to the same height, the cells being filled with gravel. To resist the thrust of the ice, both the abutments and piers are furnished with a cutwater, which meets the pier proper thirty feet above summer water, the whole height of the abutment being thirty-six feet above summer water, the centre pier being sixty feet; hence the bridge rises in a grade of one inch in one hundred and thirty-two, or forty feet to the mile, the centre again being a pure level. The centre pier is twenty-four feet in width, the remaining piers are but sixteen feet. These dimensions are directly under the girder, for at the foundation the piers are twenty-two feet in width, and at summer water sixteen feet. Transversely the piers are thirty-three feet under the girder.

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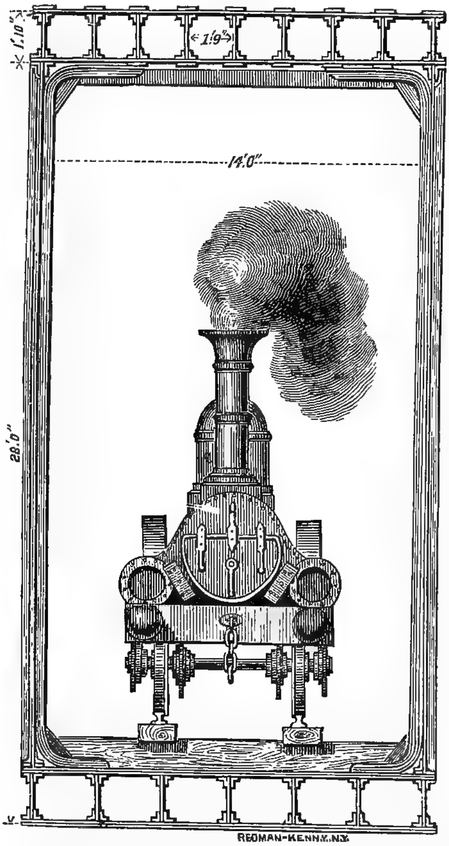
[*] There is, near Bath, England, a *chain* bridge of this name, and, like this, over a chasm of great depth; span 702¾ feet; height above the Avon, 257 feet. The chains are those of the dismantled Hungerford (Thames) Bridge. A remarkable wire suspension bridge exists at La Caille, between Geneva and Annécy, over the Cañon des Fées. The floor is 636 feet long, and is 656 *feet above the water*. Built in 1839, overturned and much damaged by a gale in 1861, it has been rebuilt with adequately increased strength.

This bridge cost $7,000,000. The peculiarity of the erection of these tubes is that they were built *in place*, on false works erected in the rapids. The *ice* which holds the surface of the rapids bound during many months of the winter, was made a useful auxiliary in the construction.

FIG. 18.



Mr. Peter W. Barlow, an eminent English engineer visited America in the summer of 1861 (a fellow-passenger across the Atlantic with the writer) *expressly* to examine the Niagara Suspension Bridge. His conclusions were given in a pamphlet published by Weale. The Civil Engineer and Architects' Journal, 1861, comments upon it as follows: "Are tubular bridges costly blunders? This is in effect the question raised by Mr. Barlow's pamphlet," and, referring to two papers in same Journal, (1860) says "from these two papers it is at least obvious, that in comparing suspended and unsuspended girders the former have greatly the advantage in point of economy. And this conclusion is supported by a very high authority on this subject, Prof. Macquorn Rankine, in two letters in our numbers of December and January last. In the latter of these letters Prof. Rankine arrives at the conclusion that a suspended girder need have only about *one-seventh* of the strength of an unsuspended girder of the same span and required to sustain the same travelling load."

"It is notorious that tubular bridges, of which that over Menai Straits and the Victoria Bridge in Canada are the most conspicuous examples, are enormously expensive. It is notorious that the cost of those two bridges has been ruinous to the companies which constructed them. There is not much difficulty in arriving at the reasons of this result. In the first place, tubular bridges are extremely complicated structures, consisting of a vast number of parts which have to be fitted together with extreme accuracy. In order to prevent the top of the tube from bulging or 'buckling' from the compression to which it is subject, the expedient of a cellular structure of that part of the tube is adopted, and it consists of numerous cells formed of iron plates, with an immense number of joints and rivets. Now all this difficulty of counteracting the tendency to distortion is avoided in suspension bridges, for in them the strains, being tensile instead of compressive, tend to counteract instead of tending to cause distortion. Again, in suspension chains the material is so disposed as to more directly sustain the travelling load than is the case in girders or tubular bridges. In the latter the source of strength is rigidity;—that is, the moment of the elastic forces of tension and compression; and this moment of forces is limited by the depth of the structure; so that, to speak in popular language, the elastic forces can never have a greater leverage than the distance between the top and bottom of the tube. But in suspension bridges the similar leverage is far greater. For the equilibrium of the half-span, the moment of the weight upon it about the abutment is equal to the moment about the same axis of the tension, which acts at the summit of the chain."

It is further observed that the Niagara Bridge "notwithstanding certain defects in its construction has proved in a great degree successful," while instead of the 3000 tons of iron in the 460 feet span of the Britannia (Menai) Bridge, there is in the former, in 821 feet span, but 400 tons of iron, combined with 600 tons of wood.

The extension of railways over the immense territorial areas of Europe and America, and the quite recent application of this powerful agent to the development of new countries, or to the spanning of uninhabited regions in order to connect populous ones, has given a vehement impulse to bridge construction as well as to the inventive faculties of its engineers. Few more instructive and suggestive studies can be made than that of the comparative characteristics of the *recent* railway bridges of India—of Russia—of Holland—of England—and of our own country. These countries are named as exhibiting *typical* constructions which reflect the peculiar civilized *status* of the peoples, and the peculiar *engineering* problems offered by different regions, modified as they are by the different nature of the *building materials* which those regions afford. We cannot enter into this subject, nor can we go at length into modern science and practice of iron bridge construction.

In our own country the problem is presented in almost every possible variety of aspect—rivers of unrivalled magnitude to be spanned by erections to rest upon foundations of the most difficult character, while necessity has rigidly limited outlay. Hence arises a special fertility of invention and a special class of work.

Russia is commencing iron railway bridge-building on a greater scale than any other European country. Hitherto her railway bridges have, for the most part, been made of timber, and are to be replaced. Especially on the Nicolai Railway it has been recently decided to reconstruct sixty-eight wooden viaducts—a decision hastened through the destruction of one 1200 feet long by fire.

Holland has been building great bridges of a remarkable character. The Moerdyck Bridge on the great railway route connecting Antwerp, Rotterdam, and Amsterdam, consists of fourteen spans of 328 feet each. The framed iron girders for this bridge, built on shore, were floated to their destination and, by aid of the tidal rise, elevated to their final positions. The railway bridges in construction, or just completed, over the Maas and Leck at Bommel and Crèvecœur are works of the same character; the former has eight spans of 187 feet and three of 394 feet and has cost over 270,000 pounds, or $1,350,000. In England the great bridge over the Tay (noticed on another page) is styled "the most important civil engineering work now being carried out in Great Britain." (Destroyed in 1879.)

We can allude to but few of the remarkable constructions of our own country.* The Quincy Bridge is the longest bridge spanning the Mississippi, the river at the point of crossing being 3250 feet in width, the navigation channel, however, being only 800 or 900 feet broad. The ge is divided into seventeen spans, two of 250 feet, three 0 feet, eleven of 137 feet, and one large draw span feet long, the girder of the latter being 36 feet in h. The piers of the fixed spans are all of masonry, of the swing is formed of four wrought-iron cylinders et in diameter, sunk through 50 feet from the water ; upon the top of these a turn-table, 30 feet diameter, , and carries the span. This bridge, designed and tructed under Mr. Thomas C. Clarke, cost over a million of dollars.

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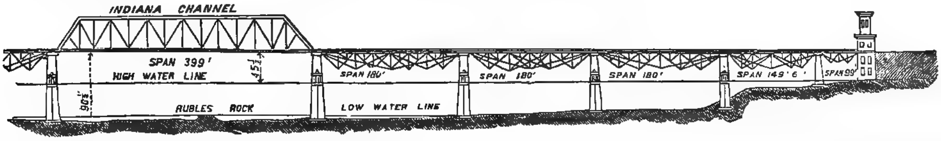
* The longest truss *span* in the U. S. is in the Newport and Cincinnati R. R. bridge; the span is 420 feet (400 feet clear opening). In Europe the bridges over the Leck at Kuilenberg (Holland) and Moldau at Prague have 515 feet span. In each of these latter are used over 2000 tons of iron and steel. The longest pivot *draw* is in the railroad bridge over the Mississippi at Louisiana, Mo.—200 feet.

e bridge at Omaha, over the Missouri, designed by Dodge, engineer of the Union Pacific Railroad, is 2800 in length, divided into eleven spans of 250 feet each, ng upon concrete filled cast-iron cylinders 8 feet 8 es in diameter. Some of them required to be sunk to a h of 70 feet below low water, making the total length olumn 139 feet. The superstructure of this bridge is ed of ordinary wrought-trussed girders, with cast-iron top member. In addition to the bridge itself, approaches three miles in length were also required, formed of earth filled in from the neighboring bluffs.

The railway bridges over the Mississippi at Dubuque, Iowa; at Hannibal, Missouri; and the great work over the Missouri at Kansas City are noteworthy constructions—as also that over the same river at St. Joseph. The superstructure of this latter bridge is of iron throughout (with floors for both railway and highway traffic) resting on stone piers and abutments sunk to the bed rock. Its total length is divided into three fixed spans of 300 feet each, one of 80 feet, and one pivot draw-span of 365 feet. The character of the river bed rendered the sinking of the pier foundations (difficult in all the works just cited) especially interesting.

Fig. 19 represents the part of the bridge over the Ohio at Louisville from the Indiana shore to the nearest (Indiana) channel.

FIG. 19.



This bridge is one of the longest iron bridges yet erected e U. S., and it includes amongst its openings two of largest spanned by trussed girders as yet constructed merica. It carries across the Ohio a line connecting Louisville and Nashville with the Jeffersonville and anapolis Railroad, the line forming a connecting link een two immense railway systems, the northern and southern. The bridge consists in all of twenty-seven s, twenty-four over the river, one over the New Albany Jeffersonville Railroad, and two on the Louisville side; these spans, with the abutments, make up a length of feet, or just one mile.

he bridge includes two spans of the lengths of 370 and feet, and a pivot bridge 264 feet in length, this bridge ng two clear openings of 114 feet 6 inches, one on each of the pivot-pier.

he lowest point of the superstructure over the middle e is 90½ feet above low water, and over the Indiana ute" 96½ feet—the low water in the Indiana chute g 6½ feet lower than in the middle chute. The extreme of the river at Louisville, above low water, is, we may tion, 40½ feet.

s will be seen by these figures the rails are, except in case of the two long spans, carried at the level of the of the girders, these being of the class known as the k truss. In this bridge a pair of diagonal tension bars ects the foot of the principal strut, or "king post," in each truss, with the ends of the top chord. This pair of diagonal bars supports one-half of the whole weight of the truss and its load. Each half span is subdivided by a strut, and two diagonal tension bars extend, one to the nearest end of the top chord, and the other to the top of the centre post. Each quarter span is again subdivided into eighths, and these again, for spans greater than 100 feet, into sixteenths.

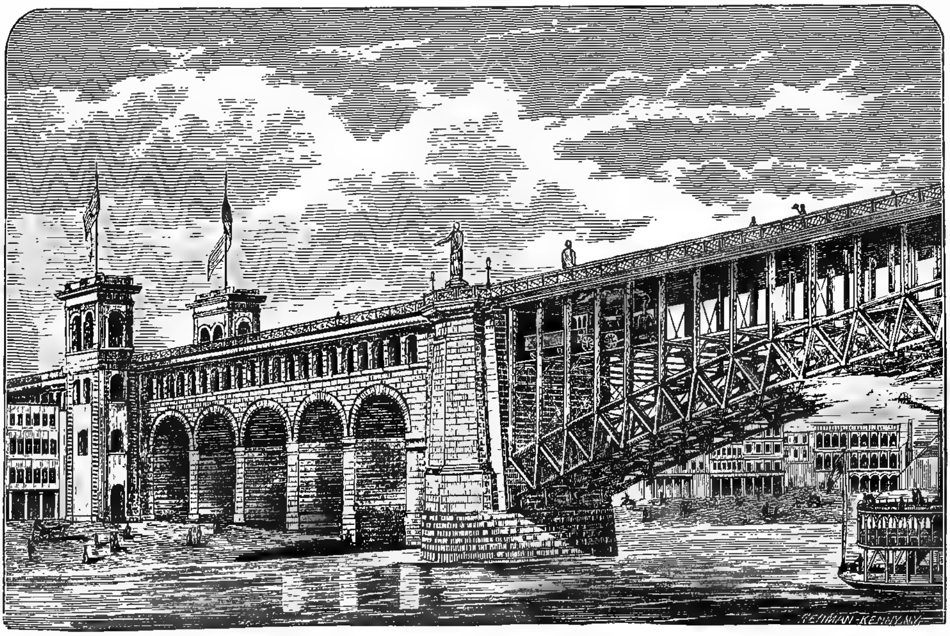
The bridge over the Hudson River at Albany connects the New York Central with the Hudson River, Harlem, and Boston and Albany roads.

It consists altogether of fifteen spans (four of 185 feet, and a swing bridge 274 feet long) and has a total length of 1740 feet, or nearly a third of a mile.

The superstructure is entirely of wrought iron, except necessary bearing and joint blocks, which may be of cast iron, and to carry, at the bottom thereof, a double track railway, and also two sidewalks, each sidewalk being 6 feet wide. The bridge to be with two lines of main girders, 26 feet apart in the clear on the straight portion of the bridge, and 27½ feet apart in the clear on the curved part.

But the most remarkable structure is the Illinois and St. Louis Bridge recently erected over the Mississippi River at St. Louis; equally remarkable whether considered in connection with the establishment of its piers (for account of which see FOUNDATIONS) or its superstructure. (Fig. 20.)

FIG. 20.


REHMAN-KENNY, N.Y.

rom the report of its eminent engineer, Jas. B. Eads, following account of the superstructure is taken:

"The bridge will have three spans, each formed with four ribbed arches made of cast steel. The centre span will be

515 feet and the side ones 497 feet each, in the clear. The rise of the centre one will be one-tenth of the span; that of the side ones 47 feet 10 inches each.

"The four arches forming each of these spans will each consist of an upper and lower curved member or rib, extending from pier to pier. Each of these members will consist of two parallel steel tubes, 9 inches in exterior diameter, placed side by side. The upper and lower members will be 12 feet apart, measured from the centre of the upper to the centre of the lower tubes. At regular intervals of about 9 feet, these members will be braced from each other by a vertical system of cast-steel bracing on each side of them. These braces will be secured at each end to cast-steel plates, formed something like the voussoirs of a stone arch, and against which the tubes will be abutted and secured every 9 feet throughout the arches. A horizontal system of bracing will extend from pier to pier between the four upper curved members, and a similar system between the four lower ones, for the purpose of securing the four arches in their relative distances from each other, and to sustain them against lateral pressure.

"The two centre arches of each span will be 13 ft. 9½ in. apart from centre to centre, and will have, in addition to the upper and lower horizontal bracing just described, a system of diagonal bracing, securing the upper member of one arch to the lower one of the other arch, and the two other members in like manner. The outside arches are each 15 ft. 1¾ in. from the middle ones, and are joined to the latter by three systems of bracing similar to those described as between the two centre arches. These systems, however, on the outside of the middle arches, extend only from the piers to the under side of the railways, the latter being carried between the two outer and the two inner arches near their crowns. The outside arches being supported in this interval against lateral movement, by rigid connections from both the upper and lower roadways.

"The roadways are formed by transverse iron beams, 12 in. in depth, supported by iron struts of cruciform section resting on the arches at the points where the vertical bracing of the latter is secured. That portion of the railways which passes below the crown of the arches is suspended from them. Between the iron beams forming the roadways, four parallel systems of longitudinal wooden members are introduced, extending from pier to pier, and serving to maintain the iron beams in position. These wooden members are each about 9 ft. long, and their ends rest upon the flanges of the beams, and are there secured from moving. On these the wooden beams for the carriage-way rest in one roadway, and the cross-ties for the railways in the other. From the opposite ends of the iron beams a double system of diagonal horizontal iron bracing serves to bind the whole together, and gives additional support against wind pressure.

"The upper roadway is 34 ft. wide between the footwalks. The latter are each 8 ft. wide, making the bridge 50 feet wide between the railings.

"The railway passages below the carriage-way will each be 13 ft. 6 in. in the clear and 18 ft. high, and will extend through arched openings of equal size in the abutments and piers."

This superstructure is estimated to cost over two millions of dollars.

In 1870 the French Minister of Public Works, at the instance of the "Conseil de l'École des Ponts et Chaussées," despatched one of its engineers, M. Malezieux, to the United States to inspect the public works, who thus comments on American Bridge Engineering.

"A distinctive feature in American Bridge engineering is undoubtedly the almost entire abandonment of plate or lattice girders, and the adoption almost universally (if we except the cases of unusually large spans where the suspension system is resorted to) of one or the other arrangements of trussed structures." M. Malezieux considers that the practice of American engineers in this respect, and also their extended application of the suspension system is worthy of the special attention of their brethren in Europe, and especially in France; and after giving a summary of the general dimensions, etc., of a number of the more important bridges in the United States, he proceeds to describe in detail the principal systems of trussed bridges in use.

An exhaustive analytical discussion of the merits of the "principal systems" of trussing, will be found in the work "Iron Truss Bridges for Railroads," by Col. W. E. Merrill, U. S. Engineers.

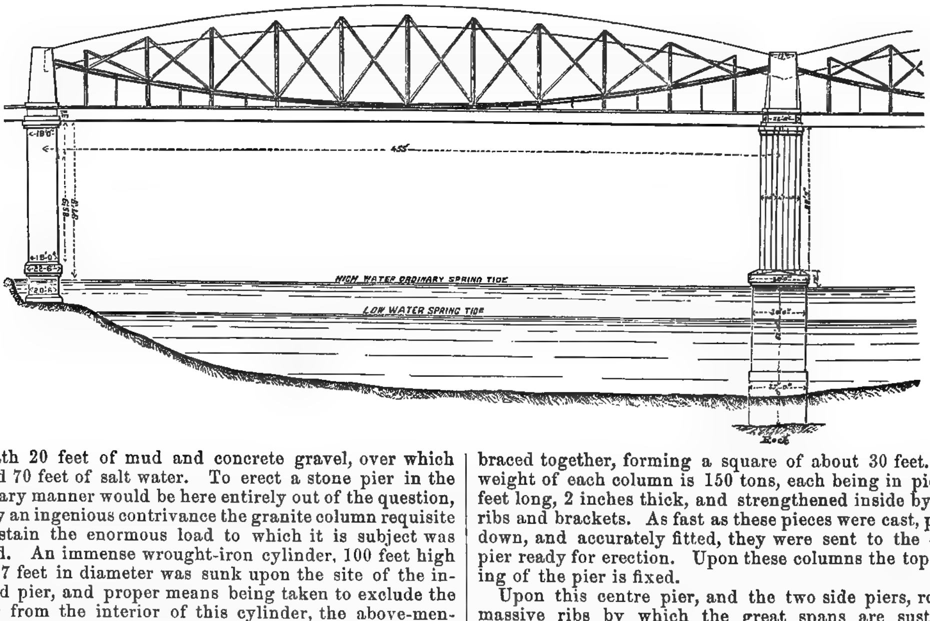
The subject of iron railway bridges cannot be dropped without allusion to one of the most remarkable of those structures: the "Royal Albert Bridge," designed to carry the Cornwall railway across the Tamar at Saltash, a few miles above Plymouth, England.

The whole structure consists of nineteen openings, two of which have a clear span of 455 feet; the remaining seventeen are each 69 feet 6 inches in length. The River Tamar is crossed by the two large spans, the smaller ones bringing the railway from the hills on either side of the valley down to the banks of the river, the total length of the entire structure being 2240 feet.

The main stone piers are at the water's edge, and support the ends of the great spans crossing the river. These are of course of the most solid construction, and more resemble the massive columns of Egypt than the works of modern engineers. Each is of granite 29 feet wide by 17 feet thick, and 190 feet in height from the foundation to the summit. The strength required in each of these piers was far surpassed by the resistance which that in the centre of the river must offer, and for this a column was required of such proportions that nothing short of the solid rock would suffice for its foundation. But to reach the rock was a matter of no ordinary difficulty, inasmuch as it lay beneath 20 feet of mud and concrete gravel, over which flowed 70 feet of salt water. To erect a stone pier in the ordinary manner would be here entirely out of the question, but by an ingenious contrivance the granite column requisite to sustain the enormous load to which it is subject was reared. An immense wrought-iron cylinder, 100 feet high and 37 feet in diameter was sunk upon the site of the intended pier, and proper means being taken to exclude the water from the interior of this cylinder, the above-mentioned column was raised within it. Upon this column four octagonal cast-iron pillars, each 10 feet wide and 88 feet 9 inches high, were erected 10 feet apart, and strongly braced together, forming a square of about 30 feet. The weight of each column is 150 tons, each being in pieces 6 feet long, 2 inches thick, and strengthened inside by stout ribs and brackets. As fast as these pieces were cast, planed down, and accurately fitted, they were sent to the centre pier ready for erection. Upon these columns the top framing of the pier is fixed.

Upon this centre pier, and the two side piers, rest the massive ribs by which the great spans are sustained. They consist each of an arched tube and a suspension chain strongly braced together, to which the small side-girders are attached. The arched tubes are in section of

FIG. 21.



an elliptical form, the major axis of the ellipse being placed in a horizontal position; they are made of stout wrought-iron plates strongly riveted together, and rendered more rigid by stiffeners and diaphragms. The width of each tube is 16 feet 9 inches, and its depth is 12 feet 3 inches, the diaphragms being placed about 20 feet apart.

The rib complete presents the appearance of a double bow, and it may be regarded as such, the tensile action of the chain upon the bed-plates being counteracted by the thrust exerted upon the same by the arched tube. The depth of the rib from the centre of the main tube to that of the main chain is 56 feet 3 inches, or about ⅛ of the clear span. The alteration of length of the rib, by contraction and expansion under variations of temperature, is provided for to the amount of six inches (although the greatest difference yet observed amounts only to three inches in the entire length of both spans) by placing the frames, which carry those ends of the main tubes which are supported by the side piers, upon 48 wrought-iron rollers, each 3 feet 3 inches long and 3½ inches diameter, in a double cast-iron frame or bed-plate.

The total quantity of wrought-iron used in this structure is 2700 tons; of cast, 1300 tons; masonry and brickwork, 17,000 cubic yards, and about 14,000 cubic feet of timber.

Each of the main ribs was constructed entire, adjacent to the site of the intended structure, and after being tested was floated out on pontoons and raised by hydraulic presses of immense power. The foundations intended to support the bridge were used to sustain these presses. As the spans were raised, by the means described, the iron columns were built up under them. The pressure upon the foundation of the centre pier will amount to more than 8 tons per square foot of bearing area, or double the pressure upon the foundations of the Victoria Tower. (Fig. 21.)

One more example of modern bridge-building for railway purposes must be introduced here. The TAY BRIDGE is styled ("The Engineer," Apl. 4, 1873), "the most important civil engineering work now being carried out in Great Britain. Indeed, the magnitude of the bridge, and the novelty and ingenuity of the means employed in its erection, entitle it to take rank with the most interesting civil engineering works ever carried to completion." The Tay Bridge will be, when finished, the largest iron bridge in the world. It will cross the river about one and a quarter miles west of Dundee. The total length from shore to shore is 10,320 ft. Commencing from the south, or Fife side, there will be three spans of 60 ft., two of 80 ft., twenty-two of 120 ft., fourteen of 200 ft., sixteen of 120 ft., twenty-five of 66 ft., one of 160 ft., and six of 27 ft. The first three spans (60 ft.), south side, are on a descending gradient of 1 in 100, the two 80 ft. spans are level; the bridge then rises with a gradient of 1 in 353 to the centre of the 200 ft. spans. It again descends with a gradient of 1 in 73.56 to the N. shore. [It has since been completed, and was blown down in a hurricane Dec. 21, 1879. A train of cars was submerged, and ninety passengers were drowned.]

The bridge thus comprises eighty-nine spans, and at the commencement on the south side the rails are 78 ft. above high water, running over the tops of the girders as far as the 200 ft. spans which cross the navigable channel of the river. Over these fourteen spans the rails run on the bottom of the girders, giving a clear headway of 88 ft. above high water. On reaching the 120 ft. spans on the north side, the rails are again on the top of the girders, which is continued, with the exception of the 160 ft. bowstring span, to the north shore. From the south side the first five spans are on a curve of twenty chains radius. The bridge then runs straight across the river as far as the end of the sixteen 120 ft. spans on the north side; thence the whole of the 66 ft. spans, 160 ft. bowstring, and the 27 ft. spans are on a curve also of 20 chains radius, forming nearly a quadrant of a circle, the length being about 2000 feet. This long curve is necessary to bring the bridge—which runs nearly due north—at right angles across the river into the town, alongside the Caledonian Railway. (See FOUNDATIONS.)

In the foregoing we have felt constrained for want of space to confine our notices of iron bridges to those which, owing to the amount and character of the moving weight they carry, develop more fully the art of the engineer—railway bridges; but there is another class of bridges, in which, indeed, iron construction for bridge purposes first developed itself, *i. e.* cast-iron arched bridges, which should at least be mentioned.

The first cast-iron bridge erected in England was over the Severn at Colebrook Dale, in the year 1777; it has five arch ribs, with a clear span of 100 feet 6 inches, and a rise of 45 feet, a width of 26 feet, and a sectional area in each rib of 56¼ square inches.

In 1796 a more notable bridge, the Sunderland Bridge over the Wear, was completed, having six arch ribs, with a span of 236 feet, and rise of 34 feet, and a width of 32 feet, the sectional area of rib being 46.5 square inches.

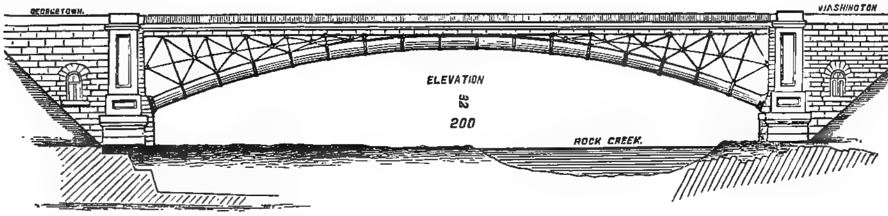
In 1806 the Bristol and in 1812 the Bonar bridges were built, the latter having a span of 150 feet, four ribs and 20 feet rise. (These two bridges are described and delineated in the Ency. Ed.)

The Southwark Bridge was built in 1818 with 8 ribs, 240 feet span, and 24 feet rise. The Vauxhall, Tewkesbury, and Plymouth bridges have spans of 78, 170, and 100 feet. The Westminster (renewed in 1859, as mentioned on a later page) has arches partly of wrought and partly of cast iron of 120 feet span, and 20 feet rise.

The foregoing (English) bridges are all still in use. The "Pont de Caroussel" at Paris, built in 1836, has spans of 187 feet, five ribs with 15½ feet rise. The bridge across the Neva at St. Petersburg (built by Joseph Harrison, Jr., of Philadelphia) though subjected to the most severe changes in temperature stands a monument to American professional skill. It has seven spans, with 157 feet as the largest.

In our own country the first example of an iron bridge construction, and, in the beautiful simplicity of conception by which purposes foreign to each other are subserved by the same material agents, the most remarkable one, is the Aqueduct Bridge, over Rock Creek, at Washington City; built by Captain (afterward Bvt. Maj.-Gen. and Quarter Master General U. S. Army) Meigs. The engraving (Fig. 22) is an elevation, and its distinguished engineer has kindly furnished the following description.

FIG. 22.



"The ribs are circular pipes forty-eight inches in interior diameter of cast-iron, and are 1½ inches thick. No additional thickness is given to them on account of the loading by the bridge.

"The thickness, 1½ inches, is the standard thickness for water pipes of 48 in. under the head of water which these bear, and all the strains caused by their being loaded with a bridge platform and its traffic are at right angles to those caused by the pressure of the water. These two sets of strains therefore do not affect each other plus or minus.

"The joints are flange joints turned plain and smooth and held together by pressure and by screw bolts as in the ordinary method of joining steam pipes. Originally the iron pipes were lined with wooden staves as a non-conductor under an apprehension of danger of injury by freezing. The temperature of the air sometimes, though rarely, here touches 0 or even falls below 0.

"But the wood acted too well as a non-conductor. The iron took its temperature from the air and sunshine, not from the water, hence a diurnal motion from expansion and contraction, which in some of the joints produced never a stream, but a dropping of water.

"This inconvenience led me to an investigation of the conditions of temperature, the quantity and rate of transmission of heat from the water as it passed through the pipes to the air, which satisfied me that it would be safe to withdraw the non-conducting lining. I took it out and the bridge has now stood some 12 years and no trouble from ice in the pipes has ever been noted.

"This bridge is, or was when first erected, unique of its kind."*

The only cast-iron arched bridge since erected (we believe) is the Chestnut Street Bridge, over the Schuylkill, at

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* Another arch of cast-iron, of 30 inches diameter, of 120 feet span, carries the water across "College Branch."

Philadelphia, commenced in 1861 and opened for travel July 4, 1866; designed and built under direction of Mr. Strickland Kneass, C. E. It has two main spans (over the waterway) each of 185 feet, each span is composed of six segmental arches with versed sines of 20 ft. placed at distances of 8 feet 8⅝ inches, and 7 feet 10¾ inches from centre to centre. They are four feet in depth, and 2½ inches thick, with upper and lower webs of same thickness, and 8 inches wide; thus giving a compressive area of 147.5 square inches to each arch rib. These arches were cast in lengths of 12 feet 10 inches, with end flanches 12 inches wide, having three side-stays from body of segment, and were secured to each other by four screw-bolts 1¼ inches in diameter. The outside arches or ribs are slightly reduced in section, and are cast with ornamental face.

As regards strength of this structure, and treating the arches as built with a succession of voussoirs, and performing functions the same as if built of stone, we find that the horizontal pressure at the crown of each road-way rib is, with 100 lbs. per square foot of transient load, 512,585 lbs., equal to 3,475 lbs. per square inch of section, and at skewback, 529,542 lbs., or 3,590 lbs. per square inch of section. Taking the crushing power of best iron at 107,000 lbs. per square inch, the maximum load that would probably be placed upon it, would give a pressure at crown of but $\frac{1}{31}$ its ultimate strength.

The cost of this bridge was about $500,000.

We have progressed thus far without even mentioning that class of structures to which has seemed pre-eminently to attach the title of BRIDGE and which furnishes the principal theme of most writers, viz., the masonry arched bridge. The arch seems to have been known to the Chinese (see Tomlinson and Ency. Ed.) for many ages. The gateways of the great wall are arched and Kirchee speaks of stone bridges three or four miles long and of an arch of the incredible span of *six hundred feet*. But it is to the Romans that the world is really indebted for the practical application of the arch to bridges. Eight of these bridges over the Tiber are described in history.

But perhaps the most magnificent of all the Roman bridges, and one of the noblest monuments of antiquity, is the bridge of Alcantara upon the Tagus, at the town of that name. The town has probably taken its name from that structure, as the word *alcantara*, in the Arabic, signifies "the bridge." It consists of six arches; its whole length is 670 Spanish feet, and from the bottom of the river to the roadway the height is 205 feet.

Whatever constructive energy was exerted during the Middle Ages was devoted either to religious purposes (witness the Convents, Churches, and Cathedrals), or to the agencies of War, or of self-preservation, as exhibited in the numberless castles and walled towns. The destructive tendencies of war have always seemed to be peculiarly directed against bridges. It could hardly be expected, therefore, that an age in which every man's hand was against his neighbor should *produce* these adjuncts to the occupations of peace. In days of general insecurity there was no safety for travellers particularly in passing rivers, where violent exactions were made by banditti.

To put a stop to these disorders, sundry persons formed themselves into fraternities, which became a religious order, under the title of Brothers of the Bridge. The object of this institution was to build bridges, establish ferry boats, and receive travellers in their hospitals on the shores of th rivers. It is stated "that Saint Benezet (the patron sair of Avignon) who proposed and directed the building of th bridge of Avignon, was a shepherd, and that he was nc twelve years of age when repeated revelations from heave commanded him to quit his flock and undertake this enterprise."

This bridge, which was composed of 18 arches, was begun in 1176, and completed in 1188. In 1385, during th contentions of the popes, some of its arches were destroyed three others fell in 1602, from the neglect of repairing fallen arch. In 1670, the frost was so great that the Rhon for several weeks bore the heaviest carriages; when th thaw followed, the ice destroyed the piers; but the thirc pier, with the chapel of St. Nicholas, has stood notwithstanding all these accidents (*ibid*).

It is worthy of remark, that the bridge of Avignon wa begun under the direction of Saint Benezet in 1176, anc that of London begun to be built of stone under the direction of Peter of Colechurch, a priest, in the same yeai (1176). The French "Brothers of the Bridge" accomplished their magnificent and useful work in 12 years, thc labours of the English priest occupied 33 years; but thi may be accounted for, by considering the interruption which must be experienced in a river where the tide rises twice every day from 13 to 18 feet.

In London bridge there were 19 arches, and it was 45 feet in breadth. For many ages there were houses along each side of it; but these were removed, the middle pier was taken away, and the space including the two adjacent arches, converted into one arch of 72 feet span, in 1758. The remaining old arches are very narrow, and the piers enormously large, being from 15 to 25 feet in thickness above the sterlings.

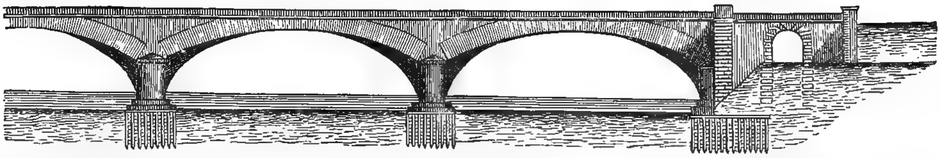
Some of the old piers of the Old London Bridge were larger than the original openings of the arches; they consisted of small rubble stones laid in lime-mortar, surrounded by a thin casing of squared stones. The Roman bridges were probably constructed in the same manner. In modern bridges, the piers consist wholly of squared stones, each course being of equal height quite through the body of the pier. The thickness ought to be regulated by the span and rise of the arches, combined with the height of the piers. At the bridge of Neuilly the thickness is only one-ninth part of the span from the springing of the arches. The height is regulated according to circumstances, attention being given to the highest point to which the waters have ever been known to have risen (*ibid*).

The next (in order of time) important bridge was that at Westminster, built in the years 1739–50, consisting of 13 large and two small arches, semi-circular, the middle one having a span of 76 feet. This bridge, of which a Mr. Labalye was the engineer, was not only, for the time, the greatest work of that kind in England, but it formed, in what regards laying foundations in deep water and constructing centres for large arches upon navigable rivers, a new school for bridge-building (Ed. Encyc.).

Like the Old London Bridge it has since been superseded by another structure—in this case with iron arches of from 104 to 120 feet span.

The finest of the earlier French bridges and the greatest work of the celebrated Perronet, is that over the Seine at Neuilly. (Fig. 23.) Built 1768–74.*

FIG. 23.



It consists of five arches, each 120 French, or 128.2 English feet span, and 30 French or 32 English feet rise; the breadth, including the parapets, is 45 French, or 48 English feet. A great peculiarity in this bridge is that the soffits of the arches are shaped to suit the contracted vein of water, as formed in the entrance and exit of pipes. This is accomplished, by making the general form of the body of the arch elliptical, with a rise of 30 French or 32 English feet; but making the headers follow the segment of a circle. This, besides affording facility for the passage of flood waters, gives a great appearance of lightness to the fabric (Ed. Encyc.).

The construction of a magnificent stone bridge, says the Edinburgh Encyc., "is justly looked upon as one of the greatest performances of the masonic art; for if we compare the enormous weight of a great arch, with the strength which the cohesion of the firmest cement can give, we readily admit that it is only by the nicest adjustment and balancing of its parts, that they are hindered from instantly falling to pieces."

And in consonance with the above dictum, the theory of the arch has always formed one of the prominent components of works on theoretic civil engineering, while the main features of treatises on bridge-building have usually been the art of constructing arches, piers, centering and coffer-dams. But this class of works has now become almost purely *monumental*. The "enormous weight of a great arch" is rivalled by its enormous expense, and it imposes the necessity of proportionate care and expense in giving to its piers sure foundations; and these costly piles are multiplied, to the great detriment of the water-way of the river, by the limitation of span which masonry arches can compass; or, at least, by the enormous ratio by which *cost* increases with increase of span. In our country there are, naturally, few examples of masonry arched bridges, properly so called; but it would be an unpardonable omission in an account of *American* Engineering, and would be doing an injustice to its distinguished engineer (now Quarter Master General, U. S. A.) to omit to notice the superb, and unrivaled in span, bridge and aqueduct combined, over the Cabin John Valley*, Potomac Aqueduct. The main road, macadamized by Act of Congress, leading up the Potomac Valley passes over the Cabin John Creek by the "Union" Arch. It is noteworthy as exhibiting the longest (220 feet) stone span in the world. The arch (circular) has a rise of 53½ feet, and is 101 feet high above the bed of the stream. It is of cut granite, 4 feet thick at crown, 6 feet thick at spring; but re-inforced by the spandrils (of coursed rubble and Seneca sand-stone) being laid in course normal to the main arch.

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* It is not generally known that this engineer published in 1793 a Mémoire "On the investigation of means to be employed to construct great masonry arches of *two, three, four*, and even *five hundred* feet span, with the view to cross deep valleys (chasms) having rocky escarpments. Par le Citoyen Perronet." The memoir, printed at the Imprimerie nationale executive du Louvre, bears the stamp of *de Prony*. J. G. B.

When the centre was struck there was no perceptible motion of the arch which could be detected when watched by two cross-wire telescopes. This fact is worthy of mention as Engineers are all taught to read the descriptions of the first long arches built over the Seine, at Paris, some of which, on striking the centre, moved 18 inches. In fact the arch of Cabin John in warm weather in a great measure, if not entirely, relieved itself from the centre, owing to expansion, before the centre was removed. Its key was laid in a cool season.

The bridge is 20 feet wide. The spandrils are hollow, having the two outer walls and one wall in the middle line or axis of the bridge. Upon these rests a platform of masonry upon which the conduit of brick, 9 feet clear diameter, is built. Made water-tight by asphalte between the brick rings. (For view of this structure see Fig. 6, article Aqueduct, by Gen. M. C. Meigs, U. S. Army.)

The magnificent arched structure carrying the Croton Aqueduct over the Harlem River, is purely an aqueduct. In both these cases the resort to the masonry arch was natural and proper. Save these, the fine viaducts of the Baltimore and Ohio Railway, built in the early days of American Engineering, are the only considerable works of the kind which we recall; and it is safe to say that the future of engineering construction in our country (or in any other, unless for monumental purposes or for exceptional reasons, we might say) will never exhibit a specimen of a great masonry-arched bridge.

The subject of Bridge would not be complete without a few words concerning Military Bridges.

Wherever warfare has been so far reduced to a system and a science, as to call into the field, for protracted campaigns, large and organized armies, the very necessities of the case call for some systematic method of passing streams, and, as belonging to it, special organizations of men (*personnel*) for making bridges, and a portable bridge *apparatus*.

The bridge of boats of Xerxes for passing the Hellespont—the timber pile bridge of Cæsar (of which an account has been given) for passing the Rhine, were not ordinary, but *extra*-ordinary constructions necessitated by the magnitude of the obstacles; and they owe their record probably to that peculiarity. It is quite likely, however, that during ages when roads for wheeled vehicles scarcely existed, and, on the other hand, forest timber was abundant, the felled tree (elaborated into a rude bridge), or some such improvised expedient, could generally be resorted to, and that a regular "bridge-equipage," in the modern sense of the term did not exist. The Romans are known to have had a species of "ponton" (as we now call it) to carry with their armies. In fact the wooden boat has naturally offered the readiest means of support to portable bridges; but these, generally large and heavy, are with difficulty transported. Hence, various expedients for creating a vessel of considerable flotation power, yet lighter and more portable than ordinary boats (such as frame-work, covered by skins, canvas, etc.) have been resorted to. The French, the systematizers of the modern "Art of War," were naturally the first to provide a regular organization and established type of construction for the military bridge, and to organize a "*personnel*" by which it should be operated.

Their first *ponton* was of copper. Their system has undergone successive modifications and improvements, and instead of metal, wood is used in their ponton. As fixed in 1853 the French ponton, as described by Gen. Cullum in his work on Military Bridges, is a flat-bottomed wooden boat, 31 feet long: the middle part or body of which, for a length of 16 feet has a trapezoidal section of 5′ 7″ width at top, and 4′ 4″ at bottom, and 2′ 7″ deep; the fore part 8′ 9″ long, diminishes to 2′ 6″ in width at the bow, and has a sheer of 5½″; and the aft part, 6′ 3″ long, diminishes to 4′ 7″ in width at the stern, and has a sheer of 3″. Each bateau weighs 1,455 lbs., is borne on the shoulders of 16 to 20 men, has a flotation of 18,700 lbs., carries 25 infantry soldiers, is convenient for disembarking troops, and can be easily navigated in a rapid current by five men.

The material for the French bateau bridge consists of 8 abutments, 8 trestles, 32 bateaux, 4 mooring-boats, 339 balks (84 abutment, 24 claw, and 231 bateau), 784 chesses, 32 anchors, and all the accessories for forming a bridge of 41 bays, 262 yards long, and 12′ 9½″ wide.

The Russians have a somewhat lighter equipage; the ponton (of canvas) is a flat-bottomed bateau, having, except at the ends, a rectangular section. The length at top is 21 feet, and at bottom 18′ 4″; the width 5′ 4″; and the depth 2′ 4″. The skeleton consists of two side-frames, connected by movable transoms—all of four inch scantling. The canvas cover is 10′ 8″ wide, 30 feet long in the middle, and 23′ 3″ along the edges: both sides being tarred or painted black with a composition, applied hot, composed of hempseed oil, strong loam, india-rubber, soap, wax, and soot. The cover is brought over the ends of the frame, and lashed to the top-transoms; it is secured, along the sides, to the top string-pieces of the side-frames by small nails passing through eyelet-holes along the edges of the cloth. A plank is laid on the bottom for the pontoniers to stand upon. The canvas ponton, frame and cover complete, weighs 718 lbs.; and has a flotation of 13,428 lbs.

The complete bridge is composed of 32 canvas pontons, with bridge-flooring and accessories for 33 bays; and a section of the Birago equipage consisting of 8 trestles and 15 wooden pontons (8 bow and 7 body pieces), with a bridge-flooring for eight bays.

The Austrians, after satisfactory trials in the passage of the broad, deep, and rapid current of the Danube, adopted, in 1841, a system named from its inventer, Col. Birago, of the Austrian Imperial Engineers.

This equipage has fixed and floating bridge-supports, the former consisting of abutments and trestles, and the latter of pontons of one to six pieces assembled together according to the requirements of the bridge for the passage of infantry, cavalry, or artillery, and whether designed for one, two, or three distinct roadways.

The pontons are flat-bottomed, wooden bateaux, of one piece, or from two to six assembled together, end to end, by suitable bolts and fixtures. The *cap* is *adjustable;* being partly supported at the proper height by *suspension*-chains, at one end of which are large rings passed over the tops of the legs, the free ends being run through suspension-rings on the upper side of the cap. After the chains are made taut, and the cap is at its proper height, the latter is held in place by the *toggles* inserted in the last link which has passed through the suspension-rings.

The Birago trestle is composed of a *cap* and two *legs*, to the lower ends of which *shoes* are attached, to increase their bearing surface, and give greater stability to the trestle.

Nothing like a "bridge-equipage" had belonged to our military service until 1846. The Engineer Department had long foreseen the necessity of a corps of well-drilled pontoniers and a bridge-equipage for our army, and year after year had urged their great importance upon the attention of Congress, but not until the 15th of May, 1846, was its sanction given to the project of the department, and when too late to aid the passage of the Rio Grande by our forces, then invading Mexico.

With the sanction of Congress finally obtained, a company of sappers, miners, and pontoniers was organized as part of the Corps of Engineers, and an india-rubber ponton bridge of 46 pontons was prepared by direction of the Chief of Engineers, but under the superintendence of Captain (now Bvt. Major General) G. W. Cullum. Another of 36 pontons was subsequently despatched with the army under General Scott. Owing to the lightness of these pontons only *thirty-five six-horse carriages* are necessary to transport, over the worst roads, a complete train for the formation of a bridge of two hundred yards. For the French bateau bridge of nearly two hundred and forty metres, *seventy-seven six-horse carriages* are used.

The rubber pontons in use for drill purposes at West Point having become unserviceable, and it having become evident that rubber was not adapted to their construction, experiments were undertaken by the then Instructor of Practical Engineering, Captain J. C. Duane. (Vid. "Organization of the Bridge Equipage of the United States Army," Official.)

The immense trains with which our armies are unavoidably encumbered, the long marches to be made, and the numerous wide and rapid rivers to be crossed, demand an equipage of the most substantial character. On the other hand, the extended expeditions of light columns, which necessarily attend our military operations, require a train light enough to keep pace with the most rapid cavalry movements.

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*Previous to the construction of this Aqueduct, the bridge over the Dee, at Chester, England, built in 1833, exhibited the greatest span of any masonry arch in the world. This arch is circular with a chord (span) of 200 feet and a rise of 42 feet. The material is sand-stone.

Hence we require both a reserve and advance-guard train.

The experiments included the trial of the bridge equipages used by those European armies most experienced in the art of military bridge-building.

Pontons were constructed after the models of the French bateau, the Austrian sectional ponton, and the Russian canvas boat. Corrugated-iron boats were procured, corresponding as nearly in form and dimensions to the French and Austrian boats as the nature of the material would permit. A number of Birago trestles were also constructed. All of the above material, with the exception of the iron boats, was prepared by the enlisted men of the Engineer Company ("A") then stationed at West Point.

The bridges formed of this material were exposed as much as possible to the action of heavy loads, storms, the tide, and floating ice. The material was also packed on carriages of various patterns in order to ascertain the best form, both of bridge material and of carriage, for transportation.

The selection of the French, Russian, and Austrian trains for these experiments, was made after a careful study of the various equipages used at present by the armies of Europe. These three nations alone appeared to have definitely settled on their systems, and this after much experience and thorough research.

After experimenting for two years, the conclusion was arrived at that the French ponton should be adopted. Experiments followed to determine *the material* of which the ponton should be made. Life-boats having been successfully made of corrugated-iron, it was presumed it might be, with equal advantage, applied to pontons. It was not only found that to get adequate strength, the weight must be increased beyond that of the wooden ponton, but that iron failed in other respects. In fact, it would not bear land transportation; as, in travelling over a rough road, the joints open by the yielding of either the rivets or sheet iron. When in the bridge, if the boat grounds on an uneven or rocky bottom, a hole is frequently punched through it, and such injuries cannot be repaired in the field. The wooden ponton is not only much less liable to such accidents, but can be readily repaired when they do occur.

Previous to the battle of Gettysburg, a ponton bridge over the Potomac at Harper's Ferry was destroyed, the pontons being scuttled and set adrift above the rapids. About three weeks after, the water having fallen, the boats were recovered, repaired with pieces of hard-bread boxes obtained from the commissary, and used in constructing a bridge at Berlin, over which the entire army passed into Virginia.

With regard to the canvas boat it soon became apparent that it was precisely what we required for our advance-guard train. It is light, simple, strong, easily repaired, and when packed can safely be transported with the superstructure of the bridge as rapidly as any column of troops can move. A strong argument in favor of its adoption was that it had been used successfully by the Russians for more than a hundred years, under every variety of circumstances likely to occur in this country.

The French ponton wagon not being adapted to our rough roads, further experiments ensued to fix upon the selection of a proper carriage for transporting our bridge-equipage.

Through the information gained by these experiments resulted the system of bridge-equipage adopted at the commencement of the late Civil War.

"During the winter of 1861–62, five trains were constructed, each composed of thirty-four pontons and eight trestles—the pontons being nearly of the same form and dimensions of the French bateau. The frame was somewhat different, the ribs being entire and strongly ironed, and the ironing stronger throughout. The stern was provided with a locker. There were also other alterations in the details of construction. The balks were stronger, and the Birago trestle was modified by substituting built beams, instead of solid timber, for the trestle caps and balks.

"At the same time several canvas trains were organized. In constructing the ponton frame, the dimensions and form of the Russian boat were exactly retained. The scantling for the frame was considerably lighter, but, being strongly braced and ironed, the strength was about the same. One train was composed of canvas boats and trestles; being, in truth, a trestle train, with auxiliary pontons to be used only where the depth of water, or muddy bottom, prevented the use of trestles.

"In the month of February, 1862, a ponton bridge composed of about sixty boats of the reserve train, was thrown across the Potomac at Harper's Ferry. The river was then a perfect torrent, the water being fifteen feet above the summer level, and filled with drift-wood and floating ice. The greatest difficulty was experienced in pulling the pontons into position, and it was necessary to make use of ship anchors and chain cables to hold them in place. Notwithstanding these unfavorable circumstances, the bridge was completed in about eight hours, and the corps commanded by General Banks, with all its trains and artillery, passed over it without accident or delay.

"Several of these trains accompanied the army in the Peninsular campaign. The pontons were used in discharging quartermaster and commissary stores at Ship Point; in disembarking General Franklin's command at West Point (York River); and in constructing bridges over Hampton Creek, the streams in front of Yorktown, and the Upper Chickahominy. Finally, a bridge was built over the Lower Chickahominy, about two thousand feet long, over which nearly the whole army of the Potomac, with its immense trains, artillery, and cavalry, passed with promptness and safety.

"After the army had passed the bridge was dismantled and the balks, chess, etc., packed into the pontons, which were formed into rafts and towed by steamers to Washington. The bridge trains were next transported to Harper's Ferry, where a bridge was constructed a second time, but under entirely different circumstances from that built during the previous winter. The water was now not deep enough; and, as it continued to subside shortly after the bridge was laid, many of the pontons grounded on a very uneven and rocky bottom. Some of them were completely out of water, yet the heavy trains continued to move over the bridge without seriously injuring them; and when the water rose, most of them floated as well as ever.

"Discovering in this way that the boats were much stronger than we had supposed, we were enabled to improve the method of bridging tidal streams.

"It had formerly been considered necessary to build out to low-water mark with trestles, so that the ponton should always be afloat. The bridge is now commenced at high-water mark, building with pontons alone. As the water subsides, the pontons nearest shore ground successively, forming a gentle ramp from the abutment to the floating portion of the bridge, instead of making the descent in twenty feet as formerly. This method, of course, applies only to wooden pontons, and to cases where the bottom is favorable.

"During the Fredericksburg campaign, it became necessary to force the passage of the Rappahannock. The enemy having entrenched themselves on the bank, prevented for some time the construction of the bridge; until, at length, troops were embarked in the pontons and ferried across, where they stormed the rifle-pits, and held them until the bridge was completed.

"During the year 1863, the ponton trains accompanied the army in all its marches backward and forward through Virginia, frequently bridging the Potomac, Rapidan, and Rappahannock. In the latter stream, the bridges remained in position all winter; and, notwithstanding the frequent floods and the quantity of ice formed, but few interruptions occurred on these thoroughfares.

"During the campaign of 1864, trains, composed of fourteen pontons and two trestles, accompanied each of the three army corps of the army of the Potomac. These trains attended their corps in the long march from Culpeper to the James River; and, although the roads were frequently very bad, in no instance did they delay the march of the troops, or arrive late when a bridge was to be laid.

"The headquarters train was followed by a canvas train; which, when a crossing was to be made by surprise, was sent forward with the cavalry, who covered the construction of the bridge and held the position till the main body arrived.

"On reaching the James River, a bridge was laid, opposite Charles City Court-House (at a point selected by the writer of this article) about two thousand feet in length. The water was so deep and rapid that the pontons could not be held by their own anchors, and it was found necessary to attach their cables to schooners anchored above and below the bridge." "For the next 40 hours a continuous stream of wagons passed over the bridge, from 4000 to 6000 wagons, some said, 50 miles of wagons, and nearly all the artillery of this army, and by far the larger portion of the infantry and all its cavalry present, and even to its heads of 3000 or more of beef cattle—the most injurious of all—without an accident to man or beast." (*Report of Gen. Benham.*) The length of the bridge was made up of 200 ft. in trestle work and 2000 ft. in pontons (101 in all); depth of the river 85 ft.

"Thus the wooden ponton train through four years of war during which the bridges constructed were without parallel in number and magnitude, amply fulfilled all the requisites of a good bridge equipage. The frequent crossing of the Potomac, Chickahominy, and James Rivers proved that, even under the most unfavorable circumstances, it could furnish a bridge capable of passing a large army, with its heaviest trains over wide and rapid streams, with safety and despatch.

"Its capabilities in ferrying troops were shown at Ship Point, West Point, and Fredericksburg; and of the mobility of the equipage there was abundant proof in the long marches during the last two years of the war.

"The canvas equipage, also, was perfectly successful as an advance-guard train. In the cavalry raids, it was always able to keep pace with the columns; and, although they frequently marched hundreds of miles, it was invariably ready to furnish a prompt and secure means of crossing all the streams on their route. It also often furnished bridges for the heavy trains of the army over streams of moderate width and rapidity.

"The only part of the bridge equipage which did not realize all our expectations was the Birago trestle.

"As already stated, a train was organized early in the war on the Austrian principle, in which the trestle is the main dependence, the ponton being merely auxiliary. It was supposed that many streams would be encountered which would be bridged best with trestles alone, but none such were met with. In fact, when a stream is more than two feet deep, a ponton bridge may be laid; when less than that depth, if the bottom is hard, it may be forded, and no bridge is required; should the bottom be soft, the trestle legs will usually settle so as to render the bridge unsafe. As it was not deemed advisable to transport with the army a train which could only be used in exceptional cases, this description of equipage was abandoned. The trestle was, however, very useful as an auxiliary, especially with the canvas train; for, as these boats when in the bridge should never be allowed to touch the bottom, it is frequently necessary to build out several bays from the shore before sufficient depth of water can be obtained to float the ponton—and for this purpose nothing could be better than the Birago trestle, which is also equally useful for a similar purpose with the reserve train, when the river bottom is rough near the shore.

"The canvas train was extensively used by the western army, and with such success that it was proposed to employ it exclusively. Experience, however, in the East has clearly proved that this train cannot fulfil all that is required of the bridge equipage of a large army. The bridges of the Potomac and James rivers could not have been built with canvas boats, which will not resist ice and drift-wood; neither are they suited to the disembarkation of troops or the passage of a river by force.

"Experience would therefore lead us to concur with General Barnard in his remarks on this subject, viz.:

"'The numerous proposers of "flying" bridges forget that if a military bridge is intended to be *carried with* an army, it is also intended to *carry* an army, its columns of men, its cavalry, its countless heavy wagons, and its ponderous artillery. It must carry all these, and it must do it with certainty and safety, even though a demoralized corps should rush upon it in throngs. No make-shift expedient, no "ingenious" invention not tested by severe experiment, no light affair of which the chief merit alleged is that it is light, will be likely to do what is required, and what the French ponton has so often done.'"

The experienced engineer officers, from whose Introductory History we quote, constituted a Board which, in 1870, established the present authorized organization. It was based upon the experience we have described in their language.

As now fixed the United States bridge-equipage is composed of reserve and of advance-guard trains. The former are intended to accompany large bodies of troops in the field, and are provided with the material necessary for the construction of bridges of sufficient capacity to pass large armies with their heaviest trains over rivers of any size and rapidity.

The advance-guard equipage is intended for the use of light troops, such as advance guards, cavalry expeditions, etc. It is organized, both as regards material and carriages, with a view to rapidity of movement. At the same time it is capable of furnishing a bridge which will fulfil all the requirements of troops engaged on such service.

The basal elements of these distinct equipages—the French wooden bateau and the Russian canvas ponton—are of dimensions very nearly corresponding to those (already given) of their original prototypes; but with modifications in details of construction derived from our own experience.

The Reserve Equipage is divided into trains, each of which is composed of four ponton divisions and one supply division. Each division is accompanied by a tool wagon and travelling forge.

Each ponton division is complete in itself, containing all the material necessary for constructing a bridge of eleven bays, or 225 feet in length.

Each of these divisions is subdivided into four sections, two of which are ponton and two abutment sections; the former contains three ponton wagons and one chess wagon; the latter, one ponton, one chess, and one trestle wagon each.

The ponton section contains the material for three bays, and should never be subdivided. The division may be increased or diminished at pleasure, by changing the number of its ponton sections.

The supply division is provided with articles necessary to replace material lost or worn out, such as balk, chess, spare parts of carriages, a few complete carriages, etc.

The carriages of this division consist of ponton, chess, and tool wagons, and of forges. Their number and proportion will be determined by the nature of the country in which the army is operating, and by the proximity of the main depot.

The trains of the Advance Guard Equipage are composed of 4 ponton divisions, each of which consists of 8 ponton, 2 chess, and two trestle wagons.

The ponton wagon carries all the material necessary for constructing a complete bay. The division may, therefore, be increased or diminished by one or more ponton wagons without disorganizing it. When a forced march is to be made, and it is desirable to lighten the loads, the chess may be removed from the ponton wagons, the rope from the trestle wagons, and the load of the chess wagons be reduced to 40 chess. The number of the latter wagons in this case must be increased to 5.

The ponton wagons of reserve train are drawn by 8 mules or 6 horses, those of the advance-guard train by 6 mules or 4 horses; the "loads" being about 3000 and 2000 lbs. respectively. It would be out of place to enter more fully into this subject in this work; but these historical details concerning the development of our military bridge system—a matter in which we had no experience whatever—during the war cannot fail to be interesting.

Another interesting branch of the subject—the remarkable constructions applied to the improvisation of railroad bridges, in place of destroyed ones, and the noteworthy system of repair and construction introduced into our military railway service, can only be alluded to. The military railroad construction and repair corps were a part of the Quartermaster's Department, which organized, hired, and paid all their members, and bought and paid for all the material, and possessed and operated the railroads at an expense which at one time amounted to about $2,000,000 per month. Under the Chief of that Department, and especially charged with this duty, the principal organizer and conductor of military railroad transportation and repairs was Brig.-Gen. D. C. McCallum (who has since made a valuable report on this subject), well known as an able civil Engineer and inventor of the "Inflexible Arch Truss;" but the credit of the military railroad operation, and repair and success belong to no individual altogether, but to the Quartermaster's Department, and to the body of Railroad Engineers, superintendents, and operatives who came into its service to aid the country during the war.

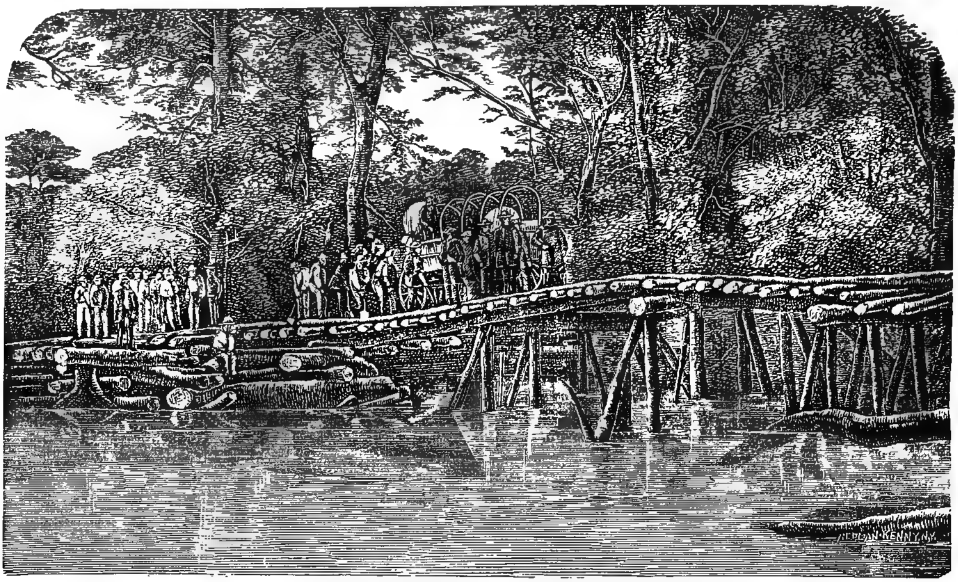
In the occupation, for protracted periods, of the same ground (as in investments, sieges, etc.) military bridges assume frequently a semi-permanent character.

Thus, while the Army of the Potomac occupied a position near Richmond (May and June 1862) its wings were separated by the formidable barrier of the Chickahominy rivulet and swamp. One of the bridges is thus described in the report of the Chief of Engineers of the Army of the Potomac:

"The bridge was built over the stream upon frame trestles; through the swamp it was supported by cribs. The *approaches* to the bridge over the low bottom-lands were either raised corduroy or (on the north side) simply earth raised two or three feet (the soil being here sandy), with a layer of brush one foot below the upper surface; deep lateral ditches being made. The whole structure of the bridge and approaches was about fourteen hundred yards long. The trestle-work and crib-work bridge was mostly done by troops of the Engineer brigade under General Woodbury; the approaches on the north, by the 9th and 22d Massachusetts regiments (Colonels Cass and Gove, both of whom were killed in the battles following), and those on the south side by the 3d Vermont. The bridge was ready for the passage of teams on the 14th, covered with earth, and the approaches entirely completed on the 17th. The bridge proper was 1,080 feet long; roadway, 11 feet wide; number of cribs, 40; of framed trestles, 6." (Fig. 24.)

The combined armies under General Grant occupied positions before Petersburg and Richmond from June 1864 to April 1865. The James River separated the Army of James (in its final position) from the centre and left.

FIG. 24.

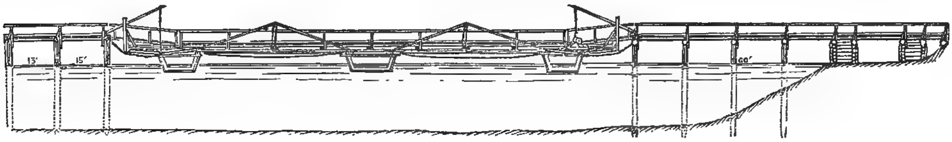

MEEHAN-KENNY, N.Y.

Woodbury and Alexander's Bridge.

assured communication was indispensable, and at the same time one which would not impede the navigation to our own vessels, whether transports or armed.

Col. P. S. Michie, Chief of Engineers Army of the James, designed and submitted for approval a timber p bridge with a floating draw (the floats being our ordina pontons) of which an elevation of a portion, including t "draw," of pontons is here given. (Fig. 25.)

FIG. 25.



The piles of trestles were guarded against ice (which in the winter forms freely in the upper James) by highly inclined guard pieces, the feet of which were secured to piles in the bed of the river. Each trestle was made up of a cap piece and six piles (in pairs) driven into the bed of the river. This bridge constructed late in 1864 was in use up to the close of the war. During the period above indicated the gap in our lines made by the Rappahannock was occupied by one or more ordinary ponton bridges.

Limiting the scope of the word *bridge*, by the radical meaning (as given in our definition) we have omitted in the foregoing nearly all reference to a very essential portion of the art of *bridge-building*, viz.: the establishment of pier and abutment *foundations*. For this subject see "FOUNDATIONS." Consult "Dictionary of Engineering" (Byrne). "Theory of Strains on girders and similar structures" (Stoney). "The Strains upon Bridge Girders" (Cargill). "Woodbury on the Arch." "Roebling on the Niagara Suspension Bridge." "Boudsot, Ponts Suspendus." "The Pesth Suspension Bridge." "Iron Truss Bridges" (Col. W. E. Merrill). "The Theory of Strains" (Diedrichs). "Theoric élémentaire des Poutres Droites" (Collignon, an excellent little French work); also Humber's great work on Bridges and "Modern Examples" and accounts of Quincy and Kansas City bridges. (See also FLEXURE OF BEAMS and CANTILEVER BRIDGE.) J. G. BARNARD.

Bridge-Head. See TÊTE-DE-PONT.

Bridge, Natural. See NATURAL BRIDGE.

Bridgenorth (anc. *Bruges* or *Brugia*), a town of England, in Shropshire, on both sides of the Severn, 19 miles S. E. of Shrewsbury, and 123 miles N. W. of London. The upper part of the town is picturesquely built on a rock sixty feet higher than the river. It has an old castle, almshouses, a public library, a blue-coat or charity school, a handsome bridge, and manufactures of carpets, nails, tobacco-pipes, boats, and worsted stuffs. It has a heavy commerce upon the river, and is supposed to have been founded by a daughter of Alfred the Great. Pop. in 1881, 5890.

Bridge of Allan. See APPENDIX.

Bridgeport, Cal. See APPENDIX.

Bridgeport, a city, seaport, and an important R. and commercial centre, one of the county-seats of Fairfie co., Conn. (see map of Connecticut, ref. 6–C, for locati of county), is on an inlet of L. I. Sound, at the mouth Pequonnock River, 58 miles N. E. of New York and miles W. S. W. of New Haven; lat. 41° 10′ 30″ N., lo 73° 11′ 46″ W. It has lines of steamboats connecting with New York, and is mostly built on a plain lying both sides of the Pequonnock River, the eastern porti being designated East Bridgeport, while on the weste side, back of the plain, rises Golden Hill, about 60 fe above high water, occupied mostly by elegant residence Bridgeport contains a public library, orphan asylum, boa of trade, and other public institutions. Its schools a second to none in the State. It is the third city in weal and importance in Connecticut. Between fifty and six corporations, with an aggregate capital of about $8,000,00 are doing business in this place, manufacturing carriage sewing-machines, miscellaneous hardware, machinery, bra and iron castings, leather, cartridges, hats, shirts, saddle springs and axles, corsets, etc. The census of 1880 show 170 manufactories; capital $9,751,785; average numb of hands employed, 7508; wages paid during the ye $3,342,935; value of products, $10,458,212. It has thr fine parks. A horse-railroad connects its extreme limi Pop. (in 1870, before the annexation of a part of Fai field), 18,969; in 1880, 27,643.

Bridgeport, R. R. junction, Belmont co., O. (see m of Ohio, ref. 5–I, for location of county), on the Ohio Riv opposite Wheeling, with which it is connected by a bridg Pop. in 1870, 1178; in 1880, 2395.

Bridg′er's Pass, a defile in the Rocky Mountains, the S. part of Wyoming Territory. The overland mail rou passed through it before the Pacific R. R. was opened. is "a narrow gallery, walled by noble precipices of granite and metamorphic sandstone, rising directly fro the traveller's side to the almost perpendicular height from 1000 to 2500 feet, and is several miles in length."

Bridg′et, SAINT, or **Saint Bride,** one of the thr patron saints of Ireland, lived about 500–520 A. D. Bridget's Day is Feb. 1st.

Bridgeton, R. R. centre, a city, port of entry, and the capital of Cumberland co., N. J. (see map of New Jersey, ref. 7–B, for location of county), is situated on both sides of Cohansey River, a fine tide-water stream, 20 miles from Delaware Bay, 37 miles S. of Philadelphia, and 127 miles S. of New York. Its area is 15.39 square m., or 9849 acres. Its pop. was in 1800 about 400; 1829, 1736; 1838, 2315; 1850, 3480; 1860, 5104; 1870, 6830; in 1880, 8722; and in 1885, 10,065. As a port of entry it is second in the State. The leading articles received are coal, pig iron and iron ore, lumber, lime and shells, fertilizers and manufactured goods. The principal shipments are nails, gas and water-pipe, canned fruits, woollen goods, window-glass, hollow-ware, and grain, potatoes, etc. It is the leading city of Southern New Jersey in the variety and value of its manufactured products, which consist in part of nails, water and gas-pipe, castings, machinery, woollen goods, glass, canned fruits, lumber, brick, shipbuilding, etc. Educational facilities are fine. The South Jersey Institute, for both sexes, opened in 1870, has a handsome and well-appointed building, which cost over $65,000, on a commanding site. The West Jersey Academy occupies a fine building on a beautiful location. Ivy Hall, a select boarding-school for young ladies, has a high reputation. There are also public schools of a high order. It has a good public library, a flourishing board of trade, building and loan associations, a large number of benevolent societies, and a children's home for the care of destitute children.

As the head of navigation and a fording-place on the Cohansey, a settlement early grew up. Before the Revolution there were not over 200 inhabitants, but they were staunch patriots. Dr. Jonathan Elmer, a Bridgetonian, was a member of the Revolutionary Congress. A company from Bridgeton served under Gen. Schuyler, and a privateer schooner built here made one successful voyage, but was captured when returning from the second. During the present century the place has had a steady growth, and was incorporated in 1865. The climate is mild and healthy, and the city and its surroundings most beautiful.

Bridgetown, the capital of the island of Barbados, is on its W. coast, and extends along the N. side of Carlisle Bay, which forms its roadstead; lat. 13° 4′ N., lon. 59° 38′ W. It is the residence of the bishop of Barbados and the governor of the Windward Islands, and has an arsenal and barrack in the vicinity. Pop. 20,947.

Bridgewater, a town and river-port of England, in Somersetshire, on both sides of the river Parret, 33 miles by rail S. W. of Bristol. It is neatly built, and the houses are mostly of brick. Vessels of 200 tons can ascend the river to this town. Here is St. Mary's Church, which has a remarkable and lofty spire. This is the native place of Admiral Blake. Bridgewater became a free borough in 1200. Pop. in 1881, 12,024.

Bridgewater, a post-village of New Dublin township, Lunenburg co., 12 miles from Lunenburg, Nova Scotia, has manufactures of lumber, etc. Pop. in 1881, 3487.

Bridgewater, on R. R., Plymouth co., Mass. (see map of Massachusetts, ref. 4–J, for location of county), 27 miles S. of Boston. It contains a State normal school, academy, State almshouse, extensive iron-works, cotton-gin and other manufacturing establishments, and is the seat of the county agricultural fair. Pop. of township in 1870, 3660; in 1880, 3620; in 1885, 3827.

Bridgewater (Francis Henry Egerton), Earl of, born Nov. 11, 1758, was a son of John Egerton, bishop of Durham. He inherited the earldom in 1823, and died childless Feb. 11, 1829. By his last will he left £8000 to be paid to the author of the best treatise "On the Power, Wisdom, and Goodness of God as manifested in the Creation." He was an Anglican priest. (See Bridgewater Treatises.)

Bridgewater Treatises, a celebrated series of works named in honor of the earl of Bridgewater. (See preceding article.) The trustees who had the control of his bequest of £8000 placed it at the disposal of Gilbert Davies, president of the Royal Society, who appointed eight gentlemen to write separate treatises illustrative of the power, wisdom, and goodness of God. They are arranged as follows in the collected edition: Vol. I., by Sir Charles Bell, F. R. S.: "The Hand as Evincing Design" (1832, 7th ed. 1860); II., III., by Rev. William Kirby, M. A., F. R. S.: "Power, Wisdom, and Goodness of God in the Creation of Animals" (1835); IV., by John Kidd, M. D., F. R. S.: "Adaptation of External Nature to the Physical Conditions of Man" (1833); V., by Rev. William Whewell, M. A., F. R. S.: "Astronomy and General Physics with Reference to Natural Theology" (1833); VI., by Rev. Thomas Chalmers, D. D.: "Adaptation of External Nature to the Moral and Intellectual Conditions of Man" (1833); VII., by William Prout, M. D., F. R. S.: "Chemistry, Meteorology, and Digestion with Reference to Natural Theology" (1834, 4th ed. 1855); VIII., IX., by Rev. William Buckland, D. D., F. R. S.: "Geology and Mineralogy with Reference to Natural Theology" (1836); X., XI., by Peter Mark Roget, M. D., F. R. S.: "Animal and Vegetable Physiology with Reference to Natural Theology" (4th ed. 1869).

Bridg′man (Laura), a blind deaf-mute, affording a remarkable instance of the development of intellectual and moral powers under the most adverse circumstances. She was born at Hanover, N. H., Dec. 21, 1829. When two years old, through a severe illness, she lost her sight, hearing, and smell; her sense of taste being at the same time greatly impaired. At the age of eight she was placed under the instruction of Dr. Howe of Boston, principal of the Perkins Institution. She soon learned to read and spell with a manual alphabet; and she afterwards learned to write and to sew, and to play very well on the piano.

Bridgman (William R.), U. S. N., born Nov. 28, 1844, in Iowa, graduated at the Naval Academy in 1861, became an ensign in 1862, a lieutenant in 1864, and a lieutenant-commander in 1866. He served in various vessels of the West Gulf and Mississippi River squadrons during 1862 and 1863, participating in the action with Forts Jackson and St. Philip and capture of New Orleans, and in many of the most important fights on the Mississippi.

Foxhall A. Parker.

Bridgton, on R. R., Cumberland co., Me. (see map of Maine, ref. 10–B, for location of county), 38 miles from Portland. It has woollen mills, etc. at the Centre Village, and is accessible by steamboat from the foot of Sebago Lake. Pop. of township in 1870, 2685; in 1880, 2863.

Brid′lington, or **Bur′lington,** a market-town of England, in the East Riding of Yorkshire, and on the North Sea, 54 miles by rail E. by N. of York. Here are remains of a rich priory founded by a grand-nephew of William the Conqueror. Numerous ancient tumuli or barrows occur in this vicinity. Bridlington Quay, a seaport and bathing-place, is on the sea 1 mile S. E. of the town. It has a chalybeate spring and several hotels; also an active trade in corn, which is exported from it. This place is noted for chalk-flint fossils. Pop. of Bridlington and Quay, 8363.

Brid′port, a seaport-town of England, in Dorsetshire, on the Brit or Bride River, 16 miles N. W. of Dorchester. It is surrounded by hills, and consists chiefly of three spacious streets. It has a Gothic church, an almshouse, a town-hall; also manufactures of cordage, sail-cloth, shoe-thread, and fish-nets. The vicinity is celebrated for its butter and cheese. Pop. in 1881, 6790.

Briec, a village of France, department of Finistère, 9 miles N. N. E. of Quimper. Pop. in 1881, 5875.

Brief [Lat. *breve*], **Papal,** a letter addressed by the pope to temporal princes or communities on subjects of discipline or public affairs. It differs from the papal bull in several respects, giving decisions on matters of inferior importance, which do not require the deliberations and assent of a conclave of cardinals. It is not signed by the pope, but by the segretario de' brevi, an officer of the papal chancery. It is written on parchment, and sealed in red wax with the pope's private seal, called the "Fishermen's Ring" (Annulus Piscatoris).

Brief [from the Lat. *brevis*, "short"], in law, an abridged statement of the plaintiff's or defendant's case, prepared by his attorney for the use of counsel. It should contain a summary of the pleadings, a concise statement of the facts involved, the names of the witnesses, the substance of their testimony, and usually observations by the attorney in the nature of suggestions to counsel.

The word "brief" is also employed in this country to indicate the sketch of the argument of counsel, which is either used by him or submitted to the court under its rules. "Brief" is also sometimes employed in the sense of *breve*, to denote one of the writs by which all suits in the higher courts were originally begun.

Brieg, a town of Prussia, in Silesia, on the Oder, and on the railway from Breslau to Oppeln, 29 miles by rail N. of Neisse. It is well built, and has a gymnasium, a good library, and manufactures of hosiery, ribbons, linens, and woollens. Pop. in 1880, 17,508.

Brieg, in Valais. See Appendix.

Briel, or **The Brill,** a fortified seaport-town of Holland, in the province of South Holland, and near the mouth of the river Meuse, 13 miles S. S. W. of The Hague; lat. of lighthouse, 51° 54′ 11″ N., lon. 4° 9′ 51″ E. It has a good harbor, is intersected by several canals, and contains several magazines. The capture of this town by William de la Marck in 1572 was the first important event in the long contest between the Dutch and Philip II. of Spain. Van Tromp and De Witt were born here. Pop. 4442.

Brienne, or **Brienne-le-Château,** called also **Brienne-Napoléon,** a small town of France, in the department of Aube, on the river Aube, 23 miles E. N. E. of Troyes. Here was a military school in which Napoleon I. was educated. The place derived its name from a château built by the last count de Brienne. In Jan., 1814, a battle was fought here between Napoleon and the allies, commanded by Blücher and Schwarzenberg, in which the latter were victorious. Pop. in 1881, 1918.

Brienz, Lake of [Ger. *Brienzer-See*], in Switzerland, is formed by the river Aar, at the foot of the Hasli Valley. It is 8 miles long, 2 miles wide, and from 500 to 2100 feet deep. The surface is 1847 feet above the level of the sea. It is surrounded by high mountains, one of which, called the Rothhorn, commands a grand view of the Alps. The surplus water of this lake flows through the Aar into Lake Thun. A small steamer plies on the lake daily.

Brier Creek of Georgia rises in Warren county, flows south-eastward, and after a course of about 100 miles enters the Savannah near Jacksonborough. Mar. 4, 1779, the British, under Prevost, defeated a force of Americans, under Gen. Ashe, on this creek.

Brierre de Boismont (ALEXANDRE JACQUES FRANÇOIS), a French physician, born Oct. 18, 1797, has published numerous treatises on medico-psychological subjects; among others, "De l'Ennui," "Sur le Suicide et la folie-suicide" (rev. ed. 1865), and "Des Maladies Mentales" (1866).

Bries [Hun. *Breznobanya*], a royal free city of Hungary, in the county of Sohl, 20 miles N. E. of New Sohl. Pop. 11,766.

Brig, a square-rigged vessel with two masts. It has a boom mainsail, and is otherwise square-rigged—*i. e.* having the sails brought to yards hung horizontally by the middle. The hermaphrodite brig is the same with the BRIGANTINE (which see).

Brigade [It. *brigata*, a "company"], a group of regiments or battalions combined into one body. In the British army it denotes a body formed by the union of two or more regiments or battalions under one commander, called a brigadier. It is a temporary grouping which can be broken up whenever the commander of the army thinks proper. In the U. S. army two or more regiments of infantry or cavalry may constitute a brigade.

Brigadier', or **Brigadier-General,** the commander of a brigade; an officer who is one degree higher than a colonel, and one lower than a major-general. In the British army a brigadier is an officer (usually a colonel) who for a limited time and for a special service is appointed to the command of a brigade. When this is broken up he either falls back to his colonelcy, or is raised to the rank of major-general.

Brigandine, a part of the defensive armor of the Middle Ages, was an assemblage of small plates of iron sewed upon quilted leather or linen. It formed a sort of coat or tunic, and derived its name from the irregular, light-armed troops called brigans or brigands, who were addicted to marauding and plundering.

Brigan'tes, a powerful nation of ancient Britain, inhabiting what is now the north of England, including the counties of Cumberland, Westmoreland, Durham, York, and Lancaster.

Brigantine, or **Hermaph'rodite Brig,** a two-masted vessel, with the mainmast of a schooner and the foremast like that of a brig. The mainsail of a brigantine is a fore-and-aft sail, like that of a schooner.

Briggs (CHARLES AUGUSTUS), D. D. See APPENDIX.

Briggs (CHARLES FREDERICK), an American writer, born at Nantucket, Mass. He became an editor of the "New York Times," and published, besides other works, "The Adventures of Harry Franco, a tale of the Great Panic" (1839), "The Haunted Merchant" (1844), and "The Trippings of Tom Pepper" (1847). Died in Brooklyn, N. Y., June 20, 1877.

Briggs (GEORGE NIXON), LL.D., an American lawyer and judge, born in Adams, Mass., April 13, 1796. He was a member of Congress for twelve years, and governor of Massachusetts from 1844 to 1851, and afterwards judge of the court of common pleas. He was a distinguished philanthropist, and for many years president of the Baptist Missionary Union. Died Sept. 12, 1861.

Briggs (HENRY), an English mathematician, born near Halifax, Yorkshire, in 1556, was educated at Cambridge. He became in 1619 Savilian professor of geometry at Oxford. He made important contributions to the theory of logarithms, and published in 1624 a great work entitled "Arithmetica Logarithmica," giving the logarithms of natural numbers from 1 to 20,000, and from 90,000 to 100,000, calculated to fourteen places. Died in 1631.

Brig'ham (AMARIAH), M. D., born near New Marlborough, Mass., Dec. 26, 1798. He became superintendent of the lunatic asylum at Utica, N. Y., in 1842. Among his works is "The Anatomy, Physiology, and Pathology of the Brain" (1840). Died Sept. 8, 1849.

Brigham (Rev. CHARLES HENRY), born in Boston, Mass., July 27, 1820, graduated at Harvard, became in 1844 pastor of the First Congregational church in Taunton, Mass., and in 1865 pastor of the Unitarian church at Ann Arbor, Mich. After 1866 he was professor of biblical archæology and ecclesiastical history in the Meadville (Pa.) Theological School. He was a prominent member of the American Oriental Society, of the Philological Society, and of the American Association for the Advancement of Science, and was the author of many contributions to periodical literature. D. Feb. 19, 1879.

Bright (JESSE D.), born at Norwich, Chenango co., N. Y., Dec. 18, 1812, became a lawyer of Indiana, circuit judge in the State courts, lieutenant-governor, etc., and U. S. Senator from Indiana (1845–62). D. May 20, 1875.

Bright (JOHN), an eminent English orator and statesman, born near Rochdale on the 16th of Nov., 1811. He is a member of the Society of Friends. About 1840 he became a personal and political friend of Richard Cobden, and gained distinction as an orator of the Anti-Corn Law League, in advocacy of which he addressed many public meetings. He was elected a member of Parliament for the city of Durham in 1843, and was returned for Manchester in the general election of 1847. Cobden and Bright became the principal leaders of the Manchester school or party, which was not identified with either of the great political parties, but advocated a pacific foreign policy and electoral reform. He was defeated in the election of 1857, because he had opposed the Crimean war against Russia and the Chinese war, but he was elected in the same year by the Liberal voters of Birmingham, which he continued to represent for many years. During the great civil war in the U. S. he expressed his sympathy with the Union cause in several eloquent speeches. After the Reform bill of Russell and Gladstone had been rejected by the House of Commons in 1866, Mr. Bright advocated the cause of electoral reform by vehement speeches at immense public meetings in London, Manchester, Birmingham, and other places. In 1867 the friends of reform triumphed, and procured the passage of a bill granting the right of suffrage to every householder in a borough. He entered the cabinet formed by Mr. Gladstone in Dec., 1868, as president of the board of trade, and resigned office on account of ill health about Mar., 1871; again a member of Mr. Gladstone's cabinet of Apr. 28, 1880; he resigned July 14, 1882, announcing in the House of Commons that he retired because he differed from his colleagues of the cabinet on their Egyptian policy. He was elected lord rector of the University of Glasgow Nov. 15, 1880. A collection of his speeches was published in two vols. in 1868.

Bright (MARSHAL H.), born at Hudson, N. Y., Aug. 18, 1834, was educated at several schools and took a course at Lawrence Scientific School, Cambridge, 1852–53; reported in New York senate 1854; associate editor "Albany Argus" same year; served in the late war, being appointed on the staff of Gen. Robert Anderson Oct., 1861, and serving successively on staffs of Gens. W. T. Sherman, D. C. Buell, W. S. Rosecrans, and George H. Thomas 1861–65; participated in several engagements; brevetted major for valuable and meritorious services; resigned his commission at close of the war, 1865; engaged in silver-mining in Nevada; became managing editor of "Christian at Work," New York, 1873, and editor-in-chief 1880. He has contributed to numerous periodicals on theological, scientific, and philosophical subjects, and delivered various addresses.

Bright'on, formerly **Brighthelmstone,** a town and fashionable watering-place of England, in Sussex, and on the English Channel, 50 miles S. of London. It is the southern terminus of the London and Brighton Railway. Lat. of lighthouse, 50° 50′ N., lon. 0° 8′ W. It extends 3 miles along the coast, and is sheltered on the N. and N. E. by the South Downs. To resist the inroads of the sea, which formerly undermined the chalk-cliffs at Brighton, a sea-wall of great strength has been constructed. It is 60 feet high, and forms an admirable promenade. In the middle of the town, in an open space called the Steyne, is the Pavilion or Marine Palace, a fantastic structure of Oriental style built by the prince of Wales (George IV.). It was finished in 1827, and is now owned by the corporation of Brighton. The town is well built, and consists mostly of new and elegant streets and terraces. It is a favorite resort for the aristocracy and the opulent classes, has numerous magnificent hotels, two theatres, assembly-rooms, and many boarding-schools. Among its institutions are Brighton College, founded in 1847 for the education of the sons of noblemen, a hospital, and the Sussex Literary and Scientific Institution. Brighton returns two members to Parliament. Steamers ply between this place and Dieppe. A fine terrace, called the Marine Parade, extends about a mile between the Steyne and Kempton, an eastern suburb of Brighton. It has little or no maritime trade, and owes its rapid increase to the salubrity of the air and its attractions to persons in pursuit of health and pleasure. It entertains, on an average, about 20,000 visitors. Pop. in 1881, 107,528.

Brighton, on R. R., Suffolk co., Mass. (see map of Massachusetts, ref. 2–I, for location of county), 5 miles W. of State-house at Boston, has a public library, and formerly had a celebrated cattle-market. It became a part of the municipality of Boston Jan. 5, 1874, and is now the Twenty-fifth Ward of that city. Pop. in 1885, 8523.

Brighton, on R. R., Livingston co., Mich. (see map of Michigan, ref. 7–J, for location of county), 43 miles S. E. of Lansing, has good water-power, various manufactures, and a public library. Pop. in 1870, 454; in 1884, 855.

Bright's Disease (or **Ne'phria**), so called after the English physician, Dr. Bright, who first investigated its character, consists essentially of a degeneration of epithelium of the kidneys. This impairs the excreting powers of the organ, so that the urea is not properly removed from the blood. The disease is characterized by albuminuria. When we apply heat and nitric acid to the urine from a kidney so affected, albumen is coagulated; under the microscope we observe moulds of the tubules of the diseased organ. Headache and sickness of stomach are common symptoms, and dropsy usually attends the disease. The retina is usually attacked by a degenerative inflammatory disease, which impairs the sight, and is detected by the ophthalmoscope. The causes are, indulgence in strong drinks, exposure to wet and cold, gout, and syphilis. The indications for treatment are, to remove any of those causes which may be present, relieve congestion of the kidneys, at the same time endeavoring to increase strength by iron and other tonics. When considerable dropsy occurs, cathartics may be called for. Bright's disease may be either acute or chronic. The prospect of recovery is small, but patients sometimes attain a comfortable, but generally a precarious, degree of health. REVISED BY WILLARD PARKER.

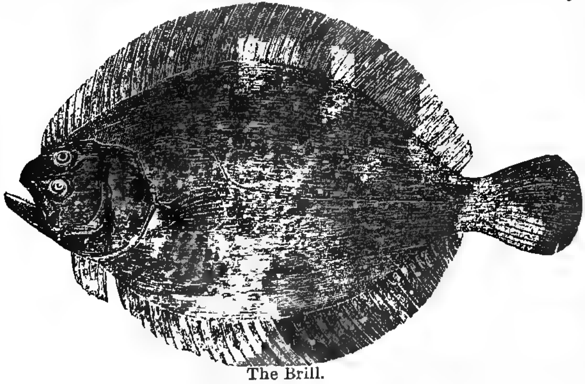
Brigittines, or **Order of the Saviour,** a monastic order affiliated with the Augustinians, founded by Saint Bridget of Sweden in 1344. It originally included monks and nuns, who lived in the same house, but were forbidden to see each other. There are at present few if any Brigittine monks, and not many nuns. Sion House was the only English convent. Œcolampadius, the Reformer, was once a Brigittine monk.

Brignoles, a town in the S. E. of France, department of Var, is beautifully situated in a valley on the small river Calami, 23 miles S. W. of Draguignan. It has a normal school, a public library, and manufactures of broadcloth, silk twist, pottery, soap, and leather. Pop. 5678.

Bri'gus, a port of entry and post-town, capital of Brigus district, Newfoundland. It has a small but good harbor, having over 820 cod-fishing boats and 30 trading vessels, and is visited by steamers from St. John's. It has a convent of Sisters of Mercy and a jail. It has considerable agriculture. Pop. about 2000.

Bril (PAUL), an eminent landscape-painter, was born at Antwerp in 1556. He was a pupil of his brother Mattheus, and worked for many years in Rome, where he died in 1626.

Brill (*Rhombus vulgaris*), a fish found on the British coasts, and esteemed as food, though inferior to the turbot, from which it may be distinguished by its want of tubercles on the upper surface, and by the color, which is a reddish sandy brown on the upper side, varied with darker brown, and sprinkled with white pearly spots. It seldom weighs more than eight pounds.



The Brill.

Bril'liant [Fr. *brillant*], a diamond of fine quality formed into a number of facets, so as to refract and reflect the light, by which it is rendered more brilliant. It has a face or flat table in the middle on the top. (See DIAMOND.)

Brim'stone, a commercial and common name for SULPHUR (which see), by PROF. C. F. CHANDLER.

Brin'disi, a fortified seaport of Italy, province of Lecce, situated at the head of a bay of the Adriatic, 38 miles by rail N. N. W. of Lecce; lat. of fort, 40° 39' N., lon. 18° 1' E. The ancient *Brundisium* was taken from the Sallentines by the Romans in 267 B. C., and was afterwards the principal naval station of the Romans on the Adriatic. It had an excellent landlocked harbor, and was long one of the most important maritime cities of Italy. It was the port from which the Romans embarked on the voyage to Greece. Vergil died here in 19 B. C. The crusaders used it as their chief port of embarkation to the Holy Land. The harbor having become choked with sand, its importance greatly declined. Here is a mediæval cathedral and an ancient castle. The large steamers of the Peninsular and Oriental Company now enter this port, which has recently been improved. Since 1860 the government has dredged the harbor, so that a depth of nearly six fathoms has been obtained, and has constructed two breakwaters and about 3000 feet of quay. The position of Brindisi has been rendered very advantageous for commerce by the opening of the Suez Canal. A railway extends from this town along the coast to Ancona, Milan, etc. Pop. 16,719.

Brind'ley (JAMES), an eminent English mechanic and engineer, born at Thornset, in Derbyshire, in 1716. He made improvements in the machinery of mills, and was engineer of a canal from Worsley to Manchester, completed in 1761; the first navigable canal made in England. He was engineer of other canals. D. Sept. 27, 1772.

Brine Shrimp, an active, translucent crustacean, the *Artemia salina*, a branchiopod one inch long, found especially in the half-evaporated sea-water of the salt-works of Lymington, England. The workmen believe that these animals clarify the brines, and they therefore are careful to put them into such brines as appear to be without them. They breed rapidly and become very numerous. *Artemia fertilis* is extremely abundant in the Great Salt Lake.

Brinton (D. G.), A. M., M. D. See APPENDIX.

Brinvilliers (MARIE MARGUERITE D'AUBRAY), MARCHIONESS OF, a French woman notorious as a poisoner, was married in 1651 to the marquis de Brinvilliers. She poisoned her father, her sisters, and two of her brothers. For these crimes she was tried and put to death July 16, 1676.

Brion (GUSTAVE), a French artist of considerable reputation, was born at Rothau (Vosges) in 1824. His principal pictures are the "Potato Harvest during the Inundation," 1853; "A Funeral in the Vosges," 1855; "A Marriage in Alsace," "Jesus and Peter on the Water," 1863; "The Dance of the Cock" (Alsace), 1872. Brion was an earnest painter, most at home in scenes in which the half-German, half-French peasantry of Alsace take part. D. Nov. 6, 1877. CLARENCE COOK.

Bris'bane, a seaport and the capital of Queensland, Australia, on Brisbane River, about 20 miles from its entrance into Moreton Bay, and about 600 miles N. by E. of Sidney. Wool and other products are exported from this place. It is connected by rail with Ipswich and Dalby, and is in direct steamship communication with London and Liverpool. It is the seat of an Anglican and a Roman Catholic bishop. Pop. in 1881, 31,109.

Brissot de Warville (JEAN PIERRE), an eminent French Girondist and political writer, born near Chartres Jan. 14, 1754. He published in 1780 a "Theory of Criminal Laws." In 1785 he was unjustly imprisoned in the Bastile for about four months. With the aid of his friends he founded about 1788 the "Society of the Friends of the Negroes," and visited the U. S. to promote the abolition of the slave-trade. After his return to France he founded and edited the "Patriote Français," an able republican journal. In 1791 he was elected to the National Assembly by the voters of Paris. He was so prominent a leader of the Girondists that they were often called Brissotins. Having been elected to the Convention, he opposed the execution of the king. He was guillotined in Paris Oct. 31, 1793. (See Brissot's "Mémoires pour servir à l'Histoire de la Révolution," published by his son, 4 vols., 1830.)

Bris'ted (Charles Astor), son of the following, born in New York Oct. 6, 1820, educated at Yale College, New Haven, and Trinity College, Cambridge, author of an edition of Catullus (1849), "Five Years in an English University" (1851, revised 1872), "The Upper Ten Thousand" (1852), "Pieces of a Broken-down Critic" (1858), "The Interference Theory of Government" (1867), "Anacreontics" (1872), and a frequent contributor to leading periodicals. Died at Washington, D. C., Jan. 15, 1874.

Bristed (John), an Episcopal clergyman, born in 1779 in Dorsetshire, England, educated at Winchester School, removed to America in 1806, and practised law in New York, studied divinity and was ordained in the Episcopal Church. He was author of "Resources of the British Empire," "Resources of the U. S.," and "Anglo-American Churches." Died at Bristol, R. I., in 1854.

Bris'tle [Lat. *seta*], the name of the stiff strong hairs which grow on the backs of swine, and are used extensively in the manufacture of brushes; also by shoemakers and saddlers as substitutes for needles. Bristles are an important article of commerce. There is a great variety in their color and quality. The white are considered the most valuable. The best bristles are obtained from the hogs of cold climates, as from Russia.

Bris'tol, an important maritime city of England, situated on the Avon at its confluence with the Frome, 8 miles from the sea, 11½ miles by rail N. W. of Bath, and 118 miles by rail W. of London; lat. 51° 27′ N., lon. 2° 35′ W. It is chiefly in the county of Gloucester, and partly in Somersetshire, and it occupies several hills and valleys. It is the terminus of the Great Western, the Bristol and Exeter, and the Midland Railways. Bristol returns two members to Parliament. Among its remarkable buildings are the cathedral, which was founded about 1150; the fine church of St. Mary Redcliffe, which was completed in 1376; the Temple church, which has a leaning tower; the guildhall; the exchange, used as a corn-market; and the new general hospital. The modern portions of Bristol, including Clifton and other suburbs, consist of handsome residences in squares, terraces, crescents, and detached villas. This city has a public library, a bishop's college, a medical school, an infirmary, an asylum for the blind, an asylum for deaf-mutes, and other benevolent institutions. The Avon here, though narrow, is deep enough for large vessels. About £650,000 have been expended in turning this river into a new course, and its old channel now forms a harbor furnished with locks and quays 6000 feet long. Bristol was the first British port between which and the U. S. a regular communication by steam was established. It has an extensive trade with Canada, the U. S., the West Indies, France, Russia, the shores of the Mediterranean, etc. The chief articles of export are copper, iron, brass, coal, salt, and manufactured goods. The manufactures of this city are chiefly cotton goods, refined sugar, glass, woollen goods, chemical products, machinery, and earthenware. Here are extensive shipyards, which turn out excellent vessels. This place was called *Caer-oder* by the Britons, and *Bricstowe* or *Briestow* by the Anglo-Saxons. A fortified town existed here as early as 500 A. D. It was formerly the second commercial city in England. During the civil war it was taken alternately by Royalists and Roundheads. Among the distinguished natives of Bristol were Sebastian Cabot and the poets Chatterton and Southey. Pop. in 1881, 206,503.

Bristol, on R. R., Hartford co., Conn. (see map of Connecticut, ref. 4–D, for location of county), 18 miles W. S. W. of Hartford. It has a large manufacture of clocks, several foundries, machine-shops, and stocking-mills. Pop. of township in 1870, 3788; in 1880, 5347.

Bristol, Fla. See Appendix.

Bristol, Bucks co., Pa. (see map of Pennsylvania, ref. 5–J, for location of county), on R. R. and the Delaware River, 19 miles above Philadelphia, and nearly opposite Burlington, N. J. It has almost hourly communication with Philadelphia by steamboats. Here is a valuable mineral spring. Pop. in 1870, 3269; in 1880, 5273.

Bristol, a port of entry and capital of Bristol co., R. I. (see map of Rhode Island, ref. 5–H, for location of county), is on R. R. and Narragansett Bay, 16 miles S. S. E. of Providence and 7 miles S. W. of Fall River. It has a good harbor, which is easy of access, and will admit large vessels. A beautiful eminence called Mount Hope rises about 300 feet high in Bristol township. It has manufactures of cotton goods and other articles. Pop. of Bristol township in 1870, 5302; in 1880, 6028; in 1885, 5737.

Bristol, a city of Sullivan co., Tenn. (see map of Tennessee, ref. 5–K, for location of county), is situated partly in Washington co., Va., on Norfolk and Western, and E. Tenn. Va. and Ga. R. Rs., 130 miles E. N. E. of Knoxville. It is the seat of King College. Pop. in 1880, 1647.

Bristol, Marquesses of (1826, in the United Kingdom), earls of Bristol (1714, in Great Britain), Earls Jermyn (1826, in the United Kingdom), and Barons Hervey (1703, in England), a noble family of Great Britain.—Frederick William John Hervey, the third marquess, born June 28, 1834, succeeded his father in 1864. He was member of Parliament for West Suffolk 1859–64.

Bristol Bay, an inlet of the Pacific Ocean, in North America, between Cape Newnham and the peninsula of Alaska.

Bristol Brick, or **Bath Brick,** a variety of brick used for scouring steel table-cutlery and other polished steel surfaces. It is made at various places in England and the U. S., a peculiar fine sand being used in the manufacture.

Bristol Channel, an inlet of the Atlantic Ocean, in the S. W. part of England, is bounded on the N. by Wales and on the S. by Somerset and Devonshire. At the E. end it communicates with the estuary of the Severn. It is the largest inlet of Great Britain, and has a coast-line of 220 miles. The tides rise here to an extraordinary height—at Bristol about forty, and at Chepstow sometimes seventy, feet. The principal bays are Swansea Bay, Caermarthen Bay, Cardiff Road, the Severn Estuary, and Barnstable Bay.

Bristow (Benjamin H.). See Appendix.

Bris'tow Sta'tion, a post-village of Prince William co., Va., on the Orange and Alexandria R. R., 4 miles W. S. W. of Manassas Junction. A severe engagement took place here the afternoon of Aug. 27, 1862, between the U. S. forces under Gen. Hooker and the Confederates under Gen. Ewell, darkness closing the conflict, with severe loss on both sides. On Oct. 14, 1863, the Confederate general A. P. Hill attacked the force under command of Gen. G. K. Warren, U. S. army, at this place; the attack was handsomely repulsed by Warren, who captured several pieces of artillery and many prisoners.

Brit, the *Clupea minima*, a very small species of herring found on the coasts of New England and the British provinces of North America. It occurs in immense shoals, but is only from one to four inches long, and is chiefly important as furnishing food to larger fishes.

Britan'nia, the ancient name of the island of Great Britain. It was inhabited by rude, uncivilized tribes of Britons (Lat. *Britanni*), who were perhaps, but not probably, the aborigines, when Julius Cæsar invaded the island in 55 B. C. Their religion was a sanguinary Druidism. Many of the Britons were Cymric Celts, while those of the northern part were probably largely Gaelic. (See Briton.) They obstinately resisted the Roman invaders, but without success, and the southern half of the island was conquered by the armies of Vespasian. In the reign of Domitian, Agricola extended Roman power to Scotland, and erected a chain of forts between the friths of Clyde and Forth about 84 A. D. The northern part of the island was inhabited by the Caledonians and Picts, whom the Romans failed to subdue. These warlike barbarians made frequent inroads into the southern province, to obviate which the Romans built the wall of Antoninus about 140 A. D. Another rampart, called the Wall of Hadrian, extending from Solway Frith to the mouth of the Tyne, was completed by Severus about 210 A. D. The part of the island S. of this wall was for several centuries under the dominion of the Romans, who founded many towns (*municipia*), and diffused Roman culture, arts, and civilization in the country. They made numerous roads from London to the provinces, the remains of which are still visible. Many parts of England abound in Roman antiquities, including remains of camps, baths, mosaic pavements, weapons, ornaments, utensils, pottery, sculptures, and coins. It appears that the Romans intended to keep Britain as a permanent conquest, but in consequence of the internal disorders and external dangers that menaced the stability of the Roman empire, the legions were withdrawn from the island about 420 A. D., soon after which it was invaded and conquered by the Saxons. It is said that Cæsar was the first who gave the name *Britannia* to this island, which before his time was called *Albion*. The term *Britannicæ Insulæ*, however, was applied to the British Islands collectively before Cæsar invaded *Albion*. Britannia is usually personified in the fine arts as a woman seated on an insulated rock, leaning on a shield and holding in her hand a spear or trident. (See Camden, "Britannia.")

Britan'nia Met'al, an alloy of tin with a little antimony, zinc, and copper, is largely used in the manufacture of coffee-pots, tea-pots, and other vessels. It is harder than pewter, and not so easily indented or bent. The proportions of the metals combined to make this alloy are various. The average composition in 100 parts is—tin, 85½; antimony, 10½; zinc, 3; and copper, 1. The present composition of the alloy used at Birmingham, England, is stated to be 90 of tin, 8 of antimony, 2 of copper.

Britannicus. See APPENDIX.

Brit'ish Amer'ica is usually applied to that portion of North America which lies N. of the parallel 49° N., except Alaska. It also extends several degrees farther S., where the great lakes form the boundary between it and the U. S. It is bounded on the N. by the Arctic Ocean, on the E. by the Atlantic and Davis Strait, on the S. by the U. S., and on the W. by the Pacific Ocean and Alaska. The Rocky Mountain chain extends through the western part. The principal rivers are the St. Lawrence, the Mackenzie, the Saskatchewan, and the Churchill. It contains several large lakes—namely, Winnipeg, Athabasca, and Great Slave Lake, and includes a large inland sea, named Hudson's Bay. This vast region was formerly divided into numerous territories or provinces, but in 1873 the whole of it had been admitted into the Dominion of Canada, with the exception of Newfoundland and Labrador.

BRITISH AMERICA, in a more extended sense, comprises all the British possessions in America, including British Guiana, the British West Indies, etc.

British Burmah. See BURMAH, BRITISH.

British Colum'bia, a province of the Dominion of Canada, is bounded on the S. by the U. S. (Washington, Idaho, and Montana), on the E. by the Rocky Mountains, and on the W. by the Pacific Ocean. It includes the important islands of Queen Charlotte and Vancouver (which last was formerly by itself a British colony). British Columbia was united to Canada in 1871. The soil of portions of the province near the sea is good, and the climate mild, though rainy; but in the interior the surface is extremely rugged and the climate is severe. The coast-line is characterized by remarkable fiords, called "canals," which are often walled in by mountains. Furs are largely exported. There is much valuable timber, and the fisheries promise to become important. Cod, haddock, herring, halibut, trout, sturgeon, anchovies, and especially salmon, abound. There is much fine grazing-land. Large amounts of gold have been obtained here, and silver, copper, zinc, mercury, coal and marble are found. Area, 341,305 square miles. Capital, Victoria. Total pop. in 1881, 49,459, including 25,661 Indians and 4350 Chinese. The best harbor is at Esquimault. British Columbia has an Anglican bishop, whose seat is at New Westminster.

Certain islands in the Strait of San Juan de Fuca, having been claimed by both the U. S. and Great Britain, were held under joint military occupation until Oct., 1872, when by a decision of the emperor William I. of Germany, to whom the dispute was referred, they became U. S. territory. These islands, of which San Juan is the most important, are ten in number. Their entire population in 1880 was 948.

British Empire. See GREAT BRITAIN and IRELAND.

British Guiana. See GUIANA.

British Gum. See DEXTRINE, by PROF. C. F. CHANDLER, PH. D., LL.D.

British India. See INDIA.

Brit'ish Muse'um, The, in London, was established in 1753 by act of Parliament in pursuance of a bequest of Sir Hans Sloane to the nation of his cabinets of natural history and library, numbering 50,000 volumes, in return for a sum of £20,000 to be paid to his heirs. The palace of the duke of Montague on Russel street was purchased for the reception of the collection. In 1801 the Elgin Marbles, in 1823 the library of George III., containing 80,000 volumes, were added to the museum, and it has been subsequently enriched by the Granville library, the Sir William Temple coin cabinets, the Layard and Loftus collection of Assyrian, and the Lady Webster collection of Mexican, antiquities, and other extensive accessions. The building was in 1823–47 enlarged and renovated at a cost of £150,000. The library numbers at present 1,500,000 volumes, besides 41,180 MSS. and 33,000 documents and state papers. The collections of antiquities are altogether the completest in Europe. The museum contains also the finest collection of vases, among them the famous Portland Vase, and the largest collections of Greek and Roman sculpture in the world, and the cabinets of natural objects embrace every province of science.

Brit'on, a native or citizen of ancient Britain or BRITANNIA (which see); a name given to the aboriginal or ancient inhabitants of that island. When Cæsar invaded Albion in 55 B. C., he found in it two different peoples. The interior was occupied by the primitive or indigenous Celtic inhabitants, who had been driven back from the coasts by a people of probable Gothic descent. The latter had colonized the S. E. part of the island, and were less numerous than the Celtic Britons. The language of the Southern Celtic Britons was very similar to the present Welsh. "The Gaels and Britons," says R. G. Latham, "are the fundamental populations of the British Isles. The Picts were either aboriginal or intrusive. If aboriginal, they were like the Gaels and Britons, Keltic." (See PICTS.) When Cæsar invaded the island, the Britons were divided into a number of petty kingdoms or states. Some of these were called *Silures*, *Brigantes*, *Ordovices*, *Trinobantes*, and *Cantii*. Their religion was Druidism. (See DRUIDS.) The primitive Britons were brave and warlike, but, in consequence of their divisions, they were conquered by the Romans without much difficulty. They were rude barbarians, who painted their bodies blue. The term Briton is often applied to a modern inhabitant of Great Britain.

Brittany. See BRETAGNE.

Brive, or **Brives-la-Gaillarde,** a town of France, department of Corrèze, is situated in a rich plain on the river Corrèze, 44 miles by rail E. of Périgueux. It has manufactures of muslins, woollen stuffs, silk handkerchiefs, etc.; also a college and public library. Pop. in 1881, 14,182.

Broad Arrow, the British government mark placed upon all solid materials used in ships or dockyards, to prevent embezzlement of royal stores. The origin of the mark is obscure. Before 1698 the authorities prosecuted a dealer in marine-stores for having in his possession certain stores bearing the broad arrow of his majesty. The defendant, when asked what he had to say, replied that it was very curious that the king and he should both have the same private mark on their property. The man was acquitted, and this led to the passing of a law that persons in possession of stores or goods of any kind marked with the broad arrow shall forfeit all such goods, with £200 and costs.

Broad'cast, in agriculture, is a method of sowing seeds by casting or scattering them abroad, so as to distribute them evenly over the entire surface of the soil, instead of planting them in drills or rows. The operation of sowing broadcast is generally performed by the hand of a man, who carries the seeds in a bag or basket. Clover and timothy seeds are usually sown in this method. In the U. S., wheat, barley, and oats are often sown broadcast.

Broad'cloth, a woollen fabric about four and a half feet wide, extensively used for coats. The best quality of this article is manufactured in France, Germany, and England.

Broad'dus (Rev. ANDREW), D. D., born in Caroline co., Va., Nov. 4, 1770, died Dec. 1, 1848. The "Dover Selection" of hymns and the "Virginia Collection," compiled by him, were long popular in several States; and he "was commonly regarded as the most eloquent preacher ever known in Virginia." A rare timidity led him to decline the pastorate of leading Baptist churches in Boston, New York, Philadelphia, and various Southern cities, and he lived and died a country pastor. Some of his sermons, with a memoir by J. B. JETER, D. D., were published in New York in 1852.

Broad Mountain, a high ridge in the anthracite coal-region of Pennsylvania, in Carbon and Schuylkill cos. It has an altitude of about 2000 feet above the sea, and is nearly 50 miles long. Its direction is nearly N. E. and S. W. The Mine Hill R. R. crosses this mountain.

Broad River of the U. S. rises at the foot of the Blue Ridge, in the W. part of North Carolina. Having entered South Carolina, it flows in a S. S. E. direction through fertile uplands, and unites with the Saluda at Columbia to form the Congaree. Total length, estimated at 150 miles.

Broad'side, in naval warfare, is the simultaneous discharge of all the guns on one side of a ship of war. The fighting power of a ship is sometimes estimated by the weight of her broadside. That of some British war-steamers amounts to 2400 pounds. In printing, a broadside is a sheet of paper containing one large page or printed on one side only.

Broad'sword, a sword with a broad blade, adapted for cutting, but not for stabbing. It is not sharp-pointed. The broadsword was especially used in Scotland.

Broad Top Mountain, Pennsylvania, is in the N. E. part of Bedford co. and the S. part of Huntingdon. It rises about 2500 feet above the level of the sea. Here are extensive beds of bituminous coal, for the transportation of which a railroad has been opened from this mountain to Huntingdon.

Broad'us (JOHN ALBERT), D. D., LL. D., born Jan. 24, 1827, in Culpeper co., Va., graduated at the University of Virginia in 1850, was assistant professor in that university in 1851–53, its chaplain in 1855–57, and pastor of the Baptist church in Charlottesville, Va. (the seat of the university), from 1851 to 1859, since which time he has been professor of the interpretation of the New Testament and of homiletics in the Southern Baptist Theological Seminary, Greenville, S. C. In 1870 he published an excellent "Treatise on the Preparation and Delivery of Sermons," which has passed through several editions, and was republished in London.

Brocade [It. *broccata*], a silk fabric variegated with gold and silver threads, or a silk fabric on which figures of flowers, foliage, or other objects are formed by the threads of the warp and woof being raised by the Jacquard loom or other means. Brocade bears nearly the same relation to silk textures as damask to linen fabrics.

Broc'chi (Giovanni Battista), an Italian naturalist, born at Bassano Feb. 18, 1772. He published, besides other works, "Sub-Apennine Fossil Conchology, with Geological Observations on the Apennines, etc." (2 vols., 1814). During a journey to Sennaar he died at Khartoom, on the Nile, Sept. 28, 1826.

Broc'coli, a highly-esteemed garden vegetable, a variety of the cabbage (*Brassica oleracea*). It has considerable resemblance to cauliflower, from which it differs by the purple or green color of its heads, and its greater hardness. It is propagated by sowing the seeds in the spring or in autumn, and transplanting the young plants once or twice. The leaves are often tinged with purple. There are several kinds of broccoli, some of which are preferred for sowing in early spring. Others are sown in autumn, and are ready for use in the ensuing spring.

Brock (Sir Isaac), a British general, born Oct. 6, 1769, who in 1812 captured General Hull and his army at Detroit. He was killed at the battle of Queenstown Oct. 13, 1812.

Brock'en, The, or **Blocks'berg** (anc. *Mons Bructerus*), a mountain of Prussia, in the province of Saxony, 20 miles W. S. W. of Halberstadt, is the highest summit of the Hartz Mountains, and is 3740 feet above the level of the sea. It is cultivated nearly to the top, which commands a fine view in clear weather. The Brocken is the cradle of many popular superstitions. It is, according to an ancient belief, the scene of the annual dance of the witches on Walpurgis Night (May 1st). This superstition, in all probability, owes its origin to the phenomenon known as "The Spectre of the Brocken," seen here and elsewhere, which is simply the reflection of the forms of men and other objects against the sky, the vapors of the atmosphere acting as a vast concave mirror; hence the objects reflected are seen greatly magnified.

The Spectre of the Brocken.

Brock'ett (Linus Pierpont), A. M., M. D., born Oct. 16, 1820, at Canton, Hartford co., Conn.. educated at Connecticut Literary Institution and Brown University, entering the latter in 1837. He studied medicine in New Haven, Conn., Washington, D. C., and New York City, and graduated as M. D. from Yale Medical College in 1843. After practising his profession for some years, he devoted himself to literary pursuits at Hartford, Conn., and from 1847 to 1857 was partner in a publishing-house in that city. Resuming literary labor in 1856, he has been since connected with several religious newspapers, was a large contributor to the "New American Cyclopædia," and had charge of several departments in the "American Annual Cyclopædia" from its beginning in 1862. In 1857, Amherst College conferred on him the honorary degree of A. M. He has published many works, among which the following are best known: "Geographical History of New York," 1847 (with J. H. Mather); "History of Education," 1859; "The National Almanac" for 1863; "History of the Civil War" (with S. M. Schmucker), 3 vols., and 1 vol. 8vo, 1866; "Our Great Captains," 1865; "Philanthropic Results of the Civil War," 1864; "Woman's Work in the Civil War," 1867; "Men of Our Day," 1868 (revised and mostly written anew, 1872; "Woman, her Rights, Wrongs, Privileges, and Responsibilities," 1869; "The Year of Battles, a History of the Franco-German War of 1870–71," 1871; and "Epidemic and Contagious Diseases: their History, Symptoms, and Treatment," 1873. He has also edited and largely rewritten "A Hundred Years' Progress of the U. S.," 1871–73; the American biographies of "Men of the Time," 8th ed., London, 1872; "Una and her Paupers," 1872: "The Thorough Business-Man: Life of Walter Powell," 1873; and has been a frequent contributor to magazine and review literature, etc. Among his latest works is "Our Western Empire" (1881).

Brock'haus (Friedrich Arnold), an eminent German publisher, born at Dortmund May 4, 1772. He was the founder of the firm of Brockhaus in Leipsic, and published six editions of the "Conversations-Lexikon." He was distinguished for his literary culture, enterprise, and patriotism. He became a citizen of Leipzic in 1817. Died Aug. 20, 1823.—Heinrich, a son of the preceding, was born at Amsterdam Feb. 4, 1804. He succeeded his father as proprietor of the publishing-house, and published new editions of the "Conversations-Lexikon."

Brock'port, Monroe co., N. Y. (see map of New York, ref. 4–D. for location of county), on R. R. and the Erie Canal, 17 miles W. of Rochester, is in the heart of a wealthy and populous farming country. A State normal school is located here; also harvester-works, mower and reaper works, Ithaca wheel-rake works, and other manufactories. Pop. in 1870, 2817; in 1880, 1971.

Brock'ton, city, on R. R., Plymouth co., Mass. (see map of Massachusetts, ref. 4–J, for location of county); incorporated as North Bridgewater in 1821, and in 1874 received its present name; is one of the first cities in the county for wealth and population, and is an important business-centre. The manufacture of boots and shoes is a leading industry; furniture, carriages, needles and shoe-tools, etc. are also manufactured. It has a public library. Pop. in 1870, 8007; in 1880, 13,608; in 1885, 20,783.

Brock'ville, a port of entry of Ontario, Canada, capital of the county of Leeds, on the St. Lawrence River and the Grand Trunk Railway, 125 miles by railway S. W. of Montreal and 75 miles by railway S. of Ottawa. Hardware, chemicals, white lead, gloves, farming tools, steam-engines, and machinery are manufactured here. It is the southern terminus of the Brockville and Ottawa Railway. It is connected by ferry with Morristown, N. Y. Pop. in 1881, including 4905 in Elizabethtown, 12,514.

Bro'derick (David Colbreth), an American Senator, was born at Washington, D. C., in 1818. Having removed to California in 1849, he was elected a Senator of the U. S. by the Democrats in 1856. He opposed the extension of slavery, and in 1858 ceased to act with the Democratic party. He was killed in a duel by Judge Terry, a political opponent, near San Francisco, Sept. 21, 1859.

Brod'head, Green co., Wis. (see map of Wisconsin, ref. 7–D, for location of county), beautifully situated on R. R. and Sugar River, 90 miles W. of Milwaukee, has a large graded school, a foundry, machine-shops, wagon and carriage factories, large flouring-mill, etc., and an extensive trade. The surrounding country is exceedingly fertile. Pop. in 1870, 1548; in 1880, 1254; in 1885, 1545.

Brod'head (John Romeyn), LL.D., an American historian, son of Rev. Dr. Jacob Brodhead, was born in Philadelphia Jan. 2, 1814, graduated at Rutgers College in 1831, and was admitted to the bar in New York City in 1835. After two years he began to devote himself to the study of American history. In 1839 he went to Holland as secretary of the U. S. legation at The Hague. In 1841 he was appointed by Governor Seward to search out and copy documents relating to the early history of New York. When he returned in 1844 he brought with him more than 5000 separate documents, which led Mr. Bancroft to say that "the ship in which he returned was more richly freighted with new materials for American history than any that had ever crossed the Atlantic." These documents were afterwards published in eleven quarto volumes. From 1846 to 1849 he was secretary of legation under Mr. Bancroft in London. From 1853 to 1857 he was naval officer of the port of New York, and in 1855 declined the appointment of consul-general to Japan. Years of patient labor were bestowed upon his "History of the State of New York," the first volume of which appeared in 1853, and the second in 1871. After two or three years of declining health, he died in New York City May 6, 1873. He was a high-toned Christian scholar and gentleman. As an historian he was scrupulously exact and fair.

Bro′die (Sir Benjamin Collins), D. C. L., F. R. S., an English surgeon, born in Wiltshire June 9, 1783, became in 1832 surgeon to William IV., and was created a baronet in 1834. Among his works are "Lectures on Local Nervous Affections" (1837) and "Psychological Inquiries as to the Mental Faculties" (1854). He received the Copley medal of the Royal Society in 1811 for his contributions to physiology. Died Oct. 21, 1862. (See his "Autobiography," 1865.)

Bro′dy, formerly called **Lubicz,** a trading town of Austria, in Galicia, is near the Russian frontier, 50 miles E. N. E. of Lemberg. It has an imperial chamber, a theatre, and a castle; also manufactures of linen and leather. The majority of its inhabitants are Jews. Pop. 20,071.

Broglie, de (Achille Léonce Victor Charles), Duc, a French statesman, was born in Paris Nov. 28, 1785. He married in 1816 the daughter of Madame de Staël. He was a friend of Guizot, and co-operated with him as a leader of the party called Doctrinaires. He was minister of foreign affairs from Oct., 1832, to April, 1834. In 1849 he was a conservative member of the Legislative Assembly. He was elected to the Academy in 1856. Died Jan. 26, 1870.

Broglie, de (Albert), Duc, a writer and diplomatist, a son of the preceding, was born June 15, 1821. He wrote, besides other works, "The Church and the Roman Empire in the Fourth Century" (2 vols., 1856), "La Souveraineté pontificale et la Liberté" (1861), and "La Liberté divine et la Liberté humaine" (1865). Having kept aloof from public life during the second empire, he was appointed minister to London by M. Thiers in Feb., 1871, and became minister of foreign affairs in the MacMahon administration in 1873–74, and minister of justice in 1877.

Broil′ing is a simple and expeditious mode of cooking pieces of meat, by laying them on a gridiron over a bright fire or on the coals themselves. Broiling is a quicker sort of roasting. The albumen of the outside being sealed up at once, the meat is rendered extremely nutritious.

Broken Bones. See Fracture.

Broken Bow, Neb. See Appendix.

Broken Breast. See Breast, Abscess of.

Broken Wind, a disease of the horse, the nature of which is not well understood, though it is characterized by difficulty in the act of expiration, the horse making a spasmodic effort to expel the air from the lungs. The symptoms are best observed when the horse is exercised, the breathing becoming labored, the nostrils dilated, the eyes bloodshot, showing imperfect purification of blood in the lungs. A broken-winded horse has a bad hollow cough. When the animal is oppressed by work, the pulse is excessively rapid and the heart beats energetically. From this circumstance it is regarded by some as a disease of the heart. Low-bred horses are especially liable to broken wind if fed on innutritious and bulky food, and at the same time kept at hard work. The treatment is unsatisfactory, and we can only hope for palliation by keeping the alimentary canal in order, administering occasional purgatives, and feeding on a proper quantity of the best oats, which should always be bruised; also allowing the best hay in spare quantities—ten to twelve pounds daily. The hay should be cut and wet. Fresh grass in its season is the proper food. Dusty hay and dry meal as food should especially be avoided.

Broker [Norman Fr. *broggour*], in general, a species of agent employed to act as a middleman or negotiator between distinct parties, such as buyer or seller, though this statement would not include a pawnbroker. He differs from a factor, since he does not have possession of the property with which he deals. He is in a certain sense the agent for both parties, though primarily of the party by whom he is employed. Accordingly, until he closes the negotiation he is the agent of the party who employs him. If he were employed to buy, he could not sell his own goods, but must buy of a third person, even though his engagement be gratuitous. Regularly, a broker discloses his agency on the face of the transaction; should he fail to do so, he would, by the general principles of the law of agency, make himself personally liable. When he has closed the negotiation, he usually gives to either party a memorandum of the transaction, and in the case of the sale of goods gives a "bought-and-sold note." For the purpose of complying with the rule of law requiring in certain sales a written memorandum, he is the agent of both parties. A broker is to be distinguished from an auctioneer; a broker may both sell and buy—an auctioneer only sells. A broker buys and sells at private sale—an auctioneer only sells at public sale. His compensation is usually derived from commissions upon the transaction, termed "brokerage." The commission is earned when the negotiation is completed. The real inquiry in such a case is, Did the broker's services result in bringing the buyer and seller together? If that be the case, he will be entitled to his commissions, though the contract, from subsequent causes, was not in fact carried out. On the other hand, if the negotiation failed at the time, and the parties were subsequently brought together by other means, his commissions would not be payable.

In the large cities brokers form a distinct class of persons, devoting themselves to special departments of agency, such as insurance-brokers, stock-brokers, real-estate brokers, produce-brokers, and the like. A person, however, may act as a broker in a single transaction without following the business, and be governed in the main by the rules already stated. (See Agent for the more general principles governing this subject.) T. W. Dwight.

Bro′mal, $C_2HBr_3O = C_2Br_3O.H$, a compound analogous to chloral, produced by the action of bromine on alcohol.

Brom′berg [Polish *Bydgoszcz*], a town of Prussia, in the province of Posen, on the river Brahe, about 6 miles from its junction with the Vistula, and 65 miles N. E. of Posen. It is on the railway from Berlin to Dantzic, and on the Bromberg Canal, which connects the Vistula with the Oder. It has a normal school and a gymnasium; also manufactures of linen and woollen fabrics, tobacco, Prussian blue, etc. Here are several distilleries, potteries, and breweries. Pop. in 1880, 34,064.

Brome Grass (*Bromus*), a genus of plants of the order Graminaceæ, with flowers in panicles, spikelets many-flowered, glumes unequal, membranaceous, the outer palet bifid at the extremity and awned beneath. It comprises numerous species, natives of both continents. The *Bromus mollis* grows well on poor soils, and is readily eaten by cattle, but is not much esteemed by farmers. The tall brome grass (*Bromus giganteus*), a native of Europe, grows nearly five feet high, and affords a large bulk of foliage, not much relished by cattle. The *Bromus secalinus*, commonly called chess or cheat, is a troublesome weed which infests grain-fields both in Europe and the U. S. In the latter it is a naturalized or *adventive* exotic. It resembles rye (*secale*) when it is young, hence the specific name *secalinus.* The seeds retain their power of germinating for years. This weed is so common in wheat-fields that many farmers believe that wheat will turn into chess.

Brome′lia, a genus of plants of the order Bromeliaceæ, named after the Swedish botanist Bromel, are natives of tropical America, though many have naturalized themselves in Asia and Africa. The fruit is succulent, and the leaves have spiny serratures on the margins. The genus comprises a number of species, the fibres of which are used for cordage, ropes, nets, etc. Among them are *Bromelia pigna,* which abounds in the Philippine Islands, and is cultivated for its fibre by the Chinese; and the *Bromelia pinguis* of the West Indies, from the fruit of which a vinous liquor is prepared.

Bromelia′ceæ, a natural order of endogenous plants, natives of tropical climates. (See Bromelia.) They have six stamens and a single style, with a 3-celled ovary. The leaves are hard, rigid, channeled, and often spiny. Some of the species have beautiful flowers. The order comprises more than 150 species, among which are the pineapple (*Ananas sativus*) and the *Tillandsia usneoides,* which is called Spanish moss or old man's beard. It grows in the Southern U. S. on forest trees, from the branches of which it hangs down in long gray threads. The fibre of this is used to stuff mattresses. Many of the species are epiphytic, growing on trees, and are capable of vegetating for a long time without contact with the earth, and will flower if suspended in the air after being severed from their roots. The leaves of some are so formed as to retain near their base a quantity of water, and thus supply travellers with refreshment. Many plants of this order afford valuable fibres, which are used in the fabrication of cordage, cloth, etc. The fibre of the leaves of *Ananas sativus* has been made into a fabric resembling white muslin.

Bro′mide, a chemical term applied to a salt formed by the combination of bromine with a metal. Several bromides, especially bromide of potassium, are used in medicine; others are used in photography.

Bro′mine, or **Bro′mium** [from Gr. βρῶμος, a "strong and fetid odor"], symbol Br, a chemical element discovered in 1826 by Balard. It resembles chlorine in chemical habitudes, and exists in minute quantity in sea-water and the ashes of marine plants. It is also found in many mineral springs, especially those of Kissingen, Kreuznach, and Arnstadt (13.6 grains per imperial gallon), in Germany, Tenbury in Worcestershire (12½ grains), Saratoga and Ballston, N. Y., and in many brines, especially those of Pennsylvania and West Virginia, and in the waters of the Dead Sea (121 grains). Bromine also occurs as a bromide of silver in the mines of Chili and other countries. It is usually extracted from the mother-liquors or bitterns of brines, or from the purification of rock salt and chloride of potassium by the agency of chlorine or of binoxide of manganese and sulphuric acid. Formerly, most of the bromine was obtained at Schœnebeck, Prussia; since the discovery of the Stassfurth deposits larger quantities (21,000 pounds per annum) have been made there. In the U. S. much bromine is made at Tarentum, Sligo, and Natrona, Pa., at Pomeroy, O., and Kanawha, West Va. The total product of these localities was estimated at 125,000 pounds for 1870. To obviate the danger attending the transportation of bromine, much of the bromine of Stassfurth is shipped as bromide of ethyl, from which it is easily set free.

Bromine is a dark reddish-brown liquid, having a powerful suffocating odor and emitting heavy red fumes. Its specific gravity is 2.976; it boils at 145.4° F., and freezes at 19.4°. It is very poisonous; is soluble in alcohol and ether, slightly so in water. Its equivalent is 80. It combines readily with metals; forms hydrobromic acid (HBr) with hydrogen, and with oxygen bromic acid ($HBrO_3$) and hypobromous acid ($HBrO$), all of which are analogous in their properties to the corresponding compounds of chlorine. Bromine possesses bleaching and disinfecting properties. It is used to a limited extent as a disinfectant, but its most important application is for the manufacture of bromide of potassium (KBr), which is used in medicine and in photography. Bromide of ammonium, cadmium, etc. are also prepared for the latter purpose. The high price of bromine is the chief obstacle to its more extensive use.

C. F. Chandler.

Bromley (Isaac H.). See Appendix.

Bro′moform, the ter-bromide of formyl ($CHBr_3$), a compound analogous to chloroform and iodoform. It is a heavy, volatile liquid.

Broms′grove, a market-town of England, in Worcestershire, 16 miles by rail S. W. of Birmingham, is in a richly-wooded valley on the Birmingham and Bristol Railway. It has a fine old church, and a grammar-school founded by Edward VI.; also manufactures of buttons and nails. Pop. in 1881, 12,813.

Bron′chi [plural of the Lat. *bronchus;* Gr. βρόγχος, the "windpipe"], sometimes called **Bron′chia** [Gr. τὰ βρόγχια], are the subdivisions of the trachea or windpipe. Opposite the third dorsal vertebra the latter divides into two branches or bronchi of similar structure to itself. (See Trachea.) Of these bronchi, one goes to each lung, the right being little more than an inch, the left, about two inches, in length. A foreign body entering the windpipe is more likely to fall into the right than into the left bronchus. On entering the lung, the bronchi divide into smaller branches, which again subdivide, until they terminate in small cells, which seem to cluster round their extremities and open into them. These are the air-vesicles. (See Lungs.)

Bronchi′tis [from *bronchus,* and *-itis,* a suffix denoting inflammation], a diseased condition characterized by inflammation or hyperæmia (congestion) of the mucous membrane lining the air-passages, and usually accompanied by a more or less excessive secretion of mucus from that membrane. Young children, old people, and those who are feeble or ill-nourished are especially liable to it. More or less bronchitis is usually associated with pulmonary consumption, with obstructive heart disease, and with asthma. It is often seen in patients with intermittent fever, typhoid, measles, and smallpox. Perhaps the most fruitful cause is exposure to sudden and extreme changes of the weather, leading primarily to that form of acute bronchitis which is known as a "cold on the lungs." Influenza is an epidemic bronchitis caused by some unknown influence probably existing in the air.

The symptoms of bronchitis are of various character, varying according as the disease is seated in the larger or the smaller bronchi; the disease is also much more formidable in young children and in aged persons than in others. There is especial danger in the case of infants that collapse of small portions of the lung may ensue. Bronchitis may be either chronic or acute. Uncomplicated chronic bronchitis may require the use of sedatives or tonics, with systematic exercise and careful attention to the other hygienic conditions, but the treatment of individual cases will vary with the circumstances and special condition of the patient. The inhalation of medicated vapors and atomized liquids is especially recommended in some cases. Acute bronchitis is in general to be treated by expectorants or emetics, to remove the secretion, and by diaphoretics and counter-irritants, such as mustard, on the extremities and the chest, to relieve the congested blood-vessels of the bronchi. When the case is extreme and suffocation threatened, an infant may be often relieved by a warm bath. There are other special remedial measures which may be resorted to under the advice of the physician.

The diagnosis of bronchitis may be somewhat obscure, but to the practitioner the stethoscope reveals the extent and character of the disease by signs which to the untrained observer might appear insignificant. It may be observed that, except in children and old persons, the great proportion of cases of acute bronchitis recover spontaneously.

Revised by Willard Parker.

Bronchocele. See Goitre.

Bröndsted (Peter Olaf). See Appendix.

Brongniart (Alexandre), an eminent French savant, born in Paris Feb. 5, 1770. He became in 1800 director of the porcelain manufactory at Sèvres. In 1815 he was admitted into the Institute. He wrote, besides other works, an "Elementary Treatise on Mineralogy" (1807) and a "Treatise on the Art of Pottery" (1845). He classified reptiles, to the divisions of which he gave the names of Saurians, Batrachians, Chelonians, and Ophidians. Died Oct. 14, 1847.

Bronson, on R. R., capital of Levy co., Fla. (see map of Florida, ref. 2–E, for location of county). Pop. in 1880, 381.

Bron′te, a town of Italy, in Sicily, in the province of Catania, near the W. base of Mount Etna, 28 miles N. N. W. of Catania. It has manufactures of paper and woollen goods. Pop. 11,760.

Bron′té (Charlotte), "Currer Bell," an English novelist, born at Thornton, in Yorkshire, April 21, 1816. Her eccentric father, Patrick Bronté, originally *Prunty,* became curate of Haworth (Yorkshire) in 1820. She lost her mother in 1821, and was sent to a boarding-school, where her health was impaired by impure air and unwholesome food, and then taught until in 1842 she and her sister Emily went to Brussels to learn French. In 1846, Charlotte and her sisters Emily and Anne published a volume entitled "Poems by Currer, Ellis, and Acton Bell." Her first successful work was "Jane Eyre, an Autobiography, edited by Currer Bell" (1847), which was very popular. Her other chief works are "Shirley" (1849) and "Villette" (1852). She was married in 1854 to the Rev. A. B. Nichols, her father's curate, and died Mar. 31, 1855. (See E. C. Gaskell, "Life of Charlotte Bronté," 2 vols., 1857, and another life of her by T. W. Reid, 1877.)

Brontotherium. See Titanotherium.

Bronze, an alloy of copper and tin in variable proportions, is harder and more fusible than copper, but less malleable. Bell-metal is a variety of bronze, and the cannon commonly called brass are made of this alloy. Bronze was used by the ancients for weapons and utensils before the art of working iron had been invented. The metal which the Romans called *æs* was probably bronze. The brass mentioned in the Bible is supposed to have been either pure copper or an alloy of copper and tin. Bronze is extensively used in the form of statues, machinery, and ordnance. Its hardness and durability render it well adapted for the speculums of telescopes. Bronze when well prepared is the most durable of metallic materials, except gold, platinum, and some rare metals. The French and English have recently issued bronze coins for currency. Tempering produces on bronze an effect directly opposite to that on steel; and in order to render bronze malleable it must be heated to redness and quenched in water. A mixture of 90 parts of copper with 10 of aluminium produces a valuable alloy which is used as a substitute for bronze. The varieties of bronze are composed of the following proportions: Bronze cannon, copper 9, tin 1; Chinese gongs, copper 5, tin 1; musical bells, copper 6, tin 1; house bells, copper 4, tin 1; large bells, copper 3, tin 1; bronze for toothed wheels, copper 10, tin 1; telescope or speculum metal, copper 2, tin 1; bronze for mathematical instruments, copper 12, tin 1.

Bronze, Age of. It is held by some archæologists that when primeval man first began to become civilized, the first weapons of war and utensils for industry were made of stone; that in the next stage of progress (in most nations before the beginning of history) there succeeded a time when copper and its alloys were used in the place of stone for many purposes, as is known to have been true among the Peruvians, and also among some of the ancient races of North America; and that in the third stage men learned how to smelt and work iron. Hence these three hypothetical stages are respectively termed the Age of Stone, the Age of Bronze, and the Age of Iron. These terms are convenient, though it is certain that the so-called ages interpenetrated and overlapped each other. In Denmark and Scandinavia especially there have been interesting and extensive collections made of the relics of the "Age of Bronze," and it appears certain that a large part of these curious weapons and tools (which are in many cases finely wrought) were made in pre-historic times; nevertheless there are many able men who deny that the facts, so far as known, sustain the above-mentioned theory of the origin of civilization.

Bronze Wing, or **Bronze Pigeon,** the name of several species of pigeons, natives of Australia, mostly belonging to the genus *Peristera* of Swainson. They have wings marked with lustrous bronze-colored plumage. The common bronze-wing (*Peristera chalcoptera*) is distributed over all the Australian colonies. It weighs about one pound, and is esteemed as food.

Bron'zing is the covering of articles made of clay, metal, wood, or other material with a substance which gives them the appearance of being made of bronze. Sometimes bronze or some other alloy of copper is actually spread upon the articles to be bronzed; which may be done by the electrotype process, or by applying the powdered alloy by means of *gold size,* which is a mixture of linseed oil and gum animê. There are also certain chemical reagents which when applied to various metals will give them a bronzed appearance.

Bronzite, a name which has been given to varieties of Enstatite and PYROXENE (which see).

Brooke (FRANCIS J.) was born at Smithfield, Va., Aug. 27, 1763, served as an officer in the Revolutionary war, became a lawyer in 1788, held various offices, was elected to the Virginia senate in 1800, and became its Speaker, and was for many years a judge of the court of appeals, of which he was for some time president. Died Mar. 3, 1851.—His son, FRANCIS J. BROOKE, an officer of the U. S. army, was killed at the battle of Okeechobee, Fla., Dec. 25, 1827.

Brooke (GUSTAVUS VAUGHAN), born in Dublin, Ireland, about 1818, was educated for the law, but went upon the stage in 1833, and attained eminence as a tragedian, playing with success in the principal cities of Great Britain and the U. S. He was lost on the steamer London while on a voyage to Australia, Jan. 11, 1866.

Brooke (HENRY), a dramatist and novelist, born in the county of Cavan, Ireland, in 1706, was a friend of Pope. He wrote, besides other works, "Universal Beauty," a poem, a novel called "The Fool of Quality" (1767), and tragedies entitled the "Earl of Essex" and "Gustavus Vasa." Died Oct. 10, 1783.

Brooke (Sir JAMES), rajah of Sarâwak, was born of English parents in Bengal April 29, 1803. He served in the British army in India, and having formed a project to suppress piracy in the Malay archipelago, went to Borneo in 1838. He rendered some service to the sultan of Borneo, who in 1841 appointed him governor of Sarâwak. He framed a code of laws for the natives of Sarâwak, and displayed great energy in the extirpation of pirates. He and his coadjutors received £20,000 as "head-money" for the pirates whom they killed. In 1847 he was created a knight by Queen Victoria. Died in England June 11, 1868.

Brook Farm, situated at Roxbury, Mass., was a socialistic establishment on the plan of Fourier, founded by some American gentlemen in 1844, but given up in 1846.

Brookfield, on R. R., Linn co., Mo. (see map of Missouri, ref. 2-F, for location of county), is the central station and division head-quarters of the road. Several of its offices, its round-house, and extensive shops are located here. There is a coal-mine near the town. Pop. in 1870, 402; in 1880, 2264.

Brookhaven, a city, capital of Lincoln co., Miss. (see map of Mississippi, ref. 8-F, for location of county), on R. R., 54 miles S. by W. of Jackson. It is an important point in the lumber trade and manufacture, and has a foundry and machine-shops, and a flourishing female college. Pop. in 1870, 1614; in 1880, 1615.

Brookings, on R. R., capital of Brookings co., Dak. (see map of Dakota, ref. 6-G, for location of county), has an agricultural college. Pop. not in census of 1880.

Brook'ite, a mineral named in honor of Brooke the crystallographer, is pure native titanic anhydride. It occurs in reddish, yellowish, or hair-brown crystals, which are more or less translucent and have a brilliant lustre, inclining to metallic. It is found in Perthshire, Scotland, at Tavistock, in Savoy, and other places. A variety found in the Ozark Mountains, Ark., is called *arkansite.*

Brook'lime (*Veronica Beccabunga*), a perennial plant, a native of Europe, grows in ditches and wet places. It has a procumbent stem and elliptical serrate leaves, which are succulent, and are used in England as an ingredient in spring salads. They are sometimes sold with water-cresses. In the U. S. is found a similar plant, the *Veronica Americana,* or American brooklime.

Brookline, R. R. junction, Norfolk co., Mass. (see map. of Massachusetts, ref. 5-I, for location of county), on the Charles River, which separates it from Boston and Cambridge. It is a place of residence for people doing business in Boston, and has many fine villas and country seats. A small part of this township has been annexed to Boston since the census of 1870. Brookline has a public library building costing $50,000, and a granite town-house costing $150,000. Pop. of township in 1870, 6650; in 1880, 8057; in 1885, 9195.

Brook'lyn, capital of Windham co., Conn. (see map of Connecticut, ref. 5-F, for location of county), is about 40 miles E. of Hartford and 2 miles W. of the Quinebaug River. Pop. of the township in 1870, 2354; in 1880, 2308.

Brooklyn, city, on R. R., Poweshiek co., Ia. (see map of Iowa, ref. 5-I, for location of county), 104 miles W. of Davenport. It has a large brick round-house, graded schools, several grain-elevators, and a flour-mill. Pop. in 1870, 971; in 1880, 1234.

Brooklyn, a city, seaport, and capital of Kings co., N. Y. (see map of New York, ref. 8-B, for location), situated at the W. end of Long Island, on New York Bay and the East River, an arm of the sea or estuary which divides it from New York City and connects Long Island Sound with the Atlantic Ocean. Brooklyn is the third city of the Union in population, 147 miles from Albany, and 226 miles from Washington. Its latitude (at the navy-yard) is 40° 51′ 30″ N., longitude 73° 59′ 30″ W. from Greenwich; area about 16,000 acres or 25 square miles.

The commerce of Brooklyn has mostly grown up since 1844, previous to which date it had only a small coasting trade. It has now over 25 miles of dockage, and $160,000,000 of private and corporate capital have been invested in docks and warehouses, beside a large amount expended by the U. S. government in its navy-yard and by the city and State in their docks and piers. In these warehouses are stored imported goods in bond amounting to $150,000,000 annually; flour, grain, provisions, cotton, refined sugar, molasses, glucose, petroleum, etc., for export or consumption, to the amount of more than $200,000,000 more; coal, ship-stores, lumber, bricks, and building materials, to the amount of $50,000,000 more, are stored on sheds and wharves in the upper part of the shore line, and the vast petroleum trade is partly within its limits. Here, too, are ship-yards, gas-works, lumber-yards, sugar-refineries, etc. Nearly 4000 vessels are unloaded every year at the Brooklyn docks. Brooklyn is one of the largest grain dépôts in the world. The boats engaged in the grain trade are valued at $20,000,000, and its elevators and warehouses have storage for 12,000,000 bushels at once. The grain and provision trade with Europe employs seven lines of steamships and a fleet of transient steamers and ships. Railway lines are now building and steam-ferries in progress by means of which the grain, provisions, sugar, petroleum, and other imports and exports will be brought from all points to the Brooklyn warehouses without breaking bulk, for shipment and distribution.

Manufactures.—The U. S. census of 1880 gives the value of the aggregate amount of the manufactures of the city as $177,223,142, not including those owned in and run from New York City. The largest of these is that of sugar and molasses, the annual product of which, from 11 establishments, was $59,711,168; petroleum-oil refining, $15,115,293, from 18 works; paints, lead, and zinc, 28 factories produced $8,442,938, and slaughtering and meat-packing, $8,010,492, from 28 establishments. Three other items—drugs and chemicals, carpentering, and bakery products—exceeded $5,000,000 in the amount of their products. There were in all 5201 manufactories in the city.

Finances.—Permanent and temporary debt, Dec., 1881, $38,174,421; tax levy, $6,316,073.28; valuation for 1881, $260,908,625; taxes collected to Dec., 1881, $5,150,621.16.

Courts.—A city court of three judges sitting in general and special sessions, six district justices, and one central court, supreme and county courts, together with U. S. circuit and district courts; a large city jail and county penitentiary.

City Institutions.—A fine city hall, a municipal building, the Kings co. court-house, U. S. court-rooms and post-office are grouped together. The city hospital is on Raymond st.; the truant home, county hospital, almshouse, and insane hospital are at Flatbush; the inebriates' home is at Bay Ridge.

Charitable Institutions, sustained mainly from private funds, are 6 hospitals and a seventh building, a maternity hospital, 6 homes for aged and infirm of both sexes, 5 orphan asylums, 2 nurseries, 7 general or special dispensaries, 3 diet dispensaries, a home for incurables, sanitariums, employment societies, a Good Samaritan home, private insane asylums, an asylum for feeble-minded children, etc.

Education.—In 1880 there were 59 public schools in Brooklyn—viz. 1 high school, 42 grammar schools, 4 primaries, 4 colored, 6 branch, and 2 truant schools, also 16 evening schools. Number of children of school age, 181,083; enrolled in public schools, 96,663; daily attendance, 52,893; number of teachers, 1397—48 men and 1349 women; teachers' wages, $740,365.61; value of schoolhouse sites and buildings, $4,943,552.52; whole amount expended for public schools in 1880, $1,162,894.82. Aside from these public schools, there were three incorporated schools of the highest order—the Polytechnic and Packer Institutes and the Adelphi Academy—many excellent seminaries and academies for both sexes, 1 university, 2 colleges, 1 medical college, 3 business colleges, 3 large and many smaller public libraries, aggegating over 200,000 volumes; museums of natural history, antiquities, and mechanical art; an academy of design, 2 art associations, etc.

The newspapers include 4 dailies, 5 weeklies, 2 monthlies, and many papers of irregular issue.

Churches.—There were in Brooklyn, in 1881, 285 churches and missions. The leading denominations are Roman Catholic, Methodist, Episcopal, Baptist, Presbyterian, Reformed (Dutch and German), Congregational, Lutheran, Universalist, Unitarian, Friends, Jews, Disciples, etc.

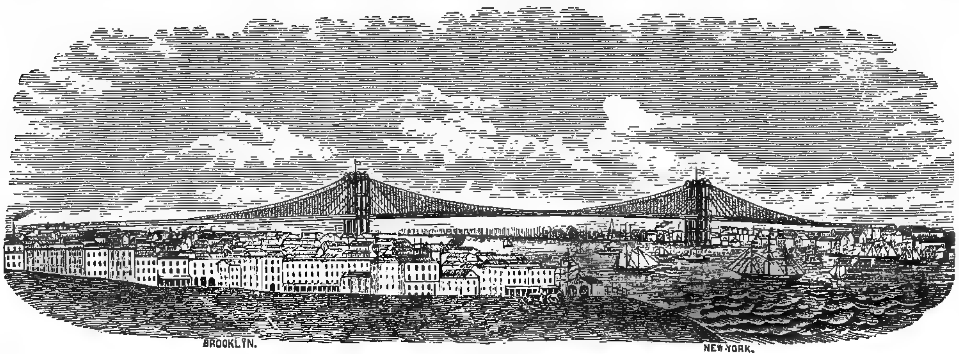
Principal Buildings.—The city hall, Kings co. court-house, the municipal building, academy of music, academy of design, Brooklyn Library buildings, Long Island Historical Society building, the Packer Collegiate Institution, Church Charity Foundation, the new Brooklyn orphan asylum, College of St. John the Baptist, the new Roman Catholic cathedral, church of the Holy Trinity, etc., Low's buildings, and the Phœnix and Continental fire insurance buildings, etc. A Federal building for post-office, etc., is in progress.

Parks and Cemeteries.—Prospect Park is of irregular figure, having an area of 522 acres, besides a parade-ground of 40 acres adjoining. It has two fine boulevards 200 feet wide, one extending to the sea, six miles distant, the other to East New York. Its grand old forest trees, fine landscapes and vistas, its lakes, bridges, and drives, are much admired. There are six or eight smaller parks, the most noted being Washington Park, where are entombed the remains of 11,000 of the martyrs of the prison-ships of the Revolution. Greenwood Cemetery, which has nearly 600 acres enclosed, is renowned for its beauty and the magnificence of its monuments. The Evergreens, enclosing 207 acres, is also an attractive cemetery.

Railways and Rapid-Transit Roads.—There are now more than forty R. R. routes having one or both termini in Brooklyn. Their whole extent exceeds 250 miles. Of these, sixteen are to be propelled partially or entirely by steam. There is one elevated R. R. in operation, and several others are projected.

Ferries.—There are 10 ferry companies with 19 ferries.

Brooklyn, or East River, Bridge is built on the suspension plan, and connects the cities of Brooklyn and New York. The plans and estimates for it were made under the direction of John A. Roebling, who was chief engineer of the work from its commencement till his death, in 1869. He was succeeded by his son, Washington A. Roebling, under whose direction it was completed. The bridge extends, with its approaches, from Sands street, Brooklyn, to City Hall Park, New York—5989 feet, or about 1⅛ miles. It has two granite towers 276⅔ feet high, situated on the shores. The size of these towers at high-water mark is 140 by 59 feet, and at the top 136 by 53 feet. The length of the river span is 1595½ feet. In each tower are two arches 33 ft. 9 in. wide for entrances to the bridge, which is supported by four large and many small cables, and by straight stays running each way from the top of each tower. The cables and suspended structure are of steel, and the floor Georgia pine. The bridge floor at the towers is 118 feet, and at the centre 135 feet, above high water. The cables are anchored 930 feet from the towers on each side; the granite anchorages, 119 × 132 feet at base, rise 90 feet above high water; weight, 60,000 tons each, which is used to resist the pull of the cables supporting the bridge. The four great cables which are each 3578 feet 6 inches long, are 15¾ inches in diameter, made of steel wire a little over ⅛ inch thick; each cable contains 5282 wires. The foundation was commenced Jan. 3. 1870, and the bridge completed in 1883, costing about $15,500,000, of which Brooklyn pays two-thirds and New York one-third. The bridge was formally opened and the event publicly celebrated May 24, 1883. It is 85 feet wide, and contains five parallel avenues, of an average width of 16 feet, separated by vertical lines of trussing, which project upward like fences; the outside avenues, nearly 19 feet wide, are for vehicles, the central one is for foot-passengers, and those adjoining that on each side are for R. R. cars, which are drawn by a stationary engine and an endless rope. The central avenue is 15½ feet wide, and is 12 feet higher than the other avenues, thus giving to foot-passengers an unobstructed view of the river. The weight of the entire suspended structure, central span, including cables, is 6740 tons, and the largest weight that can be crowded on it by freely moving passengers, vehicles, and cars is estimated at 1380 tons, which makes a total weight supported by the cables and stays of 8120 tons—viz. 6925 tons by the cables and 1195 tons by the stays. The pull on the cables from this load is about 11,700 tons, and their ultimate strength is 49,200 tons. The Brooklyn bridge is one of the mechanical wonders of the world. There is no single span that approaches in length that of this structure. (See BRIDGE and FOUNDATION.)



East River Bridge.

Water-Works.—Brooklyn is supplied with water from ponds and running streams on the south side of Long Island. The water is brought by a conduit to the great reservoir, into which it is pumped by four or five powerful engines. The present consumption averages 35,000,000 gallons a day. The cost of the water-works was $11,379,500; amount of water rates collected in 1880, $998,000.

Banks, etc.—There are 12 banks of discount (10 national), 15 savings banks, 1 trust company, 3 safe deposit companies, 7 gaslight companies, 2 electric light companies, etc.

Population.—In 1800, 3298; in 1850, 96,850; in 1860, 266,661; in 1870, 396,099; in 1880, 566,663.

History.—Brooklyn was named from Breuckelen ("marshy land"), in the province of Utrecht in Holland, 6 miles from the city of Utrecht, from which some of its earliest settlers came. The first step towards its settlement was the purchase from the Indians in 1636, by Willem Arianse Bennet and Jaques Bentyn, of a tract of 630 acres, lying at Gowanus, between Twenty-seventh street and the New Utrecht line; the second step, the purchase by Joris (George) Jansen de Rapalje of 325 acres at the Wallabout Bay, June 16, 1637.

At the time of the discovery of the Long Island shores in 1609 by Hendrik Hudson, several tribes or settlements occupied Long Island, one of which was at Canarsie, and another, the Mareckawick tribe, at Brooklyn, which, from the spot where they were located (sandy place or shore) at the Wallabout, gave the name *Mareckawick* to that locality. Brooklyn Heights, overlooking the East River, was called in the Indian dialect *Ihpetonga* (highlands). Families of these Indians were at New Utrecht and Gowanus in 1680, on the visit of the Labadists to those places in that year. The first ferry was established by license in 1642, running from Peck Slip to a point near the present Fulton ferry, from this period named "The Ferry." There were at that time five hamlets—"The Ferry;" "Breuckelyn," near present Hoyt on Fulton street, where stood the church; "Gowanus," around Gowanus Bay; "Bedford," inland; and "the Wallabout," around Wallabout Bay.

Immediately upon the establishment of the ferry in 1642, grants of building lots at that point began, and that locality, as well as the other hamlets, increased. The union of all the hamlets into one incorporated jurisdiction named Breuckelen took place in 1646, under Director-General Kieft. The Labadists, who crossed this ferry in Sept., 1679, speak of it as "a considerable thoroughfare," and say, "a considerable number of Indians live upon Long Island, who gain their subsistence by hunting and fishing; and they as well as others must carry their articles to market over this ferry, or boat themselves over, as it is free to every one to use his own boat if he have one, or to hire one for the purpose. The fare over the ferry is three stuivers in German (less than half a cent English) for each person."

In 1665, Breuckelen had attained the leading position among the towns in point of population and wealth, and was granted the privilege yearly of "a fayre and market near the ferry for all graine, cattle, or other produce of the country." Whatever the increase of population, it must have been very gradual, as (to skip a long period) the canvasser for the "New York and Brooklyn Directory" in 1796, passing up "the old road" (Fulton street), and down "New Ferry" (Main street), and through the intervening streets, gives but 125 names. The statistics of population, and the picture painted by Francis Guy of its condition up to 1820, also show that, up to this time, it held but the rank of an inconsiderable village, without institutions, commerce, or manufactures.

Over the spaces now occupied by Prospect Park, Washington Park, Greenwood Cemetery, Evergreen and Cypress Hills Cemeteries, was fought on the 27th of Aug., 1776, the important battle which has been properly designated "the battle of Brooklyn," the first great battle of the Revolution after the Declaration of Independence. The British army was under the command of Lord Howe, the Hessians under Gen. von Heister. Gen. Greene being ill, Gen. Putnam was in command of the American forces. The result is well known. An important pass was left unguarded in Howard's Hills, just beyond Bedford, by which the English troops gained the rear of the American army, and defeated it with heavy loss. Those who escaped within the lines were rescued by the masterly retreat effected by Gen. Washington on the 28th to New York by means of boats and under cover of a heavy fog, by which their movements were concealed.

The Brooklyn navy-yard was begun with the purchase by the U. S. government of 40 acres in 1801, which were converted into a navy-yard, and which was designated in 1824 by the secretary of the navy as one of the first-class navy-yards of the nation. It has since added largely to its domain by other valuable purchases, upon which are placed the U. S. hospital, a dry-dock, and costly buildings for the repair and construction of the largest vessels.

The War of 1812.—On Aug. 9, 1814, the patriotic citizens of Brooklyn and the surrounding country flocked to Fort Greene, and aided in rehabilitating that old fortification and following out the line of earthworks across the island, conformably to the plans of Gen. Joseph G. Swift, after whom one of the forts which cornered on Atlantic street (the "Cobble Hill Fort" of 1776) was named "Fort Swift." Every preparation was made to meet the dangers to which New York was liable from her exposed situation by sea and land. By these precautions or otherwise Brooklyn did not, as in the Revolution, bear the brunt of the first systematic strategic conflict.

The Civil War of 1861-65.—In this emergency the city of Brooklyn was not exceeded by any other city in raising regiments and supplying material aid. Her Sanitary Fair of Feb. 22, 1864, was extraordinary as an effort of local unity and successful effort, the pecuniary realization reaching the magnificent sum of $402,943.74.

The village charter of Brooklyn is dated April 12, 1816; the first city charter was passed April 8, 1834; the consolidation act uniting Williamsburg and Greenpoint with it passed April 17, 1854, and took effect Jan. 1, 1855. A new charter was granted by the legislature in 1873, and amended in 1880 and 1881. The township of New Lots was annexed to Brooklyn in 1886, and forms its twenty-sixth ward. Twenty-six aldermen compose the common council, but the mayor has vested in him the right, exclusive of the aldermen, to appoint the heads of departments, and is therefore responsible for the proper exercise of the executive powers. L. P. Brockett.

Brooks (Charles Shirley), an English journalist, lecturer, dramatist, and novelist, born in Oxfordshire in 1815. He produced the dramas "The Creole," "Our New Governess," etc. Among his novels are "Aspen Court" (1857), "The Silver Cord," and "Sooner or Later." He was for several years editor of "Punch." Died Feb. 23, 1874.

Brooks (Charles Timothy), a Unitarian minister and poet, born at Salem, Mass., June 20, 1813. He graduated at Harvard in 1832, and became in 1837 pastor at Newport, R. I. He was eminent as a translator of "Faust," "Hesperus," "Titan," and many small poems from the German. Died June 14, 1883.

Brooks (Elbridge Gerry), D. D., born at Dover, N. H., July 29, 1816, studied law (1833-35) with Chief-Justice Tenney of Maine, began preaching in 1836, was ordained over a Universalist church in West Amesbury, Mass., 1837, has been pastor in East Cambridge, Lowell, and Lynn, Mass., in Bath, Me., in New York City, and since 1868 in Philadelphia, Pa. He was general secretary of the Universalist General Convention (1867-68).

Brooks (Erastus), an American journalist, born at Portland, Me., Jan. 31, 1815. He graduated at Brown University, and became editor of the "N. Y. Express" in 1836. He was in New York legislature in 1853; candidate of American party for governor of New York in 1856; again in New York legislature in 1881.

Brooks (Horace), U. S. army, b. in Boston, Mass., was a son of Maria G. Brooks, the poetess. He graduated at West Point in 1835, and was assistant professor of mathematics there 1836-39; served with distinction in Florida, Mexico, and the civil war; colonel Fourth Artillery 1863; brevet brigadier-general 1865; retired Jan. 10, 1877.

Brooks (James) was born in Portland, Me., Nov. 10, 1810, and graduated at Waterville in 1831. He was educated by his own industry and self-denying efforts. He studied law with John Neal the novelist, taught school, and at the same time engaged in political journalism. When twenty-one years of age he was elected to the State legislature, and in the following year became a newspaper correspondent at Washington. He afterwards travelled in the South and in Europe. In 1836 he established the "New York Express." He was a member of Congress 1849-53, 1864-67, his seat being at last successfully contested by Hon. W. E. Dodge, and 1868-73. He died April 30, 1873.

Brooks (John), M. D., LL.D., born in Medford, Mass., May 31, 1752, practised medicine at Reading, fought with the greatest honor as an officer at Lexington, White Plains, Saratoga, Monmouth, etc., becoming a colonel and adjutant-general. He practised medicine at Medford, Mass., after the war, and held many important offices. He was governor of Massachusetts (1816-23), and president of the Massachusetts Medical Society (1817-25). Died Mar. 1, 1825.

Brooks (Kendall), D. D., born at Roxbury, Mass., Sept. 3, 1821, graduated at Brown University 1841, Newton Theological Institute 1845, tutor in Columbian College 1841-43, pastor of the Baptist church at Eastport, Me., 1845-52, professor of mathematics and natural philosophy in Waterville College 1852-55, pastor at Fitchburg, Mass., 1855-65, editor of the "National Baptist," Philadelphia, 1865-68, and president of Kalamazoo College, Mich., 1868-86.

Brooks (Maria Gowen), a poetess, born at Medford, Mass., about 1795. She was married young to a Mr. Brooks, a merchant of Boston. Her chief work is "Zophiel, or the Bride of Seven" (1825), which was praised by the poet Southey, who called her Maria del Occidente ("Maria of the West"). She died at Matanzas Nov. 11, 1845.

Brooks (Nathan Covington), LL.D., an American scholar, born in Cecil co., Md., Aug. 12, 1809, became president of the Baltimore Female College in 1848. He has published a number of poems and a popular "History of the Mexican War," besides numerous school-books.

Brooks (Peter Chardon), born in North Yarmouth, Me., Jan. 6, 1767. He engaged in marine insurance in Boston, and attained great wealth. He held many public offices of trust. Edward Everett, Charles Francis Adams, and N. L. Frothingham, D. D., were sons-in-law of Mr. Brooks. Died Jan. 1, 1849.

Brooks (Rev. Phillips), D. D. an eloquent American divine, born in Boston Dec 13, 1835, and graduated at Harvard in 1855. He studied in the Epis. Theological Seminary at Alexandria, Va., was ordained in 1859, became the same year pastor of the Church of the Advent in Philadelphia, and in 1862 of the Church of the Holy Trinity, where he remained until 1870, when he accepted the pastoral charge of Trinity church in Boston. In 1886 he was elected in Philadelphia assistant bishop of P. E. Church, but declined the office.

Brooks (Preston S.), a politician, born in Edgefield co., S. C., Aug. 4, 1819, graduated at South Carolina College in 1839. He was elected a member of Congress in 1853 and 1855. He violently assaulted Senator Sumner (for words spoken in debate) in the Senate chamber in May, 1856. He was censured by the majority of the Representatives, and resigned his seat, but was re-elected. Died Jan. 27, 1857.

Brooks (William Keith), Ph. D. See Appendix.

Brooks (William T. H.), an American officer, born in Ohio in 1821, graduated at West Point in 1841, major Eighteenth Infantry Mar. 12, 1862, and Sept. 28, 1861, brigadier-general U. S. volunteers. He served in the Florida war 1841–42, on frontier duty 1843–45, in the military occupation of Texas 1845–46, in the war with Mexico 1846–48, was engaged at Palo Alto, Resaca de la Palma, Monterey (brevet captain), Vera Cruz, Cerro Gordo, Contreras, Churubusco (brevet major), and the city of Mexico, as aide-de-camp to Brevet Major-general Twiggs 1848–51, in active operations in New Mexico in 1858, and engaged in several skirmishes against Navajos. In the civil war he served in the Virginia Peninsula campaign 1862, engaged at Yorktown, Golden's Farm, Savage Station (wounded), and Glendale, in the Maryland campaign 1862, engaged at Crampton Pass and Antietam (wounded), and commanding division in the Rappahannock campaign 1862–63, in command of the department of the Monongahela 1863–64, when Pittsburg was threatened by a raid, in command of the Tenth Corps before Richmond 1864, engaged at Swift's Creek, Drury's Bluff, Bermuda Hundred, Cold Harbor, and the siege of Petersburg. Failing health from exposure and wounds caused him to resign from the army July 14, 1864, and in 1866 he retired to a farm in Huntsville, Ala., where he resided till his death, July 19, 1870. George W. Cullum.

Brooksville, cap. of Hernando co., Fla. (see map of Florida, ref. 3–E, for location of county). Pop. not in census.

Brookville, on R. R., capital of Franklin co., Ind. (see map of Indiana, ref. 8–G, for location of county). It has great water-power, paper-mills, flouring-mills, etc., and contains Brookville College. Pop. in 1880, 1813.

Brookville, cap. of Bracken co., Ky. (see map of Kentucky, ref. 2–I, for location of county). Pop. in 1880, 378.

Brookville, capital of Jefferson co., Pa., on R. R. and Red Bank Creek (see map of Pennsylvania, ref. 3–C, for location of county). Pop. in 1870, 1942; in 1880, 2136.

Broom, a name given to several shrubs of the order Leguminosæ. They belong to the allied genera of *Spartium, Genista,* and *Cytisus.* The common broom of Europe (*Cytisus Scoparius*) grows on dry and sandy soils and heaths, and bears handsome yellow flowers. The branches, which are very tough and angular, are used for making brooms. The young tops and seeds, being strongly diuretic, are used in medicine, and are beneficial in dropsy. All kinds of broom have long, slender branches. The Spanish broom (*Spartium junceum*) grows wild in the south of Europe, and possesses medical properties like the common broom. The fibre of its branchlets is used in Italy and Spain for making cloths and ropes. The *Cytisus albus,* or white broom, also a native of Europe, is cultivated in England as an ornamental shrub, and bears white flowers which are much admired. It sometimes attains a height of fifteen feet or more. The broom (Fr. *genêt*) gave name to the royal family of Plantagenet, one of its ancestors having the broom for his crest.

Broom Corn (*Sorghum vulgare*), a plant of the order Graminaceæ, is a native of the East Indies, and is cultivated in the U. S. It has a jointed stem, which grows to the height of eight or ten feet, and bears spikelets, two and three together, on the ramifications of an open panicle. Only the middle or terminal one of these is fertile; stamens three. The panicle is extensively used in the manufacture of brooms, and the seeds are valuable as food for domestic animals. It is stated that this plant was first introduced into the U. S. by Dr. Franklin, who, finding a seed on a whisk that had been imported, planted it and propagated it. It succeeds best in alluvial soils, but will generally produce a fair crop on any land that is adapted to maize. Broom corn is largely cultivated by the Shakers, who make brooms of a good quality. It is planted in rows about three feet apart, and in hills about eighteen inches apart. The weeds are removed from the growing crop by the cultivator or the hoe. The average produce of an acre is about 500 pounds of the brush or material for brooms. The usual practice in harvesting is to bend the stalks about three feet from the ground, leave them for a few days to dry, and then cut them six or eight inches below the brush or panicle.

Broome (John L.), U. S. M. C., born Mar. 8, 1824, in the State of New York, was appointed a second lieutenant in the marine corps Jan. 12, 1848, became a first lieutenant in 1857, a captain in 1861, and a major in 1864. He served with the marine battalion in Mexico during the Mexican war. While in command of the marine guard of the Hartford during 1862 and 1863 he participated in the attack on Forts St. Philip and Jackson and capture of New Orleans, and in all the many actions of that famous vessel in the waters of the Mississippi. In his official report of the action of June 28, 1862, with the Vicksburg batteries, Commander Richard Wainwright writes: "The marine guard, under the command of Captain J. L. Broome, had charge of two broadside guns, and fought them well, thus sustaining the reputation of that distinguished corps." At the close of the war, Captain Broome, who had been twice wounded, received the brevets of major and lieutenant-colonel "for gallant and meritorious conduct." He was lieutenant-colonel in 1883. Foxhall A. Parker.

Bross (William). See Appendix.

Brough (John), born in Marietta, O., Sept. 17, 1811, was a printer in his youth, and studied at Ohio University. He edited several political journals, became a powerful Democratic orator, and held important public offices. In 1846 he became a lawyer. In 1848 he left political life for a time and became a railroad president. In 1864 he became governor of Ohio, receiving the joint vote of all parties who were in favor of prosecuting the war against the insurgent States. Died at Cleveland Aug. 29, 1865.

Brough'am (Henry), Lord, an eminent and learned British orator, lawyer, and writer, was born in Edinburgh Sept. 19, 1779. His mother was a niece of Dr. Robertson, the historian. He graduated in the University of Edinburgh, studied law, and was admitted to the Scottish bar in 1800. He was intimate with Francis Jeffrey and Sydney Smith, whom he aided in founding the "Edinburgh Review" in 1802, and he continued to contribute to that review for many years. In 1808 he removed to London, was called to the English bar, and chose the common-law courts as the scene of his practice. He became a Whig member of Parliament in 1810, and soon acquired a high reputation as a debater as well as a forensic pleader. He was considered at that period the most powerful speaker in the House of Commons except Canning, who was his political opponent. As a parliamentary orator he was distinguished for vehemence and energy, and the rather free use of sarcasm and invective. He represented Winchelsea from 1816 to 1830. Among his famous performances as an advocate was his defence of Queen Caroline (1821), by which he gained great popularity. In 1819 he married Miss Eden, a daughter of Thomas Eden and niece of Lord Auckland. He distinguished himself as a promoter of popular education, as a reformer of laws, and a friend of political reform and progress. In 1825 he published "Practical Observations on the Education of the People." He took a prominent part in founding the Society for the Diffusion of Useful Knowledge, of which he became in 1827 the first chairman. In a great speech which he delivered in 1827 he enumerated the defects in nearly every branch of English law, and made proposals for dealing with law reform on a proper scale. He made a powerful speech against slavery in 1830, soon after which he was returned to Parliament by the great popular constituency of Yorkshire. In the same year he was appointed lord chancellor in the new Whig ministry, and was raised to the peerage as Baron Brougham and Vaux. He retired from office with his colleagues in Nov., 1834, after which he ceased to act with the Whigs, without joining any other party, but pursued an independent political course.

Having cultivated various sciences with success, and written many and various works, he was chosen a foreign associate of the French Institute in 1833. Among his writings are a "Treatise on the Objects, Advantages, and Pleasures of Science;" "Sketches of Statesmen of the Time of George III." (3 vols., 1839–43); "Political Philosophy" (3 vols., 1840–44); and "Contributions to the 'Edinburgh

Review,' Political, Historical, and Miscellaneous" (3 vols., 1857). He had only two children, who died before their father. He died at Cannes, in France, May 9, 1868. He had published an edition of his collected works in 10 vols., 1857. (See Lord Campbell, "Life of Lord Brougham," 1869; "Quarterly Review" for April, 1859; "Edinburgh Review" for April, 1858.) William Jacobs.

Brougham (John), born at Dublin, Ireland, May 9, 1810, was educated to be a surgeon, but reverses of fortune, affecting his family, led to a change of plan, and he entered the stage at the Tottenham Theatre, London, in 1830. Afterward he was engaged by Madame Vestris to act in her stock company at the London Olympic Theatre. His first dramatic composition was a burlesque, written for Mr. William E. Burton. It succeeded, and he wrote many similar pieces of a light description. Madame Vestris, having been wedded by Mr. Charles Mathews, removed from the Olympic to Covent Garden, and Brougham acted for a while at that theatre. It was at this period that he wrote, in conjunction with Mr. Dion Boucicault, the comedy of "London Assurance." A little later he undertook the management of the London Lyceum during several seasons, and for this stage he wrote "Life in the Clouds," "Love's Livery," "Enthusiasm," "Tom Thumb the Second," and "The Demon Gift."

In 1842, Brougham came to America, acted at the Park Theatre, and made a professional tour of the theatrical cities of America. He then settled down as a member of the stock company of Burton's Theatre, New York. Here he wrote "Bunsby's Wedding," "The Confidence Man," "Don Cæsar de Bassoon," "Vanity Fair," "The Irish Yankee," "Benjamin Franklin," "All's Fair in Love," "The Irish Emigrant," and a dramatization of "Dombey & Son." He then undertook the management of Niblo's Garden, and wrote a fairy play called "Home," and "Ambrose Germain." On Dec. 23, 1850, he opened Brougham's Lyceum, which afterward became Wallack's Theatre. Brougham did not keep it long, but while there he wrote "The World's Fair," "Faustus," "The Spirit of Air," "Row at the Lyceum," a dramatization of "David Copperfield," and a new version of "The Actress of Padua." His next venture was made at the Old Bowery Theatre (1856–57), where he produced "The Pirates of the Mississippi," "The Red Mask," "Tom and Jerry in America," "The Miller of New Jersey," and other dramas of a common sort, but profitable. Then he accepted an engagement at Wallack's Theatre, and while there he wrote "The Game of Love," a version of "Bleak House," "My Cousin German," "A Decided Case," "The Game of Life," "Pocahontas," "Neptune's Defeat," "Love and Murder," "Romance and Reality," "The Ruling Passion," and "Playing with Fire." A little later he left Wallack's and rejoined Burton at the Metropolitan Theatre, and here he produced his burlesque of "Columbus."

In 1861–62, Brougham went to London, where he remained upwards of four years. During this time he wrote "The Duke's Motto" and "Bel Demonio," dramatic versions of two novels by Miss M. E. Braddon called "Lady Audley's Secret" and "Only a Clod."

Brougham started in New York a comic paper called "The Lantern," and he was the author of two volumes of miscellaneous writings, entitled "A Basket of Chips" and "The Bunsby Papers." He was separated from his first wife in 1845. His second wife, Miss Nelson, whom he wedded in 1847, died in 1870. He latterly acted at Wallack's Theatre, at Daly's Grand Opera-house, and miscellaneously at provincial theatres. D. at New York June 7, 1880. William Winter, *of the "N. Y. Tribune."*

Broussa. See Brusa.

Broussais (François Joseph Victor), born at Saint-Malo, in the department of Ille-et-Vilaine, France, Dec. 17, 1772; was educated in the public school of Dinan and under the supervision of his father, who was a country physician. On the outbreak of the Revolution he joined the army as a volunteer, but was discharged on account of sickness; studied medicine; obtained a commission as surgeon, first on a ship of war, afterward at Brest; and went in 1799 to Paris to pursue a regular course of medicine. In 1804 he was appointed military surgeon to the camp of Boulogne, and accompanied this division of the French army till 1808. After the publication in that year of his "Histoire des Phlegmasies chroniques," he was made chief physician to one of the divisions of the French army in Spain, and remained there till 1814. After the end of the war he was made assistant professor at the military hospital of the Val de Grâce in Paris; published in 1816 "Examen de doctrine médicale généralement adoptée;" in 1824, "Traité de la physiologie appliquée à la pathologie;" in 1829, "Commentaires des propositions de pathologie consignés dans l'examen;" in 1832, "Le cholera morbus épidémique;" and was in the same year appointed professor of general pathology in the Academy of Medicine, which office he held till his death, Nov. 17, 1838. He was the founder of the physiological system of medicine; and although his ideas did not attract much on their first appearance, he nevertheless succeeded in gathering large audiences of enthusiastic pupils around his chair in the Val de Grâce, and he finally overthrew the so-called ontological system of medicine, represented by Pinel. His own success, however, was somewhat ephemeral also, and he lived to see the physiological system itself superseded. His last work, "Cours de phrénologie," attracted only a passing attention.

Brousson (Claude), born at Nîmes, France, in 1647; studied law, and was a celebrated advocate in Toulouse when the persecutions began against the Huguenots, to whose sect he belonged. After the Revocation of the Edict of Nantes in 1685, when the churches of the Huguenots were closed, their synods interdicted, their ministers exiled, and their devotional books burnt, Brousson assembled from time to time his co-religionists in his house and endeavored to uphold their courage and strengthen their power of resistance. These reunions caused finally a popular outbreak in Toulouse, and Brousson was compelled to flee to Switzerland. Here he was consecrated to the ministry, and although the governor of the province of Languedoc put a price of 10,000 livres on his head, he returned to France, and lived up to 1693 as an itinerant priest in the Cevennes, where he preached in the caves and crags to those who from the surrounding country gathered around him, forming the famous *assemblées du désert.* After a short residence in the Netherlands, he re-entered France by the way of the Jura Mountains, and began once more to preach in the Cevennes, but was caught, brought to Montpellier, tried on a charge of co-operating with Count Schomberg in a scheme of invading France, and broken on the wheel Nov. 4, 1698. His influence, both as a preacher and a writer, was very great, and he is considered one of the martyrs of the French Reformed Church. He wrote "L'état des réformés de France" (3 vols., the Hague, 1684); "Lettres au clergé de France" (1685); "Lettres des Protestants de France à toutes les autres Protestants de l'Europe" (Berlin, 1688); "Lettres au Catholiques romains" (1689); "Relation sommaire des merveilles que Dieu fait en France dans les Cévennes" (1694); "La manne mystique du désert" (published in 1695 by the synod of Haarlem), etc.

Broussone'tia, a genus of trees allied to the mulberry, comprises the paper mulberry (*Broussonetia papyrifera*), the fibrous bark of which is used by the Chinese and Japanese in the manufacture of paper. It is a small tree with deciduous leaves of variable shape. It is planted as a shade tree in some American cities.

Brown [Fr. *brun*], in painting, a dark dusky color, inclined to red, of various degrees of depth. It belongs to the tertiary colors known as russets and olives, in which the hue is modified by an admixture of black or a dark pigment. Among the brown pigments are bistre, umber, raw and burnt sienna, and brown madder.

Brown (Aaron V.), an American statesman, born in Brunswick co., Va., Aug. 15, 1795, graduated at Chapel Hill in 1814, removed to Tenn. in 1815; member of Congress 1839–45, and was elected gov. of the State in 1845. He became postmaster-general of the U. S. in 1857. D. in 1859.

Brown (Albert G.), born in Chester district, S. C., May 31, 1813, was chosen governor of Mississippi in 1843, and elected to the U. S. Senate in 1853. He was re-elected in 1858 for six years, but withdrew from the Senate in 1861. D. June 12, 1880.

Brown (Benjamin Gratz), born in Lexington, Ky., May 28, 1826, graduated at Yale in 1847. He commenced the practice of law at St. Louis, Mo., was a member of the State legislature (1852–58), and edited the Missouri "Democrat" (1854–59). On the breaking out of the war in 1861, he raised a regiment and fought on the side of the Union. He afterwards commanded a brigade of militia. He was among the most active and influential in procuring the adoption of the ordinance of freedom in 1864 by the State of Missouri. He was U. S. Senator in 1863–67, and was made governor of Missouri in 1871. He was nominated at the Cincinnati Convention, May, 1872, for the office of Vice-President of the U. S., the Hon. Horace Greeley being the nominee for President. Died Dec. 13, 1885.

Brown (Chad) went from Massachusetts to Rhode Island in 1636, on account of his religious opinions, and in 1642 became one of the elders of the Baptist church at Providence. He was the ancestor of many distinguished citizens. Died in 1665.

Brown (Charles Brockden), an American novelist, born at Philadelphia Jan. 17, 1771. He published "Wieland" (1798), "Ormond, or the Secret Witness" (1799), and "Arthur Mervyn" (1800). He founded in 1803 "The Literary Magazine and American Register," which he edited for nearly five years. His mind was remarkable for ingenuity and imagination. Among his other works are "Clara Howard" (1801) and "Jane Talbot" (1804). He married a Miss Linn in 1804, and died Feb. 22, 1810. "His peculiar merits," says Prescott, "appeal to a higher order of criticism than is to be found in ordinary and superficial readers." (See Prescott, "Life of C. B. Brown," in Sparks's "American Biography," vol. i.; W. Dunlap's "Life of Charles B. Brown," prefixed to an edition of his works, 1827.)

Brown (David Paul), a distinguished American lawyer, born in Philadelphia in 1795. He published in 1856 "The Forum, or Forty Years' Full Practice at the Philadelphia Bar," besides several dramatic and other works. Died July 11, 1872.

Brown (Francis), D. D., was born at Chester, N. H., Jan. 11, 1784, graduated at Dartmouth College in 1805, was tutor from 1806 to 1809, was settled over the Congregational church in North Yarmouth, Me., in 1810, and was chosen president of his alma mater in 1815. It was during his presidency that the famous Dartmouth College case was carried up to the U. S. Supreme Court. Jeremiah Mason and Daniel Webster admired the ability with which he served them in their management of the case. Rufus Choate, one of his pupils, speaks in the highest terms of his genius, character, and culture. Died July 27, 1820.—His grandson, Francis Brown, was born at Hanover, N. H., Dec. 26, 1849; graduated at Dartmouth College in 1870, and was tutor there from 1872 to 1874; graduated at the Union Theological Seminary in 1877; spent two years in Germany; in 1879 was appointed instructor, and in 1881 associate professor in biblical philology, in the Union Theological Seminary, New York.

Brown (George), U. S. N., born June 19, 1835, in Indiana, entered the navy as a midshipman Feb. 5, 1849, became a passed midshipman in 1855, a lieutenant in 1856, and a commander in 1866. He was in command of Admiral Porter's flag-ship, the Octorora, at the attack on Vicksburg, June 28, 1862, and is thus commended by the admiral in his official report of that battle: "The officers and crew of the Octorora behaved like veterans; and I am much indebted to that excellent officer, Lieutenant George Brown, for the drill of the crew and the perfect arrangements made for going into action." On the night of Feb. 24, 1863, Brown, in the steamer Indianola, defended his vessel for an hour and twenty-seven minutes against the rams Queen of the West and William H. Webb, and two large "cotton-clads," surrendering the Indianola only when she was "fast filling with water." He commanded the steamer Itasca at the battle of Mobile Bay Aug. 5, 1864, and during the subsequent operations against the defences of Mobile; became captain 1877, and was lighthouse inspector 1881–84.

Brown (George L.), an eminent American landscape-painter, born in Boston in 1814. Among his masterpieces are a view in the White Mountains entitled "The Crown of New England," and "New York Harbor" (both in possession of the prince of Wales).

Brown (Goold), an American grammarian and teacher, born in Providence, R. I., Mar. 7, 1791. He published "Institutes of English Grammar" (1823) and "Grammar of English Grammars" (1850). Died Mar. 31, 1857.

Brown (Harvey), an American officer, born in 1795 at Rahway, N. J., graduated at West Point in 1818, colonel Fifth Artillery May 5, 1861. He served chiefly at seaboard posts 1818–61, as aide-de-camp to Maj.-Gen. Brown 1824–25, on quartermaster duty 1826–29, in the Black Hawk expedition 1832, in the Florida war 1836–38; engaged at Wahoo Swamp, suppressing Canada border disturbances 1839–41, in the war with Mexico 1846–48; engaged at Monterey, Vera Cruz, Cerro Gordo, Contreras (brevet lieutenant-colonel), Molino del Rey, and the City of Mexico (brevet colonel), on recruiting service 1848–52, being superintendent 1851–52, in Florida hostilities 1852–53, in command of the artillery school for practice 1857–58, and inspector of artillery 1859–60. In the civil war he was engaged in the defence of Fort Pickens, Fla., 1861–62 (brevet brigadier-general), and as military commander of the city of New York Jan. 15–July 16, 1863, suppressed the draft riots (brevet major-general). Retired from active service Aug. 1, 1863. Died at Clifton, Staten Island, N. Y., Mar. 31, 1874. George W. Cullum.

Brown (Henry Kirke), an American sculptor and painter, born at Leyden, Mass., in 1814. Among his best works are the equestrian statue of Washington in Union Square, New York, a colossal statue of Governor Clinton at Greenwood Cemetery, the "Angel of the Resurrection," also at Greenwood, and a colossal equestrian statue of Gen. Winfield Scott. His statue of Gov. Clinton at Washington is perhaps the finest. He was also a painter of no mean ability. Died July 10, 1886.

Brown (Jacob), born in Bucks co., Pa., May 9, 1775, removed to New York in 1798. He joined the army in 1812, and defended Sackett's Harbor in 1813. Having been raised to the rank of major-general, he invaded Canada in the spring of 1814, and commanded with success at Chippewa and Niagara Falls in July of that year. He became commander-in-chief of the U. S. army in 1821. Died Feb. 24, 1828.

Brown (James), born near Staunton, Va., Sept. 11, 1766, graduated at William and Mary College, became an eminent lawyer of Kentucky and Louisiana, representing the latter State in the U. S. Senate (1812–17 and 1819–24), and was minister to France 1824–29. Died April 7, 1835. He was one of the compilers of the Louisiana code.

Brown (John), a Scottish religious writer, was born in Perthshire in 1722. He preached at Haddington, and had a high reputation for piety and learning. It is stated that he knew nine languages. Among his works are a "Dictionary of the Bible" (1769), and a "Self-Interpreting Bible" (1778). Died June 19, 1787.

Brown (John), M. D., a Scottish physician, the author of the Brunonian system of medicine, was born at Dunse in 1735. He published in 1780 "Elementa Medicinæ," in which he propounded his new system. This was received with favor by many physicians. His favorite medicines were alcohol and opium. Died in London in 1788.

Brown (John), born in Providence, R. I., Jan. 27, 1736, became a partner with his three brothers in a mercantile firm. He was leader of the men who on the night of June 17, 1772, destroyed the "Gaspee" sloop-of-war, for which he was arrested and put in irons, but escaped. He supplied the troops around Boston with powder during the siege. He was a man of wealth, a liberal patron of Brown University, and a member of Congress from Rhode Island (1799–1801). Died Sept. 20, 1803.

Brown (John), a patriot, born in Sandisfield, Mass., Oct. 19, 1744, graduated at Yale in 1761. He became king's attorney in the New York colony, and afterwards practised law at Pittsfield, Mass. In 1774 and 1775 he operated for the cause of freedom in Canada, aided in the capture of Ticonderoga, took Fort Chambly, fought at Quebec, became a lieutenant-colonel, and in 1777 surprised the outposts at Ticonderoga, and made important captures. He left the service for a time from hostility to Arnold the traitor. He was killed by the Indians in the Mohawk Valley campaign Oct. 19, 1780.

Brown (John), a brother of Senator James Brown, was born at Staunton, Va., Sept. 12, 1757, served in the Revolutionary war, studied at Princeton and at William and Mary College, removed to Kentucky in 1782, was a member of Congress from Virginia (1787–88 and 1789–93), and U. S. Senator from Kentucky (1793–1805). Died Aug. 29, 1837.

Brown (John), M. D., a son of Rev. Dr. John Brown (1784–1858), a celebrated preacher, was born in Scotland Sept., 1810. He practised in Edinburgh, and published "Horæ Subsecivæ" (1858), containing the well-known "Our Dogs" and "Rab and his Friends." D. May 11, 1882.

Brown (John) **of Ossawatomie,** a zealous opponent of slavery, was born at Torrington, Conn., May 9, 1800. He removed to Ohio in early youth, and married and worked at the trade of a tanner. In 1855 he emigrated to Kansas, where he fought against the pro-slavery party, and lived at Ossawatomie. He was the master-spirit of the convention which met at Chatham, Canada, in May, 1859, and organized an invasion of Virginia in order to liberate the slaves. In July of that year he rented a farmhouse about six miles from Harper's Ferry. On the 16th of October, aided by about twenty friends, he surprised Harper's Ferry, and captured the arsenal and armory. He was wounded and taken prisoner by the Virginia militia on the next day, and was hanged at Charlestown Dec. 2, 1859. (See Redpath, "Life of Captain John Brown," 1860; "Life and Letters of John Brown," 1885.)

Brown (John A.) was a son of Alexander Brown, a banker of Baltimore. He was born in Ballymena, Ireland, May 21, 1788, came in youth to the U. S., and became manager of the Philadelphia branch of the great banking firm of Brown Brothers. He was eminent for upright dealing and benevolence. He presented $300,000 to the Presbyterian Hospital of Philadelphia. Died Dec. 21, 1872.

Brown (John G.), a painter, born in the north of England Nov. 11, 1831; settled at Brooklyn, N. Y., 1856–60; then in New York City. His portraits of children are greatly admired.

Brown (John Newton), D. D., a Baptist divine, born at New London, Conn., June 29, 1803, published in 1831 an "Encyclopedia of Religious Knowledge," and in 1834 "Memorials of Baptist Martyrs." Died May 15, 1868.

Brown (Joseph E.), a distinguished citizen of Georgia, was born in Pickens co., S. C., April 15, 1821. During his youth his father moved to Georgia. He was elected governor of that State for two years, and was re-elected four times. While he was in the executive chair he took a leading part in the secession movement in 1861. When the war was over he took a prominent part in support of the reconstruction measures of Congress. Under the new State constitution he became chief-justice of the supreme court in 1868, and supported Gen. Grant for President of the U. S. that year. He resigned his position in 1871 to assume the presidency of the Western and Atlantic R. R. Company. He supported Mr. Greeley for President in 1872. He was appointed in May, 1880, U. S. Senator from Georgia, in place of John B. Gordon, who resigned. Mr. Brown was re-elected Nov. 18, 1884.

Brown (Mason), LL.D., father of B. Gratz Brown, was born in Philadelphia Nov. 10, 1799, graduated at Yale in 1820, was judge of a Ky. circuit court for many years, and sec. of state of Ky. (1855–59). He was one of the authors of "Morehead and Brown's Digest." Died Jan. 27, 1867.

Brown (Milton), born in Ohio, became a resident of Tennessee, and was a member of Congress from that State (1841–47). He was in 1845 the author of the resolution for incorporating Texas into the Union.

Brown (Nicholas), a benevolent merchant, b. at Providence, R. I., April 4, 1769, graduated at R. I. College in 1786. He gave to that college about $100,000 at various times, and in 1804 it was named Brown University in his honor. He gave largely to other institutions. D. Sept. 27, 1841.

Brown (Olympia). See Appendix.

Brown, or **Browne** (Robert), an English theologian, the founder of the sect of Brownists, was born in 1549. His doctrines differed little from those of the Anglican Church, but he maintained that the congregation has a right to elect its own minister. Died after 1630.

Brown (Robert), F. R. S., D. C. L., an eminent botanist, was born at Montrose, Scotland, Dec. 21, 1773. He studied medicine in the University of Edinburgh, but did not practise it long, preferring to devote himself to botany. He was employed as naturalist of the expedition which Captain Flinders conducted to Australia in 1801. In 1805 he returned with a collection of 4000 species of Australian plants, and in 1810 he published a Flora of that region, "Prodromus Floræ Novæ Hollandiæ." He also wrote "General Remarks, Geographical and Systematical, on the Botany of Terra Australis" (1814). He adopted the natural system of Jussieu, and made important discoveries in vegetable physiology. In 1827 he became keeper of the botanical department of the British Museum, and in 1833 was chosen one of the eight foreign associates of the French Academy of Sciences. Humboldt styled him "Botanicorum facile princeps." Died June 10, 1858.

Brown (Samuel Gilman), D. D., LL.D., son of President Francis Brown, noticed above, was born at North Yarmouth, Me., Jan. 4, 1813, graduated at Dartmouth College in 1831, and at Andover Theological Seminary in 1837, travelled in Europe from 1838 to 1840, was professor in Dartmouth College, first of oratory from 1840 to 1863, then of intellectual philosophy from 1863 to 1867, and was president of Hamilton College from 1867 to 1881. Besides numerous addresses and articles in reviews, he published a "Biography of Self-Taught Men," 1847, and "The Life of Hon. Rufus Choate," 1862. He also lectured on "British Orators." Died Nov. 4, 1885.

Brown (Thomas), M. D., an eminent Scottish metaphysician, born near Dumfries Jan. 9, 1778. He was a pupil of Dugald Stewart in Edinburgh. In 1798 he published an able refutation of Darwin's "Zoonomia." Having studied medicine, he graduated in 1803, and practised medicine about seven years. In 1810 he was appointed colleague of Dugald Stewart as professor of moral philosophy in the University of Edinburgh. He was very popular as a lecturer, and published "Lectures on the Philosophy of the Human Mind" (4 vols., 1820). His other chief work is "Observations on the Relation of Cause and Effect" (1804; 3d ed., enlarged, 1818). His chief contribution to psychology is an explication of the sixth or *muscular* sense. Died April 20, 1820. (See Dr. Welsh, "Account of the Life and Writings of Thomas Brown," 1825.)

Brown (Thompson S.), an American officer and engineer, born 1807 in New York, graduated at West Point in 1825. He served, while lieutenant of engineers, as assistant professor at the Military Academy, 1825, in the construction of Fort Adams, R. I., 1825–26, and 1828–33 as aide-de-camp to his uncle, Maj.-Gen. Brown, 1826–28, in the improvement of Arkansas River, 1833, in charge of Cumberland road in Illinois, 1833–34, in the construction and repair of defences of Charleston harbor, S. C., 1834–35, and the improvement of Lake Erie harbors and lighthouses, 1835–36. He resigned Oct. 31, 1836, and till his death was an eminent civil engineer. He was chief engineer of Buffalo, N. Y., and Erie, Pa. (Lake Shore), R. R., 1836–38, of Lake Erie harbor improvements, 1836–38, of western division of the New York and Erie R. R., 1838–42, and of the entire road, 1842–49. Upon the invitation of the czar of Russia he became consulting engineer of the St. Petersburg and Moscow Railway. Died Jan. 30, 1855, at Naples, Italy, aged forty-eight. George W. Cullum.

Brown (W. M.), a popular American painter, born at Troy, N. Y., in 1827. His works are chiefly landscapes and fruit-pieces.

Brown Coal. See Lignite.

Browne (Charles Farrar), known as **Artemus Ward,** a humorous writer, born at Waterford, Me., April 26, 1834. He learned the business of a printer, and gained distinction by writing for the public journals a series of "Letters from Artemus Ward, Showman." He became a popular lecturer, visited California in 1863, and London in 1866. Died at Southampton, England, Mar. 6, 1867. He published "Artemus Ward his Book," and other works.

Browne (John Ross), an American writer, born in Ireland in 1817. Among his works is "Yusef, or the Journey of a Frangi: a Crusade in the East." He was minister to China in 1868–70. Died Dec. 8, 1875.

Browne (Samuel J.), born in England Mar. 19, 1788, became in 1798 a resident of Cincinnati, O. He was long a minister of the United Brethren, and afterwards of the Presbyterians. Died Sept. 10, 1872, leaving a large amount of money to found a church, a university, and a free school.

Browne (Sir Thomas), M. D., an English philosopher and writer, born in London Nov. 19, 1605. He practised medicine at Norwich for many years. He published, besides other works, "Religio Medici" (1642), which is highly esteemed, and "Inquiries into Vulgar and Common Errors" (1646). He was knighted by Charles II. in 1671. Died Nov. 19, 1682.

Brownell (Henry Howard), born in Providence, R. I., Feb. 6, 1820, graduated at Washington College, Hartford, Conn., in 1841, was admitted to the bar, but became the author of numerous works, such as "The Old World," "The New World," and several other historical works, a volume of "Poems" (1847), "Lyrics of a Day" (1864), "War Lyrics" (1866). His poetry has more than ordinary merit. In the civil war he was a volunteer naval officer, serving on Farragut's staff. Died Oct. 31, 1872.

Brownell (Rt. Rev. Thomas Church), D. D., LL.D., was born at Westford, Mass., Oct. 19, 1779, and graduated at Union College in 1804. He held various professorships, etc. in the college until 1816, when he took orders in the Protestant Episcopal Church. In 1819 he was consecrated bishop of Connecticut, and was the first president of Trinity College, Hartford (1824–31). He was largely instrumental in providing liberal endowments for its professorships, and in securing important additions to its general fund. In 1852 he became presiding bishop of the Protestant Episcopal Church in the U.S. He published an "Expositor" of the New Testament, a "Commentary on the Book of Common Prayer," "Religion of the Heart and Life" (5 vols., 1839–40), "Consolation for the Afflicted," "Christian's Walk and Consolation," and several other works. Died Jan. 13, 1865.

Brownian Movements are those seen with the microscope among minute particles (not living) in a limpid liquid. Robert Brown the botanist first described them in 1827. These molecular movements have often been mistaken for *vital* motions. When the minute organisms called *Bacteria* are exposed to a heat of 200° F. they are killed, but molecular motion still goes on in a manner obviously different from their living movements. The same phenomenon can be exhibited by rubbing fine powder of gamboge in water, and placing it under a microscope. Beale considers of the same nature the motions of very minute bubbles ($\frac{1}{20000}$ of an inch in diameter) within certain crystals. These movements have not been satisfactorily explained. Beale suggests their possible connection with heat.

Brown'ie, a spirit of the fairy order in the old superstitions of Scotland. The tradition is that he was a good-humored goblin, who attached himself to farmhouses, and occupied himself when the family were in bed in performing any work, such as churning, threshing, etc.—a spirit not seen or spoken to, and only known by the performance of voluntary labors. In Cornwall a goblin known as Browny is called to assist at the swarming of bees.

Browning (Elizabeth Barrett), an eminent English poetess, born in Herts in 1809. She was liberally educated, and studied the Greek and Latin languages with success. She published in 1826 a volume entitled an "Essay on Mind, and other Poems," and in 1833 translated from the Greek of Æschylus "Prometheus Bound." Her next production was "The Seraphim, and other Poems" (1838). Her health having been impaired by the rupture of a blood-vessel, she passed several years in seclusion. In 1846 she was married to the poet Robert Browning, and went with him to reside in Italy. She published in 1850 her collected works, including "The Drama of Exile," and a new poem called "Lady Geraldine's Courtship." Among her other poems are "Casa Guidi Windows" (1851), "Aurora Leigh" (1856), and "Poems before Congress" (1860). She died at Florence June 29, 1861, with the reputation of being the greatest poetess England had ever produced.

Browning (Orville H.), a statesman, was born in Harrison co., Ky., 1806, was educated at Augusta College, studied law, was called to the bar in 1831, and removed to Quincy, Ill. He served in the Black Hawk war, became a prominent State politician, was U. S. Senator (1861–63), secretary of the interior (1866–68), and acting attorney-general of the U. S. (1868–69). D. Aug. 10, 1881.

Browning (Robert), an eminent English poet, born at Camberwell, a suburb of London, in 1812, was educated in the University of London. He published in 1835 the drama of "Paracelsus," a poem remarkable for subtlety of thought. His tragedy of "Strafford" (1837) was performed without success. He married Miss Barrett in 1846, after which he resided in Italy until 1861. In 1855 he produced two volumes entitled "Men and Women," which are much admired. According to an anonymous critic, "they are unsurpassed in the English language for depth and subtlety of conception and profound analysis of the human mind." Among his other works are "Pippa Passes," "The Ring and the Book" (1869), "Fifine at the Fair, and other Poems" (1872), and the "Red Cotton Night-cap Country" (1873), "The Last Adventure of Balaustion" (1875), "La Saisiaz" (1878), "Dramatic Idyls" (1879), "Joco-Seria" (1883), "Ferishtah's Fancies" (1885). His poetry is too obscure to please the general public, but a "Browning Society" was established in London, 1881, for the purpose of spreading and interpreting his works.

Brown'low (William Gannaway), an American Methodist divine and politician, born in Wythe co., Va., Aug. 29, 1805, removed to Tennessee, where he edited the "Knoxville Whig." After the breaking out of the war of 1861 he was a firm adherent of the Union party, and in 1865 was elected governor of Tennessee by the Republicans, and re-elected in 1867. He became a member of the U. S. Senate in 1869. D. at Knoxville, Tenn., Apr. 29, 1877.

Brownlow, Earls, and Viscounts Alford (1815, in the United Kingdom), Barons Brownlow (1776, in Great Britain), and Baronets (1677), a prominent family of Great Britain.—Adelbert Wellington Brownlow, the third earl, born Aug. 19, 1844, succeeded his brother in 1867. He was member of Parliament for North Shropshire 1866–67.

Brown-Séquard (C. Edouard), M. D., a distinguished physiologist, was born in the island of Mauritius in 1818. He was the son of Edward Brown, a Philadelphian, and a French lady named Séquard. He studied in Paris, where he graduated as M. D. in 1840. He gained distinction by experiments on blood, animal heat, and the spinal cord. These highly important researches are believed to have thrown as much light as those of any other observer upon the physiology and diseases of the nervous system. In 1869 he was appointed professor in the School of Medicine in Paris. He has published valuable professional works, and resides chiefly in the U. S.

Brown'son (Nathan), a physician and statesman of Georgia, graduated at Yale in 1761, was a member of the provincial Congress (1775), a surgeon of the Revolutionary army, member of the Continental Congress (1776 and 1778), was chosen governor of Georgia in 1781, and was afterwards a prominent official of the State. Died in Liberty co., Ga., in 1796.

Brownson (Orestes Augustus), LL.D., an American journalist and theologian, born at Stockbridge, Vt., Sept. 16, 1803. He founded in 1838 "The Boston Quarterly Review," of which he was editor for five years, and was a frequent contributor to the "Democratic Review." He became a Roman Catholic in 1844, having previously been a Presbyterian, Universalist, and Unitarian. He published a novel, "Charles Elwood, or the Infidel Converted," and other works, and conducted Brownson's "Quarterly Review." Died April 17, 1876. (See his "Works," 1884.)

Brown Spar, a name given to a variety of dolomite or magnesian limestone, which is often exceedingly delicately tinged with oxide of iron and manganese, and is sometimes called pearl spar.

Brownstown, on R. R., cap. of Jackson co., Ind. (see map of Indiana, ref. 9–E, for location of county). Pop. in 1870, 572; in 1880, 849.

Brownsville, Lonoke co., Ark. (see map of Arkansas, ref. 3–D, for location of county), 27 miles E. of Little Rock, Here an engagement took place, Aug. 25, 1863, between a division of U. S. cavalry and the Confederates, who were quickly driven from the town.

Brownsville, cap. of Edmonson co., Ky. (see map of Kentucky, ref. 4–E, for location of county). P. in 1880, 116.

Brownsville, Mo. See Appendix.

Brownsville, Fayette co., Pa., on R. R. and the Monongahela River, 35 miles S. of Pittsburg (see map of Pennsylvania, ref. 6–B, for location of county), has large glass-factories, coal-mines, iron-foundries, machine-shops, planing-mills, etc. Pop. in 1870, 1749; in 1880, 1489.

Brownsville, on R. R., capital of Haywood co., Tenn. (see map of Tennessee, ref. 7–B, for location of county). It is in a rich cotton district, ships over 20,000 bales of cotton yearly, and has an $80,000 cotton-factory and 4 colleges. Pop. of district in 1870, 4262; in 1880, 5013.

Brownsville, a river-port and city, on R. R., capital of Cameron co., Tex. (see map of Texas, ref. 8–H, for location of county), is on the left bank of the Rio Grande, opposite Matamoras (Mexico). It has steam-navigation on the Rio Grande and an extensive trade with Mexico. Here is a custom-house and a Roman Catholic college. Brownsville was taken from the Confederates by General Banks in Nov., 1863. Pop. in 1870, 4905; in 1880, 4938.

Brown University, an institution of learning founded in 1764 at Warren, R. I., and removed to Providence, its present seat, in 1770. Its first name was Rhode Island College, but in 1804 it received its present name, in honor of Nicholas Brown, one of its chief benefactors. James Manning, D. D., was its first president (1765–90); Jonathan Maxey, D. D., was president 1792–1802; and Asa Messer, D. D., 1802–27. From 1827 to 1855, the Rev. Francis Wayland, D. D., was president of this university, and contributed greatly to its reputation. He was succeeded by the Rev. Barnas Sears, D. D., who resigned in 1867 to accept the presidency of the Peabody Educational Fund. His immediate successor was Rev. A. Caswell, D. D., who had maintained almost a lifelong connection with the university. He gave place, in 1872, to the Rev. E. G. Robinson, D. D., for many years president of Rochester Theological Seminary. Brown University is distinguished by its unsectarian character, though founded by the Baptists, who constitute by charter the majority of the fellows and board of trustees. One of the chief attractions of this coll. is its choice library of 60,000 volumes, one of the very best in America. The library building is a fine fireproof structure recently erected through the munificence of the late John Carter Brown. The statistics for 1883 are: Instructors, 20; undergraduates, 265; alumni, 3081; buildings, 10; invested funds, $702,453; assessors' valuation of land (16 acres), $402,162; assessors' valuation of buildings, $229,500. Revised by R. A. Guild.

Brownville, a city, capital of Nemaha co., Neb. (see map of Neb., ref. 7–K, for location of county), on R. R. and the Missouri River. Pop. in 1880, 1309; in 1885, 1029.

Brownwood, cap. of Brown co., Tex. (see map of Texas, ref. 3–G, for location of county). Pop. in 1880, 725.

Bruce, the name of a noble family of Scotland, descended from Robert de Bruis (or de Brus), a Norman knight who followed William the Conqueror to England in 1066. He derived his lineage from Brusi, a Northman, a son of the famous Sigurd. His younger son, Adam, who acquired a large estate in Yorkshire, left a son, Robert, who received from David I. of Scotland a grant of the lordship of Annandale, held by the tenure of military service. He died in 1141, and left a son, Robert, who was the second lord of Annandale. This second lord had a grandson, Robert, who was the fourth lord of Annandale. He married Isabel, a daughter of David, earl of Huntingdon, younger brother of King William the Lion, and thus laid the foundation of the royal house of Bruce. He died in 1245. Robert de Bruce, a son of the preceding, and the fifth lord of Annandale, was born in 1210. When the Scottish throne became vacant by the death of Queen Margaret in 1290, this Robert de Bruce and Baliol claimed the throne. The dispute was referred to Edward I. of England, who decided in favor of Baliol. Robert died in 1295, leaving a son, Robert, who by his marriage with the countess of Carrick obtained the title of earl of Carrick (1271). He fought in the English army against Baliol at the battle of Dunbar. He died in 1304, and left a son, Robert, who became king of Scotland.

Bruce (Alexander Balmain), D. D., was born in the parish of Aberdalgie, Perthshire, Scotland, Jan. 30, 1831; studied in Edinburgh; was settled in Cardross, Dumbartonshire, in 1859; was translated to Broughty Ferry, Forfarshire in 1868; and in 1875 was made prof. of apologetics and N. Test. exegesis in Free Church Coll. of Glasgow. Has published "The Training of the Twelve Apostles" (1871); "The Humiliation of Christ" (1875); "The Chief End of Revelation" (1881); "The Parabolic Teaching of Christ" (1882); and some minor works. R. D. Hitchcock.

Bruce (Archibald), M. D., born in New York in 1777, was the son of a British army surgeon. He graduated at Columbia College in 1795, and studied medicine and mineralogy five years in Europe. He was (1807–11) professor of materia medica and mineralogy in the College of Physicians and Surgeons, N. Y., became a member of many learned societies, and in 1810 edited the "Journal of American Mineralogy." Died Feb. 22, 1818.

Bruce (Sir Frederick William Adolphus), a British diplomatist, born at Elgin Castle in 1814, was a brother of Lord Elgin. He was consul-general in Egypt in 1849, and in 1865 succeeded Lord Lyons as ambassador at Washington. Died in Boston in 1867.

Bruce (George), born in Edinburgh, Scotland, June 26, 1781, came in 1795 to the U. S., and became a printer in Philadelphia. In 1803 he became publisher and printer of the New York "Daily Advertiser;" in 1806, with his brother David, he began printing books; in 1812 they introduced stereotyping into the U. S., and soon after established an extensive type and stereotype founding business. George, with his nephew David, invented a successful type-casting machine. Died July 6, 1866.

Bruce (James), a Scottish traveller, born in the county of Stirling Dec. 14, 1730. He was appointed consul-general at Algiers in 1763, after which he studied several Oriental languages, and explored the antiquities of Barbary. In 1768 he departed from Cairo on a journey to Abyssinia, in order to discover the source of the Nile. Passing through Syene, Cosseir, and Jidda, he reached Gondar in Feb., 1770. He discovered the source of the Blue Nile in November of that year, and remained about two years in Abyssinia, the king of which treated him kindly. He passed through great dangers and hardships in his return, and arrived in England in 1774. In 1790 he published "Travels to Discover the Source of the Nile" (5 vols.). His veracity was at first doubted by many, but his statements have been confirmed by Salt, Belzoni, and others. Died Apr. 27, 1794. (See A. Murray, "Life of Bruce.")

Bruce (Michael), a Scottish poet, whose productions (mostly hymns) are characterized by singular pathos and beauty, was born at Kinneswood, in the county of Kinross, Mar. 27, 1746. He died of consumption July 5, 1767. In 1770 his "friend," the Rev. John Logan (1748–88), published what purported to be his literary remains. In 1781 this same Logan published another volume of poems, which he called his own. The best of these, it is now almost absolutely certain, came from the pen of Michael Bruce. A baser act of literary piracy was never perpetrated. (See "The Works of Michael Bruce," edited by Rev. Alexander B. Grosart, 1865.)

Bruce (Robert), a heroic and famous king of Scotland, born Mar. 21, 1274, was a son of Robert de Bruce, earl of Carrick. In 1296, as earl of Carrick, he swore fealty to Edward I. of England, but he soon joined the Scottish leaders who were fighting for the independence of Scotland. Having made peace with Edward I., he became in 1299 one of the four regents who ruled the kingdom. In 1305 he was involved in a quarrel with the Red Comyn, who was a nephew of Baliol and was a claimant of the throne. Bruce killed Comyn, and then assembled his vassals and was crowned at Scone in the spring of 1306. His small army was soon defeated by the English, and he was compelled to take refuge in the island of Rathlin, on the coast of Ireland, where he remained all winter. Renewing the contest in the spring, he defeated the English at Loudon Hill in May, 1307. In less than two years he made himself master of nearly all Scotland, and in 1309 he drove back an invading army of Edward II. The latter invaded Scotland again in 1314 with an army of about 100,000 men. Bruce, who had less than half as many, gained a complete victory at Bannockburn, June 24, 1314. In 1318 the Scots invaded England, and after several other campaigns the war was suspended in 1323 by a truce. By a treaty of peace concluded in 1328 the English king recognized the independence of Scotland. Bruce died June 7, 1329, and was succeeded by his son David.

Bru'cea, a genus of shrubs which has been referred to the order Rutaceæ. A species called *Brucea antidysenterica* is a native of Abyssinia. Its leaves are said to be tonic, astringent, and efficacious in dysentery. The leaves of *Brucea Sumatrana*, a native of Sumatra and China, have similar medicinal virtues, and are very bitter.

Bruce Mines, a port of entry of the Algoma district, Ontario (Canada), near the N. end of Lake Huron, 35 miles below Sault Ste. Marie. It has productive copper-mines and exports large quantities of fish. Pop. in 1881, 472.

Bruch'sal, a town of Germany, in Baden, on the river Salzbach, and on the railway from Heidelberg to Carlsruhe, 14 miles by rail N. E. of the latter. It is the northwestern terminus of a railway which extends to Friedrichshafen, on Lake Constance. It has an old castle of the twelfth century, a fine palace, a gymnasium, and a paper-mill. Pop. in 1880, 11,373.

Bru'cia, or **Brucine,** a very bitter and poisonous vegetable alkaloid found in *Strychnos nux vomica*. It is characterized by giving a blood-red color with concentrated nitric acid. It was discovered in bark incorrectly supposed to be that of *Brucea antidysenterica*, whence its name. Its toxicological effects are like those of strychnia, but it is far less active.

Bru'cite, the native magnesic hydrate, MgH_2O_2. It is found in serpentine at Hoboken, N. J. The finest specimens occur in the chrome-mines of Texas, Pa.

Brück'e (Ernst Wilhelm), a German physiologist, born at Berlin June 6, 1819, became in 1846 teacher of anatomy at the Berlin Art Academy, and in 1849 professor of physiology in Vienna. He is the author of "Anatomische Beschreibung des Augenapfels" (1847), and "Grundzüge der Physiologie und Systematik der Sprachlaute" (1856).

Bruck'er (Johann Jakob), a German historian and Protestant minister, born at Augsburg Jan. 22, 1696. Among his works is a "Critical History of Philosophy" (in Latin, 5 vols., 1741–44), which has a high reputation. It contains valuable biographical materials, but is deficient in critical analysis. Died Nov. 26, 1770. (See "Nouvelle Biographie Générale.")

Bru'ges [Dutch *Brugge*, or *Bruggen* (*i. e.* "bridges"); Lat. *Brugæ*], a fortified city of Belgium, capital of the province of West Flanders, is situated on a fertile plain about 8 miles from the ocean, and 64 miles by rail N. W. of Brussels; lat. 51° 12′ N., lon. 3° 14′ E. The railway from Ostend to Brussels passes through Bruges, which is connected with the ocean by several canals. It derives its name from the numerous bridges (about fifty-four) which here cross the canals. It contains many fine Gothic edifices, some of which were built in the fourteenth century, and are richly adorned with works of art. Among these are the church of Notre Dame, which has a spire 450 feet high, and contains a splendid monument of Charles the Bold; the town-hall, with a lofty tower and a celebrated chime of forty-eight bells; and the cathedral of St. Sauveur, furnished with paintings of eminent artists. Memling's "Shrine of St. Ursula" and his other works at Bruges are of great importance in the history of mediæval art. Bruges has an academy of painting, a public library, a museum, an episcopal college, a hospital, a school of surgery, and an institution for the blind. Here are manufactures of cotton, linen, and woollen fabrics, lace, leather, cordage, tobacco, and soap. Several thousand females are employed in the manufacture of lace of fine quality. Bruges was an important commercial town before the Norman conquest (1066), after which it continued to increase in riches and population. In the thirteenth century it was the great central mart of the Hanseatic League. Its manufactures were also very extensive. The tapestry and cloths of Bruges were celebrated for their excellence. The population once exceeded 200,000. Its prosperity was injured by a popular revolt in 1488, and by the persecutions and vexations which it suffered under Philip II. of Spain. P. 44,501.

Brugsch (Heinrich Karl), a German Egyptologist, b. at Berlin Feb. 18, 1827. He was appointed Prussian consul to Cairo in 1864, and in 1868 the khedive made him director of the museum of Boulak. He has published a "Grammaire Démotique," "Monuments of Egypt," a "Hieroglyphic Demotic Dictionary" (4 vols., 1867–68), etc.; his "History of Egypt, from the Monuments," was translated into English in 1879.

Brühl (Gustavus), M. D., born at Herdorf, Prussia, May 31, 1826, studied in the colleges of Siegen, Münstereifel, and Treves, where he graduated; studied medicine at Munich, Halle, and Berlin; graduated M. D. at the university Sancti Ludovici; became in 1848 a physician of Cincinnati, O.; was physician of St. Mary's Hospital, lecturer on laryngoscopy, etc. in Miami Medical College; one of the founders and first president of the Peter Claver society for the education of colored children; was in 1871 Democratic candidate for State treasurer; acquired fame as a lecturer and political speaker; edited the *German Pioneer* 1869–71; has written much in prose and verse for journals; author of *Poesien des Urwalds* (1871); became one of the examiners of public schools, Cincinnati, O., and is a member of many learned and literary societies.

Brumaire, the second month in the calendar of the French Republic, is perhaps derived from *brume*, a "mist," a "fog." It comprised the time from Oct. 23 to Nov. 21. The 18th Brumaire (Nov. 9), 1799, was a famous epoch in French history. Then occurred the *coup-d'état* which subverted the power of the Directory and raised Bonaparte to supreme power as first consul. The Directory was not popular, and was weakened by dissensions among the directors themselves, two of whom, Sieyès and Ducos, promoted the design of Bonaparte by resigning on the eve of the crisis. The Council of Elders and Council of Five Hundred were dispersed or overawed by the soldiery, and the new régime was established with little fighting.

Bru'math, a town of Germany, in Alsace-Lorraine, 10 miles by rail N. N. W. of Strasburg. Pop. 5545.

Brum'mel (George Bryan), "Beau Brummel," a famous fop, born in London in 1778, was educated at Oxford. He had elegant taste in dress, became intimate with the prince of Wales, lived in sumptuous style and associated with the nobility on equal terms; was recognized as an oracle in questions of etiquette and dress, squandered a fortune, went into exile in 1815, and died at Caen Mar. 29, 1840.

Brunai, a state and seaport of Borneo (which see).

Brunck (Richard François Philippe), an eminent classical scholar, born at Strasburg, in Alsace, Dec. 30, 1729. He was liberally educated in Paris, and became an ingenious critic and bold emendator of the classics. He edited Anacreon, Aristophanes, Sophocles, and Terence, and published "Analecta Veterum Poetarum Græcorum" (1772–76). In the French Revolution he warmly supported the popular cause. Died June 12, 1803.

Brundisium. See Brindisi.

Brunehaut, or **Brunehilde,** a famous queen, was a daughter of Athanagildus, king of the Visigoths. She was married in 568 A. D. to Sigebert, king of Austrasia. She was beautiful, ambitious, and high-spirited. Her husband was assassinated in 575 by the order of Fredegonda, queen of Neustria. She afterwards governed the kingdom with ability, and obtained an ascendency over her son Childebert, who was the nominal king. Having been defeated in battle and captured by Clotaire II., she was murdered in 613 A. D.

Brunel' (Isambard Kingdom), D. C. L., F. R. S., a British engineer, born at Portsmouth April 9, 1806. He was employed under his father as assistant engineer of the Thames Tunnel, in the construction of which he displayed great energy and ability. In 1833 he was appointed chief engineer of the Great Western Railway. He was the designer and engineer of the Great Western steamship and of the Great Eastern, said to be the largest vessel ever built in the world, and of the Royal Albert Bridge, Saltash. (See Bridge, by Gen. J. G. Barnard, U. S. Army.) Died Sept. 14, 1859.

Brunel (Sir Mark Isambard), F. R. S., a celebrated engineer, born near Rouen, in France, April 25, 1769, was the father of the preceding. Driven from France by the Reign of Terror, he removed to New York in 1793, and designed the Bowery Theatre of that city. In 1799 he went to England, and married a Miss Kingdom. He was distinguished for his mechanical ingenuity, and invented several useful machines. His most important work is the Thames Tunnel, which was commenced in 1825 and opened in 1843. Died Dec. 12, 1849. (See R. Beamish, "Life of M. I. Brunel.")

Brunelles'chi (Filippo), an eminent Italian architect and sculptor, born at Florence in 1377. He improved the theory of perspective, and efficiently promoted the restoration of the ancient style of architecture as a substitute for the Gothic, which in his youth prevailed in Italy. About 1418 he was appointed architect of the cathedral of Florence (Santa Maria del Fiore), which had been commenced about 1296, and was unfinished. He raised over it a grand and beautiful dome, which is one of the largest in the world. Among his other works is the Pitti Palace of Florence. Died in 1444. (See Baldinucci, "Vita di F. di Ser Brunellesco," 1812.)

Bru'ni (Leonardo), a learned Italian writer, a native of Arezzo, and hence called Leonardo Aretino, was born in 1369. He obtained a high office at Florence, promoted the study of Greek literature, and translated into Latin some works of Aristotle and other classics. Among his original writings is a "History of Florence," in Latin. Died Mar. 9, 1444.

Brünn [Slavic, *Brno*, the "ford"], a fortified city of Austria, and the capital of Moravia, is beautifully situated at the confluence of the Schwarza and the Zwittawa, 94 miles by rail N. N. E. of Vienna and 159 miles by rail S. E. of Prague; lat. 49° 11′ 39″ N., lon. 16° 36′ 39″ E. Here is the castle of Spielberg, used as a state prison. Among the remarkable public buildings are the cathedral, the Gothic church of St. James, the *Landhaus*, formerly a rich Augustine convent, several palaces of the nobility, and a theatre. Brünn also contains a museum, a public library, and a botanic garden. It has important manufactures of woollen, cotton, and silk fabrics, ribbons, glass, soap, and tobacco. It is the seat of the highest civil and military authorities of Moravia and Austrian Silesia and of a Roman Catholic bishop. Its manufactures of woollens are said to be the most extensive in the Austrian empire. Over 15,000 persons are employed in the factories. Napoleon used Brünn as his head-quarters before the battle of Austerlitz. Pop. in 1880, 82,660.

Brun'now, von (Philipp), Count, a diplomatist, born at Dresden Aug. 31, 1797. He entered the Russian civil service in his youth, and was sent as ambassador to London in 1840, was transferred to Frankfort in 1854, and attended the Conference of Paris in 1856. In 1858 he resumed his former position in London, and took part in the Conferences of London in 1862, 1864, and 1871. Died at London Apr. 11, 1875.

Bru'no [Lat. *Brunus*], (Giordano), an eminent Italian philosopher, born at Nola, in the kingdom of Naples, in 1548. He was a man of independent and speculative spirit, and rejected the orthodox doctrines of the Church. On account of his opinions he was obliged to flee to Geneva in 1580, a few years after which he removed to Paris, and passed some time in England. His principal works are "Spaccio della Bestia trionfante" (1584), "Della Causa Principio e Uno," and "Del Infinito Universo e Mondi." About 1592 he returned to Italy and became a resident of Pavía. Having been accused of heresy, he was imprisoned at Rome for nearly two years, and was burned as a heretic Feb. 17, 1600. His system is called Pantheism, and has had much influence in modern philosophy. (See C. G. von Murr, "Leben und Schriften des G. Bruno," 1805; N. Moeller, "G. Bruno, sa Vie et ses Doctrines," 1840.)

Bruno, Saint, founder of the Carthusians, was born at Cologne about 1040. In 1086 he retired from the world, and with a few friends began to live in solitude near Grenoble. He founded there the order of Carthusians, who adopted the rule of Saint Benedict. The monastery of the Grande Chartreuse was afterwards built at the same place. He died Oct. 6, 1101.

Bruno the Great, archbishop of Cologne, born 925 A. D., was a younger brother of the emperor Otho I. He was a man of great talents, virtue, and learning, and had a powerful influence in the Church and State. He became lord high chancellor of the empire. Died in 965.

Brunol'ic Acid, a substance which occurs in oil of coal-tar, associated with carbolic, cresylic, and rosolic acids.

Bruns, von (Paul Victor), Prof., was born in Brunswick Aug. 9, 1812; studied at Brunswick, Tubingen, and Berlin. He was the author of several surgical treatises and handbooks, and made a special study of diseases of the larynx, for the treatment of which he invented a new and effective throat-mirror. He was one of the highest surgical authorities in Germany. His work on laryngoscopic surgery gained for him the grand prize of 20,000 marks, offered by the Academy of Turin. Died April, 1883.

Bruns'wick, a duchy of the German empire, consists of three larger parts and several enclaves. Area, 1526 square miles. The larger part, containing the capital, is entirely surrounded by Prussia. The chief mountain-range is a part of the Hartz Mountains in the S., the highest point of which in the duchy is the Wormberg, 3245 feet high. It is traversed by the Ocker in the N., and the Leine, Aller, and Bode. The chief products are grain, flax, and hops. Among the mineral products are silver, lead, iron, lignite, salt, etc. It has extensive manufactures of linen, wooden wares, glass, sugar, tobacco, paper, cloths, etc., also large beer-breweries. It has five gymnasia, one polytechnic school, a theological seminary, two normal, and numerous other schools. The government is a constitutional monarchy, and the supreme power is vested in a duke and a legislative body of forty-six members. The receipts and expenses for 1881 were each estimated at 8,533,700 marks. The public debt in 1882 amounted to 82,432,183 marks. Brunswick is represented by two members in the Bundesrath of the empire, and three deputies in the imperial Reichstag. Its contingent to the German army forms part of the tenth army corps. Pop. in 1880, 349,429.

History.—Brunswick formed originally a part of the duchy of Saxony, and was given in 1194 to Henry the Lion. His grandson Otto became first duke of Brunswick in 1235. After having been divided and reunited by the descendants of Otto, they were again united under Ernest the Confessor (died 1546). His two sons, Henry and William, again divided the country, and formed the two branches Brunswick-Oels and Brunswick-Lüneburg, the latter of which reigned as electors of Hanover, and in the person of George I. ascended the British throne. Brunswick was annexed to the kingdom of Westphalia in consequence of the treaty of Tilsit, but in 1813 it again became an independent state under Frederick William, who was killed in the battle of Quatrebras in 1815. He was succeeded by his son Karl, who was expelled from the country in 1830, and was succeeded by his brother Wilhelm, who is the present duke. Brunswick joined the German customs-union in 1844, assisted Prussia in the war of 1866, joined the North German Confederation in the same year, and became a member of the German empire upon its revival in 1870. With the death of Duke Wilhelm the ducal line of Brunswick will become extinct, Duke Charles having died in Aug., 1873, without issue. While the duke desires the ex-king of Hanover or his son for his successor, it is believed that Prussia would favor the succession of one of the sons of Queen Victoria. A. J. Schem.

Brunswick [Ger. *Braunschweig;* anc. *Brunonis Vicus*], a city of Germany, capital of the duchy of the same name, is on the river Oker and in a level district, 47 miles by rail E. S. E. of Hanover; lat. 52° 16′ 11″ N., lon. 10° 32′ 09″ E. The old fortifications have been demolished and converted into pleasant promenades. It contains a magnificent ducal palace, an ancient cathedral, the church of St. Andrew, with a steeple 316 feet high, a mint, an opera-house, a town-hall, and a museum which contains paintings by Albert Dürer, Rembrandt, Holbein, and other great masters. Railways extend from this town to Hanover, Magdeburg, and other places. Here are manufactures of linen and woollen goods, lacquered wares, *papier-maché*, tobacco, hardware, etc. A great annual fair is held here. Among its institutions are a college, a gymnasium, a realschule, and an asylum for deaf-mutes. This is a very old town. It was enlarged and beautified by Henry the Lion in the twelfth century. It formerly belonged to the Hanse League. Pop. in 1880, 75,038.

Brunswick, city, R. R. junction, and port of entry, capital of Glynn co., Ga. (see map of Georgia, ref. 7–K, for location of county), on St. Simon's Sound, 8 miles from the Atlantic Ocean and 80 miles S. S. W. of Savannah. It has a safe and spacious harbor, and is chiefly engaged in the manufacture and export of yellow-pine lumber. At the S. end of St. Simon's Island, and on the N. side of the entrance to the sound, is St. Simon's light-house; lat. 31° 08′ 03″ N., lon. 81° 23′ 26″ W. It is of brick, 108 feet high, and shows a fixed light varied by red and white flashes. Pop. in 1870, 2348; in 1880, 2891.

Brunswick, R. R. junction, Cumberland co., Me. (see map of Maine, ref. 10–B, for location of county), on the right bank of the Androscoggin River, 30 miles N. E. of Portland and about 8 miles W. of Bath; lat. 43° 54′ 5″ N., lon. 69° 57′ 4″ W. It is the site Bowdoin College (which see). The river here falls nearly 50 feet in the distance of half a mile, affording abundant water-power. Brunswick has a cotton-mill, and other manufactories. Many ships are built and owned here. Pop. in 1870, 1449; in 1880, 2410.

Brunswick, R. R. junction, Chariton co., Mo. (see map of Missouri, ref. 3–F, for location of county), on the N. bank of the Missouri River, 90 miles E. by N. by R. R. from Kansas City. Pop. in 1870, 1645; in 1880, 1801.

Brunswick-Bevern (August Wilhelm), Duke of, a Prussian general, born Oct. 15, 1715, took part in the wars of Frederick the Great against Austria. He distinguished himself in the battles of Lowasitz, Reichenberg, Prague, and Kollin. He was defeated and taken prisoner at Breslau in 1757, and was released in 1758. Died Aug. 1, 1781. He was the tallest soldier of his time in the Prussian army.

Brunswick Black is a varnish employed to coat over coarsely-finished iron grates, fenders, etc. It is composed mainly of lampblack and turpentine. It is applied with a brush, dries quickly, and leaves a shining, jet black surface.

Brunswick Green, a pigment used in the arts, consisting of the hydrated chloride and the oxide of copper. It is obtained by exposing metallic copper to the action of muriate of ammonia, or by mixing sulphate of copper and common salt into a paste with water. It is also generated by the action of sea-water on copper, and occurs native in Atacama in the form of green sand, hence called atacamite.

Bruns′wick-Lü′neburg (Karl Wilhelm Ferdinand), Duke of, a German general, born Oct. 9, 1735, was a nephew of Frederick the Great, and the eldest son of Duke Karl. He fought for his uncle in the Seven Years' war, and succeeded to the dukedom in 1780. He became in 1792 commander-in-chief of the allied armies of Austria and Prussia, which invaded France and were repulsed by Dumouriez. In 1793 he resigned the command. He took command of the Prussian army in 1806, and was defeated by the French at Jena in October of that year. In this battle he was mortally wounded. Died Nov. 10, 1806.

Bru′sa, or **Bur′sa** (anc. *Prusa ad Olympum*), a city of Asia Minor, in Anatolia, is pleasantly situated at the N. base of Mount Olympus, about 60 miles S. by E. from Constantinople. It is on a beautiful and fertile plain, and presents a magnificent external appearance, having more than 200 mosques and minarets, some of which are very handsome. The streets are narrow, but are kept clean by running water. Here are many colleges and schools, several Armenian churches, and large bazaars supplied with European goods. Brusa is one of the most commercial cities in Asiatic Turkey, and raw silk is the chief article of export. It has manufactures of silk, satin, gauze, cotton cloths, and tapestry. The silks of Brusa are highly esteemed in the European markets. Here are warm mineral springs which were celebrated in ancient times. *Prusa* was the capital of ancient Bithynia. It was taken by the Turkish sultan Orkhân in 1326, after which it was the capital of the Turkish empire until 1453. Feb. 28, 1855, the town was nearly destroyed by an earthquake. Pop. 60,000.

Brusanti′ni (Vincenzo), Count, an Italian poet of the sixteenth century. He went in youth to Rome to seek his fortune, but forgot his purpose, and was put into prison on account of certain indiscreet acts. In prison he suffered much. He afterwards made a long tour throughout Italy, and his talents won him the patronage of many princes. His indiscretion, however, lost him whatever favors he had gained, and in 1570 he died at Ferrara, his native town. He is known by his "Angelica Inamorata" and "Cento Novelle," imitations, the one of the "Orlando Furioso" of Ariosto, and the other of the "Decameron" of Boccaccio. Both are clumsy, cold, and untasteful performances.

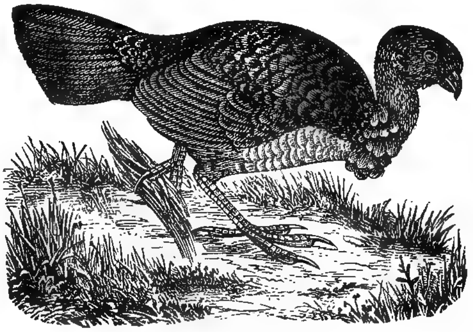
Brusasor′ci (properly Domenico **Ri′ccio**), a painter, born at Verona, Italy, in 1494. His title of "the Titian of Verona" was conferred upon him on account of his imitation of the style of that master. His works, which have been greatly overpraised, are chiefly at Verona. Many of them are in fresco. Died in 1567.—His son, Felice Riccio, called the Younger Brusasorci (1540–1605), was a skilful painter on marble and alabaster.

Brus′chius, or **Brusch** (Gaspard), a German historian, born Aug. 19, 1518, at Schlakenwald in Bohemia, was in 1552 made a count palatine and poet laureate by Ferdinand, king of the Romans. He favored Luther and Melanchthon, and in 1559 was murdered in a forest by some gentlemen who thought themselves satirized by him. His chief historical works are "De Germaniæ episcopatibus epitome" (1549) and "Monasteriorum Germaniæ præcipuorum Chronologia" (1551).

Brush, an instrument for removing dirt from various surfaces by friction, for adjusting the hair, or for polishing, or applying paints, whitewashes, and the like. Hogs' bristles furnish a large part of the material for the friction surface of the best brushes, but for delicate work camel's, badger's, sable's, and rabbit's hair is used. Wire brushes are used in various departments of manufacturing industry. Split whalebone is sometimes employed as a substitute for bristles. Broom-corn and twigs of trees are often employed for stiff brushes, and the coarse instruments used in cleaning streets are partly made from piassaba and other imported palm fibres. Most brushes are made by joining some of the above materials to a stock of wood, leather, bone, or metal, by various methods—a business which gives employment to many thousands in Europe and the U. S. Ingenious machines have been invented for the performance of various parts of the work of making brushes; and these machines have greatly reduced the labor and expense of making some kinds of brushes. Other kinds are still made by hand.

Brush (George Jarvis), born at Brooklyn, N. Y., Dec. 15, 1831, was educated at Yale College, at the University of Munich, the Mining Academy of Freiberg, Saxony, and the School of Mines in London. He became in 1855 professor of metallurgy in Yale, to which the professorship of mineralogy was added in 1864. He is executive officer of the Sheffield Scientific School, has published numerous papers in the "American Journal of Science," and is author of parts of the fifth edition of Dana's "Mineralogy."

Brush Turkey (*Tallegalla Lathami*), sometimes called **Wattled Tallegalla** and **New Holland Vulture,** a bird of Australia remarkable for the peculiar manner in which its eggs are hatched. Several pairs of these birds having united to build a nest, collect leaves, grass, etc. into a heap, sometimes to the amount of several cart-loads. In this mass the several females deposit their eggs, where they remain till hatched by the artificial heat of the mound. The bird is about the size of our common turkey, and has wattles on its head and neck. When pursued, it endeavors to make its escape by running through the tangled brush or by flying into the low branches of a neighboring tree.



Brush Turkey.

Besides the above, there are several other species and genera, all Australian, and nearly all closely resembling the above bird in its peculiar habits. These now constitute the family Megapodidæ. (See Megapodidæ.) The birds are edible, and are much sought as game.

Bruso'ni (Girolamo), an Italian historian and poet, born at Legnano Dec. 10, 1610. He wrote many Latin and Italian poems, and was for a time confined in prison at Venice for assuming improperly the dress of a Carthusian monk. He wrote many historical and other works, of which the most celebrated is "Istoria d'Italia" (1656–80). Died after 1679.

Brus'sels [Dutch, *Brussel;* Fr. *Bruxelles*], the capital of Belgium, is situated in the province of Brabant, on the river Senne, 27 miles by rail S. of Antwerp, and 227 miles by rail N. N. E. of Paris; lat. 50° 51′ 10″ N., lon. 4° 22′ 13″ E. It is built partly on the slope of a hill which rises 220 feet above the level of the sea, and partly on a fertile plain. The upper town on the hill is the most modern and fashionable, and contains the royal palace, public offices, and the finest hotels. Brussels is the most important and populous city of Belgium, is remarkable for the number and richness of its antique buildings, and ranks among the finest cities of Europe. The walls which formerly surrounded this city have been converted into boulevards, broad promenades lined with double rows of shade trees. The Allée Verte is a fashionable promenade along the Scheldt Canal, and extends to the royal palace of Laeken, about 3 miles N. of the city. The principal public squares are the Place Royale, the Grande Place, in which stands the hôtel de ville, and the Place de la Monnaie, which contains the mint, the theatre, and the exchange. Among its remarkable edifices are the hôtel de ville, a fine Gothic structure, with a spire 364 feet high, in the grand hall of which the emperor Charles V. abdicated in 1555; the Gothic cathedral of St. Gudule, which was built about 1270, and is celebrated for its painted windows, numerous statues, and carved pulpit; the church of Notre Dame de la Chapelle, commenced in 1134; the royal palace; the modern church of Notre Dame de Bon Secours; the former palace of the prince of Orange; and the Palace of the Fine Arts, which contains a large collection of paintings of the Flemish school. Brussels has a public library (Royal) of 350,000 volumes; a botanic garden; an astronomical observatory, one of the finest in Europe; a magnetic observatory; a free university, founded in 1834, with four faculties—viz. law, medicine, mathematical and physical sciences, and belles-lettres; a normal school, a polytechnic school, and institutions for the blind and for deaf-mutes. The only mint of the kingdom is situated here. Brussels is one of the great centres of Belgian industry, and is celebrated for the manufacture of lace which is considered the finest in the world. The other chief products of its manufactories are fine linens, damasks, ribbons, gold and silver embroidery, glass mirrors, jewelry, paper, porcelain, hats, mathematical and musical instruments, carriages, and chemical products. Its trade is facilitated by a canal which connects it with Antwerp, and by railways which radiate in many directions. About one-third of the people of this city speak French, and the others Flemish or Dutch. Pop. in 1880, with suburbs, 394,940.

Brutus (Lucius Junius), a famous Roman patriot, was a son of Tarquinia and a nephew of Tarquin the Proud. According to tradition, that tyrant was about to put him to death, but he saved his life by feigning idiocy, which was the origin of his surname *Brutus*. When the tragic fate of Lucretia had prepared the people to revolt, Brutus led them, expelled the Tarquins from Rome, and founded a republic (509 B. C.). He was then elected one of the consuls. He ordered the execution of his own sons, Titus and Tiberius, who were convicted of treason. About 507 he was killed in a battle against the Tarquins.

Brutus (Marcus Junius), a Roman republican, a descendant of the preceding, was b. in 85 B. C. He married Porcia, the daughter of Cato Uticensis, who was his maternal uncle. In the civil war he fought under Pompey against Cæsar, but after the battle of Pharsalia he was kindly treated by the dictator, with whom he entered into friendly relations; he was appointed governor of Cisalpine Gaul. His zeal for republican liberty and the influence of his friend Cassius induced him to join the conspiracy against Cæsar; both took part in his murder; became prominent leaders of the republican party; led an army against that of Antony and Octavius at Philippi (42 B. C.), and after the reverse of Cassius, Brutus killed himself on the field.

Brüx, or **Brix,** a city of Bohemia, on the river Bila, 14 miles N. of Saaz. It has a gymnasium, a realschule, numerous coal-mines, and manufactures of salts from the famous mineral spring of Seidlitz. Pop. in 1880, 10,136.

Bryan, cap. of Bryan co., Ga. (see map of Georgia, ref. 5–K, for location of county). Pop. in 1880, 1372.

Bryan, on R. R., capital of Williams co., O. (see map of Ohio, ref. 1–C, for location of county). It has an academy and important manufactures, and is noted for its artesian wells. Pop. in 1870, 2284; in 1880, 2952.

Bryan, a city on R. R., capital of Brazos co., Tex. (see map of Texas, ref. 4–I, for location of county), 100 miles N. W. of Houston and 8 E. of Brazos River, has a cotton-gin and mill-factory, a manufactory of tobacco, one of carriages, one of soap, and one of cotton-seed oil. It has a college, two academies, and the State Agricultural and Mechanical College. Pop. not in census of 1880.

Bryanites. See Bible Christians.

Bry'ant (William Cullen), b. Nov. 3, 1794, at Cummington, Hampshire co., Mass.; educated at Williams College, which he entered in 1810. He studied law, and in 1815 was admitted to the bar, but after practising successfully for ten years, first at Plainfield and then at Great Barrington, removed in 1825 to New York, and engaged in the business of an editor. In 1826 he became connected with the "Evening Post," of which he was the editor-in-chief till his death. Under his direction this paper maintained through a long series of years a high standing in the American press by the boldness of its protest against slavery before the war, by the vigor of its support to the government during the war, by the fidelity and ability of its advocacy of Democratic freedom in trade and legislation, and by the purity of its moral tone. In 1834, 1845, 1849, and 1857, Mr. Bryant visited Europe, and presented the literary fruit of his travel in a series of "Letters of a Traveller" and "Letters from Spain and other Countries," which rank high in literature of their class. Unpretending yet elegant in manner, they give the facts as these presented themselves to the writer without embellishment of fancy or ornament of style. In the world of literature Mr. Bryant is known chiefly as a poet, and here his name is illustrious both at home and abroad. Bryant's career as a poet began very early. He contributed verses to the county gazette before he was ten years old; in his fourteenth year he published a political satire, "The Embargo," together with another long poem "The Spanish Revolution," which in a twelvemonth reached a second edition. "Thanatopsis," perhaps the most impressive and most widely known of his pieces, was produced in his nineteenth year. He published the first volume of poems in 1821 at Cambridge, and the first complete collection in 1832 at New York. Nevertheless, his poems are not many, nor are they the product of a facile muse. The ear for rhythm and the talent for graceful expression are probably gifts of his nature, for they are present in his first poems, "The Ages" and "Thanatopsis." But the principal characteristic of his poetry is thoughtfulness; the intellectual process by which ideas ripen in his mind would seem to be long and slow, and consequently they lack that flash which accompanies the revelations of an impassioned imagination; but they are bright, clear, and sweet. The latest fruit of his genius is his translation of Homer, of which the "Iliad" appeared in 1870, and the "Odyssey" in 1871. The work is a monument of industry; and in some important respects, in the fluency and variety of the rhythm, and in the simplicity, copiousness, and dignity of the expression, deserves a place with the masterpieces of translation. Mr. Bryant responded to frequent invitations to make ceremonial addresses—a duty that he discharged with rare felicity. His efforts in this kind have been collected in a volume of "Orations and Addresses." In his old age, too, he was honored in many ways by his fellow-citizens, who delighted to pay tributes of respect to his literary eminence, the breadth of his public spirit, the faithfulness of his public service, and the worth of his private character. Mr. Bryant's summer residence was at Roslyn, L. I. D. at New York City June 12, 1878. REVISED BY O. B. FROTHINGHAM.

Bryd'ges (Sir SAMUEL EGERTON), an English writer and bibliographer, born in Kent Nov. 30, 1762, published, besides many novels, letters, poems, etc., "Censura Literaria, containing Titles and Opinions of Old English Books" (10 vols., 1805–09), "The British Bibliographer" (4 vols. 8vo, 1810–14), and "Res Literariæ" (3 vols., 1821). He claimed that he was the lawful heir to the barony of Chandos, but his title was not recognized. D. at Geneva Sept. 8, 1837. (See his "Autobiography," 2 vols., 1834.)

Bryen'nius (NICEPHORUS), a Byzantine historian and general, was a minister of Alexis Comnenus, whose daughter, Anna Comnena, he married. Died about 1137. His "History of Constantinople" was edited by MEINEKE (1836).

Bryn'hild, or **Brynhil'da,** a beautiful maiden, celebrated in the Norse mythology. Though called a valkyria, she is evidently the same person as the Princess Brunhild of the "Nibelungen Lied." (See THORP's "Northern Mythology," vol. i.; see also NIBELUNGEN LIED, in this work.)

Bryn Mawr College. See APPENDIX.

Bry'ony (*Bryonia*), a genus of plants of the order Cucurbitaceæ, having triadelphous stamens, with distinct anthers, and stems which climb by means of lateral tendrils. The flowers are campanulate, 5-partite, and unisexual. The common bryony (*Bryonia dioica*) is a native of England, has palmate or 5-lobed leaves, and bears red berries about as large as a pea. It abounds in a fetid and acrid juice. The large perennial root is a purgative and emetic, and is employed in medicine, especially in homœopathic practice. The root of *Bryonia alba* possesses similar properties, and contains a bitter, poisonous principle called *brionine*.

Bryony, Black (*Tamus communis*), a plant of the order Dioscoreaceæ, is a native of many parts of Europe. It has long twining stems, cordate, undivided leaves, and red berries which are succulent but unwholesome. It is acrid, but the young suckers, in which the acrid principle is not fully developed, are eaten in Greece like asparagus.

Bryozo'a [Gr. βρύον, "moss," and ζῶον, "an animal"], an order of animals which appears to occupy an intermediate place between mollusks and articulates. Most writers have called them mollusks; others class them with the "molluscoids;" while some refer them to the Articulata. They are very small, and moss-like or polyp-like in appearance, mostly marine, but some species live in fresh water.

Bryson (ANDREW J.), U. S. N., born July 25, 1823, in New York, entered the navy 1837, became commander in 1862 and captain in 1866; commanded the iron-clad Lehigh in 1863 and 1864 at the reduction of Fort Macon, and was in all the important fights with the defences of Charleston harbor; rear-admiral 1879; retired Jan. 30, 1883.

Bu'aze, an African plant, of which the botanical relations are not yet known, but which is likely to prove of importance on account of its fibre. Dr. Livingstone found it growing in large quantities north of the Zambesi, and thought its fibre stronger and finer than that of flax.

Bu'balus, Bubalis, or **Bubalé** [Gr. βούβαλος, a term anciently applied to a species of antelope], a genus of Bovidæ which is formed by the buffaloes of India and Africa, the anoa, and perhaps the musk-ox of North America (*Bubalus* or *Ovibos moschatus*). It includes those species which have the bony core of the horn excavated, with large cells or sinuses communicating with the cavity of the nose. The horns are flattened, and bend laterally with a backward direction. The *Antilope Bubalus*, a native of Barbary, is about the size of a large stag, and has a head and muzzle like an ox. Its horns are furnished with a number of thickened rings, and are curved so that the points are directed backward. It is gregarious. The figure of this animal is found on the monuments of ancient Egypt.

Bubas'tis (the *Pi-beseth* of Scripture and modern *Tel-basta*), a ruined city of Lower Egypt, in the Delta of the Nile, about 75 miles a little E. of N. from Cairo; lat. 30° 36′ N., lon. 31° 33′ E. The site is now occupied by extensive mounds containing the remains of brick houses and broken pottery. (See Herodotus, ii. 137, 156.)

Bubastis, a goddess of ancient Egypt, a deification of the moon corresponding to the Greek Artemis, said to signify literally "she who multiplies her aspects;" so called in allusion to the changes of the moon. According to other authorities, Bubastis was the deification of the cat, which animal, as is well known, was an object of worship in ancient Egypt. Her name, according to modern Egyptologists, was *Pecht* or *Pasht*.

Bub'ble [Lat. *bulla;* Fr. *bulle*], a globular film or vesicle of water or other liquid inflated with air, vapor, or gas. The air usually expands until the film is burst by the distension. Bubbles formed with a mixture of water and soap will float in the air and exhibit interesting optical phenomena. "The colors," says Sir J. Herschel, "which glitter on a soap-bubble are the immediate consequence of a principle the most important from the variety of phenomena it explains, and the most beautiful from its simplicity and compendious neatness, in the whole science of optics." (See THIN PLATES, COLORS OF.) The formation of bubbles of steam (ebullition) always occurs when water is heated to the boiling-point.

Buccaneer' [Fr. *boucanier*], a name applied to the famous adventurers or filibusters who in the sixteenth and seventeenth centuries infested the West Indies and the Spanish colonies of South America. They were mostly English and French, and were united by a common hostility to the Spaniards, to plunder whom was their principal object and business. For mutual protection against the cruelty of the Spaniards, they organized themselves into an association or community bound by a simple code of laws. The island of Tortuga was at one time occupied by them, and was their chief base of operations. They took immense booty from the Spanish galleons which conveyed precious metals to Spain, and often attacked towns on the coasts. Among the famous and able leaders of the buccaneers were the French Montbar, surnamed THE EXTERMINATOR, and Henry Morgan, a Welshman, who was born about 1637. He organized fleets and armaments, took strong fortresses, and displayed remarkable military talents. He was knighted by Charles II. The navigator Dampier also took part with the buccaneers in some expeditions against the Spaniards. (See JAMES BURNEY, "History of the Buccaneers.")

Buccina'tor [Lat. *buccino*, "to swell the cheeks," as in blowing a trumpet, from *bucca*, the "cheek"], the name of a muscle situated in the substance of the cheeks; so called because, when the cheeks are distended with air, the contraction of the buccinator muscle forces it out. Its principal use is to compress the food during mastication.

Bucci'no, a town of Italy, in the province of Salerno, is on the river Botta, here crossed by an old Roman bridge, 23 miles W. of Potenza. Here are quarries of fine marble. Pop. 6049.

Buc'çinum [a Latin word signifying a "trumpet"], a genus of gasteropod mollusks, characterized by a shell with a smooth nonplicated columella, and with a fissure or short respiratory canal inflected towards the left. The shape of some species of this genus resembles that of a trumpet. *Buccinum undatum* is the systematic name of the shell called whelk. Most of the living species are found in the cold zones; many are fossil.

Buc'cleugh, DUKES OF (1663), dukes of Queensberry, marquesses of Dumfriess-shire, earls of Drumlanrigand Sanquhar (1684), earls of Buccleugh (1619), earls of Dalkeith (1663), viscounts of Nith, Torthorwold, and Ross, and Barons Douglass (1684), Barons Scott of Buccleugh (1606), Barons Scott of Eskdale (1619), Lords Scott of Winchester (1663, in Scotland), earls of Doncaster, and Barons Tynedale (1662, in England), a noble family of Scotland, descended from Sir Walter Scott of Branxholm and Buccleugh, a brave and powerful chieftain who lived in the reign of James V. He fought at the battle of Pinkie in 1547, and died in 1552. Some incidents of his life formed the subject of Scott's poem, the "Lay of the Last Minstrel." His great-grandson, also named Sir Walter, was raised to the peerage as Lord Scott of Buccleugh in 1606. The first duke was beheaded in 1685, but the duchess retained the title and estates. Henry, the third duke, born in 1746, was a pupil and friend of Adam Smith. He distinguished himself by his efforts to improve his extensive estates by planting trees, enriching the soil, making roads, and improving the breed of sheep. Died in 1812.—His grandson, WALTER FRANCIS, born Nov. 25, 1806, the fifth duke of Buccleugh and the seventh of Queensberry, is said to have spent £320,000 in improving the harbor of Granton, about two miles from Edinburgh, the greatest public work ever executed in Scotland by an individual at his own expense. He succeeded his father in 1819, was lord of privy seal 1842–46, and pres. of council in 1846. Died in 1884.

Bucen′taur [It. *Bucentoro*], the name of a celebrated Venetian galley which was gilded and sumptuously furnished, and was used only once a year in a splendid aquatic procession when the doge performed the ceremony of espousing the Adriatic on Ascension Day by dropping a ring into the water. It was about 100 feet long, and was propelled by oars. In the annual procession the Bucentaur, which conveyed the doge and other high functionaries, was followed by many gondolas and feluccas. It was burned in 1797, having been kept for this service since 1177.

Buceph′alus [Macedonian Gr. Βουκεφάλας, for Βουκέφαλος, *i. e.* "ox-head" or "big-head"], the favorite horse of Alexander the Great, who rode on him in all his campaigns. He was purchased in Thessaly by King Philip, and cost, according to Pliny, sixteen talents, equal to $20,000, nearly, of our money. The royal grooms were unable to manage him, but Alexander, then very young, tried and succeeded; and Bucephalus would never permit any one but Alexander to ride him. Bucephalus died in India from the effect of wounds received in battle about 326 B. C., and Alexander built in his honor the city *Bucephala* on the Hydaspes.

Bu′cer [from the Gr. βοῦς, a "cow," and κέρας, a "horn," being a literal translation of his German name, *Kuhhorn*], (Martin), a German Reformer, was born near Strasburg in 1491, and was for a time a Dominican friar. He became a Protestant in 1521. He was a friend of Luther, and studied Greek and Hebrew at Heidelberg. He introduced the Reformed doctrines at Strasburg 1523, and was for many years professor of theology at that city. When dissensions arose between Luther and Zwingle, Bucer acted the part of mediator. His opinions in relation to the sacrament accorded more nearly with those of Zwingle than those of Luther. He attended the Diet of Augsburg in 1548, and there conducted himself with moderation, but he refused to subscribe to the "Interim." At the invitation of Archbishop Cranmer he went to England in 1549, and became professor of theology at Cambridge. He wrote in Latin and German numerous religious works and commentaries on Scripture. Died Feb. 27, 1551.

Buceroti′dæ [βοῦς, an "ox," and κέρας, a "horn"], or **Hornbills,** a family of the Picariæ, remarkable for the excessive size of the mandibles, of which the upper usually supports a large horn-like protuberance. The feet are strong and short, the wings short; size large.

Buch, von (Leopold), a celebrated Prussian geologist, born at Stolpe-on-the-Oder April 25, 1774. He studied mineralogy under Werner at Freiberg. He explored the geology of many countries of Europe, generally travelling on foot. In 1805 he witnessed an eruption of Mount Vesuvius, which converted him to the Plutonic theory. Among his principal works are "Geognostic Observations during Travels in Germany and Italy" (2 vols., 1802–09), "Travels in Norway and Lapland" (1810), and "On the Mountain-Systems of Russia" (1840). He published an excellent geological map of Germany (1824). He was the author of the doctrine of the slow upheaval of continents. Died in Berlin Mar. 4, 1853. (See the English translation of Flourens' "Eulogy on L. von Buch," in the Smithsonian Report for 1862, p. 358.)

Buch′an, a district of Scotland, in the north-eastern part of Aberdeenshire, consisting of about one-fourth of the county lying between the Doveran and the Ytham.

Buchan, Earls of, and Lords Auchterhouse (1469), Barons Cardross (1606, in Scotland), a noble family of Scotland.—David Stuart Erskine, the thirteenth earl, was born in Nov., 1815, and succeeded his father in 1857.

Buchanan, Ga. See Appendix.

Buchanan, Berrien co., Mich. (see map of Michigan, ref. 8-G, for location of county), on the St. Joseph River and on R. R., 87 miles E. of Chicago and 197 miles W. of Detroit. It is situated in the midst of a rich agricultural and fruit region, has a large trade, and a variety of manufactures. Pop. in 1870, 1702; in 1880, 1894.

Buchanan (Claudius), D. D., a Scottish preacher, born near Glasgow Mar. 12, 1766. He was professor in the College of Fort William in Bengal. He wrote "Christian Researches in Asia" (1811), and promoted the spread of the gospel in India. Died Feb. 9, 1815.

Buchanan (Franklin), born at Baltimore, Md., became a midshipman of the U. S. navy in 1815, and passed through the various grades of the service, becoming a captain in 1855. In 1861 he resigned, intending to enter the Confederate service, but subsequently he asked to be restored. His request was refused, and he then joined the Southern navy. He commanded the Merrimack frigate after she was fitted up as an iron-clad, and with her engaged and sunk the wooden frigates Congress and Cumberland. Being wounded in this affair, the command of the Merrimack in the encounter with the Monitor devolved upon Lieut. Catesby Jones. Became a rear-admiral; was defeated and made prisoner by Farragut in Mobile Bay, Aug. 5, 1864, when he fought on board the Tennessee iron-clad, and lost a leg.

Buchanan (George), an eminent Scottish poet and historian, born at Killearn, in the county of Sterling, in Feb., 1506. He was well educated in Paris, and became a professor in a college of that city. Having adopted the Reformed doctrines, he returned to Scotland in 1537, and wrote "Somnium," a satire against the monks, for which he was persecuted. He took refuge in England, and passed over to France about 1540. He was employed as a teacher in Bordeaux and Paris for several years, during which he wrote some Latin tragedies. After several changes of residence and adventures, he returned to Scotland in 1560. In 1562 he was appointed classical tutor to Mary queen of Scots. His religious and political principles rendered him a supporter of Regent Murray in the civil war that ensued. He became preceptor to the young king, James VI., in 1570, and keeper of the privy seal in the same year. Died Sept. 28, 1582. As a scholar he was almost unrivalled by any of his contemporaries. He wrote Latin verse with great purity, and was humorous, sarcastic, and profound. His chief works are a "History of Scotland" ("Rerum Scoticarum Historia," 1582), a metrical Latin version of the Psalms (1570), and "Franciscanus," a poetical satire. (See his "Autobiography," 1608; David Irving, "Memoirs of the Life of George Buchanan," 1807.)

Buchanan (Isaac), a Canadian politician, born in Glasgow, Scotland, July 21, 1810, became a leading merchant and president of the board of trade of Hamilton, Ontario. He was active in putting down the rebellion of 1837, and was for many years prominently engaged in public affairs. He published "The Relations of the Industry of Canada with the Mother-country and the U. S." Elected to the Canadian Parliament in 1841 for the city of Toronto, he helped to secure responsible government for the people and in procuring the reduction of the duty on Canadian wheat. In 1843 he supported Lord Metcalf's administration at the head of the Constitutional or order party. For many years he held a seat in the executive council of the province. Died Sept. 30, 1883.

Buchanan (James), fifteenth President of the U. S., born in Franklin co., Pa., April 23, 1791, graduated at Dickinson College, Carlisle, in 1809, and was admitted to the bar in 1812. He was a Federalist in his youth, but voted for General Jackson in 1828, and was then elected to Congress. In 1831 he was sent as minister to Russia, was U. S. Senator 1833–45; and was then appointed secretary of state. After four years of private life, he was sent as minister to England in 1853. He was nominated by the Democrats and elected President of the U. S. in 1856. The other candidates were John C. Fremont, Republican, and Millard Fillmore, "American." Mr. Buchanan received 174 electoral votes. His policy was hostile to those who opposed the extension of slavery. In his message of Dec., 1860, he blamed the Northern people for the disruption of the Union, and affirmed that the Executive had no power or right to prevent the secession of a State. He published in 1866 "Mr. Buchanan's Administration," a work in defence of his policy as President. Died June 1, 1868.

Buchanan (Joseph Rodes), M. D. See Appendix.

Buchanan (Robert C.), an American officer, born in 1811 in Maryland, graduated at West Point in 1830, and Feb. 8, 1864, colonel Tenth Infantry. He served at frontier posts 1830–70, in Black Hawk war 1832, engaged in command of gunboats in the battle of Bad Axe River, as adjutant Fourth Infantry 1835–38, in Florida war 1836–38—1841–42, engaged at Camp Izard, Oloklikaha, and Okeecho-bee, emigrating Cherokees to the West 1838, in the military occupation of Texas 1845–46, in the war with Mexico 1846–48, engaged at Palo Alto, Resaca de la Palma (brevet major), Monterey, San Antonio, Churubusco, Molino del Rey (brevet lieutenant-colonel), Chapultepec, and the city of Mexico; in command of district of Oregon and Northern California 1856, engaged against Rogue River Indians, and as superintendent of Western recruiting 1857–59. In the civil war he served in the Virginia Peninsula 1862, engaged at Yorktown, Gaines' Mill (brevet colonel), Glendale, and Malvern Hill (brevet brigadier-general), in Northern Virginia campaign 1862, engaged at Manassas, in the Maryland campaign 1862, engaged at Antietam and Potomac Run, in the Rappahannock campaign 1862–63, engaged at Fredericksburg (brevet major-general), as assistant provost-marshal, etc. for New York 1864, and member of commissions 1865–68. Retired from active service Dec. 31, 1870. D. Nov. 29, 1878. George W. Cullum.

Buchanan (Thomas McKean), U. S. N., born Sept. 10, 1837, at Bellefonte, Pa., graduated at the Naval Academy in 1855, and became a lieutenant in 1860, and a lieutenant-commander in 1862. He was in many engagements with the enemy on the lower Mississippi in co-operation with our army, and on the 15th of Jan. fell, with a bullet through his head, while "encouraging in his own person his officers and men to fight courageously" in the sharp action at Bayou Têche. In his report to the navy department of this battle Rear-Admiral Farragut writes: "Lieutenant-Commander Buchanan was one of our most gallant and persevering young officers. He informed me two days ago that he thought the enemy was about to make an attack on him, and that he would anticipate them. In reply to my letter, in which I enjoined him to do his whole duty on this occasion, he assured me that I need give myself no uneasiness upon that score, as they had all determined to go down rather than surrender."

Foxhall A. Parker.

Buch'anites, a Scotch fanatical sect, now extinct, which derived its existence (in 1783) and its name from a Mrs. Buchan, whose maiden name was Elspeth Simpson. She was born in 1738, and claimed to be the woman mentioned in Rev. xii. The last of the sect died in 1846.

Bu'charest, the capital of Roumania, is situated in a fertile plain on the river Dimbovetza, about 140 miles N. W. of Varna; lat. 44° 25′ 30″ N., lon. 26° 5′ 24″ E. The houses are mostly mean, and the streets dirty and not well paved. It is said to contain ninety-five churches, one college, a public library, several hospitals, and an excessive number of gaming-houses. This city has the reputation of being the most dissolute capital in Europe. It is the entrepôt for the trade between Austria and Turkey, the chief articles of which are grain, wool, salt, building timber, cattle, and wax. The treaty of peace by which the sultan ceded Bessarabia and part of Moldavia to Russia was concluded here in May, 1812. Pop. in 1881, 221,000.

Buchez (Philippe Joseph Benjamin), an able French philosophical writer and republican, was born in Ardennes in 1796. He studied medicine, and took part in several plots against the Bourbons. He wrote, besides other works, "The Science of the Development of Humanity" (1833), and a "Complete Treatise on Philosophy from the Catholic and Progressive Point of View" (3 vols., 1840). Buchez and Roux published "The Parliamentary History of the French Revolution" (40 vols., 1833–38). He was president of the National Assembly in May, 1848. Died in 1865.

Buch'holz, a town of Germany, in Saxony, 46 miles S. W. of Dresden. Pop. in 1880, 6539.

Büch'ner (Friedrich Karl Christian Ludwig), born at Darmstadt, in Germany, Mar. 29, 1824, is a leading writer of the present time in advocacy of "humanitarian," materialistic, and atheistic opinions. His best-known work is entitled "Kraft und Stoff" ("Force and Matter," 1854). He has written also two volumes with the title "Physiological Pictures" (1861); one on "Natural Philosophy," "Six Lectures on Darwin" (1868), and a work on "Man in the Past, Present, and Future" (1869–70). The latter has been translated (1872) into English by W. S. Dallas, F. L. S. With considerable acquaintance with recent science, an easy style, and some ingenuity of argument, the principal attraction of Büchner's works to most readers is, probably, his audacity. In 1872–73 Büchner made a lecturing-tour in the U. S., under the auspices of the German Turnverein, but without marked results in the propagation of his opinions.

Buchtel College. See Appendix.

Bu'chu [a South African word], the leaves of *Barosma crenata*, *crenatula*, and *serratifolia*, and of other strong-smelling South African plants used in medicine for their diuretic properties. They belong to the order Rutaceæ, and are used by the Hottentots for many diseases. The natives also prize them for their fragrance, and use them in perfuming their bodies. In commerce the various kinds of buchu are known as "round" and "long" buchu, etc. They all contain a volatile oil.

Buck, a name given to the male of the fallow deer and other species of deer; also to the male of sheep, goats, and antelopes. The term is not properly applied to the male of red deer or American deer, which is called a stag. The term doe is applied to the females of those species of deer the males of which are called bucks.

Buck (Gurdon). See Appendix.

Buck'au, a town of Prussia, in the province of Saxony, forms a suburb of Magdeburg. Pop. in 1880, 12,506.

Buck Bean, or **Marsh Trefoil** (*Menyanthes trifoliata*), a plant of the order Gentianaceæ, the only known species of its genus. It is indigenous in Europe and the U. S., and is widely distributed in the colder parts of the northern hemisphere. It grows in bogs and marshes. The leaves are ternate, the corolla funnel-shaped and 5-parted, and the fruit is a pod or 2-valved capsule. A bitter extract obtained from the leaves is a valuable remedy for dyspepsia and disorders of the bowels. The whole plant is tonic, and is used in Germany as a substitute for hops.

Buck'eye, the popular name of certain American exogenous trees and shrubs of the genus *Æsculus* and the order Sapindaceæ. The Ohio buckeye (*Æsculus glabra*), growing in the Valley of the Mississippi, is a large tree with a strong-smelling bark, small, obscure flowers, and prickly fruit containing the seed, which is a large nut resembling that of the horse-chestnut tree, which is a near relative of this buckeye. The sweet buckeye (*Æsculus flava*), a tree, sometimes a shrub, of a range rather more to the S. than that of the preceding, has yellow or sometimes dull purple flowers. The red buckeye (*Æsculus Pavia*) has a still more southern habitat. It is generally small, and has bright-red flowers. The white buckeye (*Æsculus parviflora*) is a shrub of the mountains of the Southern States, with panicles of white flowers. There are various other species in Asia.

Buckhan'non, capital of Upshur co., West Va. (see map of West Virginia, ref. 4–E, for location of county), on Buckhannon River. Pop. in 1870, 475; in 1880, 761.

Buckhout (Isaac Craig). See Appendix.

Buckingham (George Villiers), Duke of, the favorite of James I. of England, was born in Leicestershire Aug. 20, 1592. He became in 1617 a gentleman of the bed-chamber, and obtained in the space of two years the titles of baron, viscount, and earl. In 1616 he was appointed lord admiral of England. He accompanied Charles, prince of Wales, when he went to Madrid in 1623 to obtain in marriage the infanta of Spain. The failure of this suit was ascribed to the arrogance of Villiers, who in his absence was created duke of Buckingham. After the death of James I. he became the favorite and prime minister of Charles I., but he made himself odious to the nation. He was assassinated by John Felton Aug. 23, 1628.

Buckingham (George Villiers), Duke of, a son of the preceding, was born in Westminster Jan. 30, 1627. He was an adroit courtier, but profligate and unprincipled. On the defeat of the royalist party in 1651 he went into exile. At the Restoration (1660) he became a member of the privy council and an enemy of Lord Clarendon, after whose fall (1667) he was a confidential minister of Charles II. He was the president of the ministry called the "Cabal." He wrote the "Rehearsal," a comedy, and other plays. Died April 16, 1688.

Buckingham (Joseph Tinker), an American writer, born at Windham, Conn., Dec. 21, 1779, published "Specimens of Newspaper Literature, etc.," and became successively editor of the "New England Galaxy," the "Boston Courier," and the "New England Magazine." Died April 11, 1861.

Buckingham (William Alfred), LL.D., born at Lebanon, Conn., May 28, 1804, was governor of the State (1858–66), and in 1869 was elected to the U. S. Senate by the Republicans. Died at Norwich, Conn., Feb. 5, 1875.

Buckinghamshire (England). See Bucks.

Buckingham and Chandos, Dukes of, marquesses of Chandos and Earls Temple of Stowe (1822, in the United Kingdom), marquesses of Buckingham (1784), Earls Temple (1749), Viscounts and Barons Cobham (1718, in Great Britain), Earls Nugent (1776, in Ireland), Barons Kinloss (1601, in Scotland), a noble family of Great Britain.—Richard Plantagenet Campbell Temple Nugent-Brydges Chandos Grenville, the third duke of this family, born in 1823, succeeded his father in 1861. He was lord president of the council 1866–67, secretary of state for the colonies 1867–68, and became lord lieutenant of Bucks.

Buckingham Court-house, cap. of Buckingham co., Va. (see map of Virginia, ref. 6–G, for location of county). Pop. not in census of 1880.

Buck'inghamshire, Earls of (1746, in England), Barons Hobart (1728, in Great Britain), and baronets (1611, in England), a noble family of Great Britain.—Augustus Edward Hobart, the sixth earl, born Nov. 1, 1793, succeeded his brother in 1849.

Buckland (Cyrus), an American inventor and machinist, born at Manchester, Conn., Aug. 10, 1799, invented machines for working gunstocks, and a machine to cut the grooves in the barrel of a rifle.

Buckland (William), D. D., F. R. S., an English geologist, born at Axminster in 1785, was educated at Oxford.

Reader on geology on royal foundation at Oxford in 1819; author of a distinguished work in geology, "Reliquiæ Diluvianæ" (1 vol., 1823). His principal work is the Bridgewater Treatise entitled "Geology and Mineralogy, considered with reference to Natural Theology" (2 vols., 1836). In 1825 he became a canon of Christ Church, Oxford. Dean of Westminster in 1845. Died Aug. 14, 1856.

Bucklan'dia, a large and beautiful evergreen tree of the order Hamamelaceæ, a native of the Himalaya Mountains. The trunk is sometimes seven feet in diameter at five feet from the ground, and grows to the height of forty feet before it branches. The foliage is thick and glossy, but the timber is not very valuable.

Buck'le (Henry Thomas), a popular English author, b. at Lee, in Kent, Nov. 24, 1822. His father was a merchant, at whose death he came into the possession of an ample fortune, and was enabled to gratify his fondness for books, forming, it is said, one of the finest private libraries to be found in all Europe. He published in 1857 the first volume of the "History of Civilization in England," a work displaying great boldness as well as affluence of thought, and characterized by an easy and vigorous style. It proposed to introduce a new method of studying and writing history which should raise history to the rank of a real science. The second volume appeared in 1861. Mr. Buckle set out on an Eastern tour in 1861, and died at Damascus May 29, 1862. The three volumes of "Miscellaneous and Posthumous Writings" (edited by Miss Taylor, 1872) are of little interest.

Buckley (Samuel Botsford), Ph. D. See Appendix.

Buck'minster (Joseph), D. D., an orthodox divine, was born at Rutland, Mass., Oct. 14, 1751, graduated at Yale in 1770, became pastor of a church at Portsmouth, N. H., in 1779, and an eloquent and popular preacher. Died June 10, 1812.

Buckminster (Joseph Stevens), D. D., a Unitarian minister, a son of the preceding, born at Portsmouth, N. H., May 26, 1784. He graduated at Harvard in 1800, and became minister of the Brattle Street church, Boston, in 1804. Died June 9, 1812.

Buckner, former capital of Hodgeman co., Kan. (see map of Kansas, ref. 7–D, for location of county). Pop. not in census of 1885.

Buck'ner (Simon Bolivar), born 1823 in Kentucky, graduated at West Point in 1844, in infantry 1844–52, and subsequently as commissary of subsistence, rank of captain. He served at frontier posts 1844–52, as assistant professor at the Military Academy 1846, in the war with Mexico 1846–48, engaged on the march through Coahuila, at Vera Cruz, Cerro Gordo, Amazoque, San Antonio, Churubusco (wounded and brevet first lieutenant), Molino del Rey (brevet captain), Chapultepec, and the city of Mexico, and quartermaster Sixth Infantry, as assistant instructor at the Military Academy 1848–50, and on commissary duty at New York City 1852–55. Resigned Mar. 26, 1855. He was superintendent of construction of Chicago customhouse 1855, adjutant-general, rank of colonel, of Illinois 1857, colonel of Illinois volunteers for Utah expedition (not mustered into service), inspector-general commanding Kentucky home guards 1860–61, and farmer near Louisville 1860–61. He joined the Southern army in the civil war, and was in command of Bowling Green, which he evacuated on the capture of Fort Henry, falling back to Fort Donelson (surrendered Feb. 16, 1862, to Gen. Grant, with 16,000 troops and vast stores); prisoner of war at Fort Warren till Aug., 1862, in command of a division of Hardee's corps in Bragg's army in Tennessee, as major-general assigned to the third grand division, engaged at Murfreesboro' and Chickamauga, and included, May 26, 1865, in Kirby Smith's surrender to Gen. Canby.

George W. Cullum.

Bucks, or **Buck'inghamshire,** an inland county of England, is bounded on the N. by Northampton, on the E. by Bedford and Hertford, on the S. by Berks, and on the W. by Berks and Oxford. It has an area of 730 square miles. The surface is diversified by valleys and hills of moderate height. The Chiltern range of chalk-hills, about 900 feet high, extends across the county in a N. E. and S. W. direction. Near the middle of the county is the fertile Vale of Aylesbury, which is farther N. than the Chiltern Hills; the soil is generally fertile, and contains a large portion of clay. It is drained by the Ouse, the Thame, and other small rivers. The staple products are wheat, beans, butter, cattle, and mutton. The sheep of the Vale of Aylesbury are noted for their fine and heavy fleeces. Bucks county is intersected by the Great Western and North-western Railways. The chief towns are Aylesbury, Buckingham, and Marlow. Pop. in 1881, 176,277.

Bucksport, on R. R., Hancock co., Me. (see map of Maine, ref. 8–E, for location of county), in Bucksport township, and on the left (E.) bank of the Penobscot River, 18 miles S. of Bangor. It derives its support from shipbuilding, fisheries, and commerce. It has manufactures of various kinds, and is the seat of the East Maine Conference Seminary. Pop. in 1870, of the township, 3433; in 1880, 3047, including 1458 in village.

Buck'stone (John B.), an English dramatist and comic actor, born in 1802. He performed with success in London, and wrote many popular dramas, among which are "The Green Bushes," "The Rough Diamond," "The Wreck Ashore," and "Good for Nothing." D. Oct. 31, 1879.

Buckthorn (*Rhamnus*), a genus of shrubs or small trees of the order Rhamnaceæ, distinguished by a bell-shaped calyx which is four or five cleft, and petals which are small and sometimes wanting. The fruit is a berry-like drupe, containing two to four separate seed-like nutlets. The species are numerous, and natives of many temperate and tropical regions. The common buckthorn (*Rhamnus catharticus*) is a deciduous shrub, a native of Europe, and naturalized in the U. S. It has spiny branches, ovate leaves, and small black berries (or drupes) which are nauseous and purgative, and which yield the pigment called sap-green (or bladder-green). This shrub is planted for hedges in the U. S. The Atlantic U. S. have two native species. The alder buckthorn (*Rhamnus Frangula*) is a European shrub which is not armed with spines, and has ovate, entire leaves. The berries are violently cathartic. The bark has been employed in medicine, and is used for dyeing yellow. The unripe fruit of dyers' buckthorn (*Rhamnus infectorius*), a shrub which grows in Southern Europe, yields a bright yellow dye. The so-called French berries or Avignon berries used by dyers are the fruit of the last and other species.

Buck'wheat[*] (*Fagopyrum esculentum* or *Polygonum Fagopyrum*), an annual plant of the order Polygonaceæ, is said to be a native of Central Asia and the basin of the Volga. It is cultivated for food in Europe and the U. S., thrives on poor soils, and grows to the height of two feet or more. It has triangular, heart-shaped or halberd-shaped leaves. The seeds are triangular and resemble a beech-nut in form. Cakes of buckwheat eaten warm are a favorite article of food, which is very nutritious. Buckwheat meal contains about 10 per cent. of gluten and 50 per cent. of starch. Bees are partial to the flowers of this plant, which secrete a large portion of honey, which, however, is not of the first quality. Buckwheat comes to maturity in a shorter time than most other grains, and may be sown late. In the U. S. the seeds are usually sown broadcast. The quantity of seed required for one acre is a bushel or one bushel and a half. It requires little manure, and does not exhaust the soil. A good crop of this grain yields about forty bushels on an acre, and a bushel of it weighs from forty-five to forty-eight pounds. Another species, called Tartarian buckwheat (*Fagopyrum Tartaricum*), is a hardy native of Siberia, and is adapted to cold climates. It is distinguished from the common buckwheat by the toothed edges of its seeds, and is inferior in quality.

Buckwheat Tree, a small tree or shrub of Georgia and the Gulf States (the *Cliftonia ligustrina*), a smooth, elegant evergreen of the order Cyrillaceæ. It has clusters of white, fragrant blossoms in March, April, and May. It grows around swamps, ponds, and streams, and is often called *titi*. Its pendulous winged fruit is sometimes shaped like a kernel of buckwheat; whence the name.

Bucol'ic [Gr. βουκολικός (from βουκόλος, an "ox-herd," derived from βοῦς, an "ox," and κολέω, to "care for," a word which only occurs in compounds, but whose root is seen in the Lat. *colo*); Lat. *bucolicus*], pastoral or pertaining to herdsmen. This term is applied to a kind of pastoral poetry written in hexameter verse. The poems of Theocritus and the "Eclogues" of Vergil are the most perfect models of bucolic poetry.

Bucy'rus, R. R. junction, capital of Crawford co., O. (see map of Ohio, ref. 3–F, for location of county), on Sandusky River, 62 miles N. of Columbus. It is the seat of a large farming and manufacturing community, and has one of the largest union school-houses in the State. There are mineral springs in the town and neighborhood. The skeleton of a mastodon was found in the vicinity in 1838. Pop. in 1870, 3066; in 1880, 3835.

Buczacz, a town of Austria, in Eastern Galicia, often mentioned in the wars between Poland, Hungary, and Turkey. Pop. 9970.

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[*] Originally "beech-wheat," because its seeds are shaped like beech-nuts; in German it is *Buchweizen*, which is literally "beech-wheat."

Bu'da [Ger. *Ofen;* Slavonic, *Budin;* Lat. *Buda*], a free city of the Austrian empire, capital of Hungary, is on the right bank of the Danube, opposite Pesth, with which it is connected by a magnificent suspension bridge. It is 130 miles S. E. of Vienna, and in lat. 47° 29′ N., lon. 19° 3′ E. It is built in the form of an amphitheatre around a hill which rises 485 feet above the level of the sea, and presents a picturesque appearance. This hill is crowned by a citadel and a royal palace. The other remarkable edifices are the cathedral, the palaces of the nobility, and the observatory, which is on the top of a hill called Blocksberg. Here are hot sulphur springs, from which Buda derives its German name of *Ofen—i. e.* "oven." It has manufactures of silks, velvets, cotton and woollen goods, leather, and gunpowder. Large quantities of excellent wine, called *Ofner,* are produced in this vicinity. Buda was formerly considered the key of Christendom. It was taken by Solyman the Magnificent in 1541, and occupied by the Turks until 1686. Buda and Pesth are now considered as one city, styled Buda-Pesth. Pop. in 1880, of Buda alone, about 60,000: together with Pesth, 360,551.

Buda, Old [Ger. *Alt Ofen;* Hun. *O'Buda*], a municipal town of Hungary, in the county of Pesth, on the Danube, almost adjoining the suburbs of Buda. It is supposed to be the ancient *Sicambria.* 16,002.

Buddæ'us (John Francis), a distinguished Lutheran theologian and philosopher, born at Anclam June 25, 1667. At the age of twenty he was master of arts and adjunct professor in the philosophical faculty at Wittenberg, and in 1689 at Jena. He was elected in 1692 professor of the Greek language at Coburg, and in 1693 he was invited to take the chair of moral philosophy at Halle. In 1705 he became professor of theology at Jena. His position was one which harmonized orthodoxy and pietism. His erudition was enormous (he was the most universal scholar among the theologians of his time), yet accurate, and his judgment was of the most solid kind. He wrote more than a hundred books, most of which are still sought by scholars, and several of which are acknowledged standards. His practical skill as an instructor was of a high order, and many of his pupils rose to great eminence. His writings which are most read in our day are "Institutiones Philosoph. eclecticæ," "Theologia Moralis," "Historia Ecclesiæ Veteris Testamenti," "Theologia Dogmatica," "Isagoge ad Theologiam Universam," "Ecclesia Apostolica." In philosophy he was an eclectic. His writings are marked by tact, clearness, logical arrangement, and ease of style. His Latin is above the common standard. He was distinguished for his eminent purity of character, his fidelity to the faith of the Church, and his firmness and moderation towards those who dissented from it. Died at Jena Nov. 19, 1729. C. P. Krauth.

Buddha, or **Buddhism.** See Booddha.

Bud'ding, or **Inocula'tion,** is a mode of propagating improved and choice varieties of fruit which cannot be reproduced by seeds. It is the best mode of propagating peaches, and is convenient in the case of plums, cherries, apples, pears, roses, etc. The best time for budding is the last half of summer. The operation is performed by opening the bark of the stock with a vertical and transverse cut, nearly like a letter T, and inserting into it a leaf-bud of another variety. The length of the bark and wood cut off with the bud is about one inch. These buds are taken from a branch formed in the present or preceding year. They should be cut squarely at the top, so as to fit the transverse section of the bark of the stock. The leaf growing close to the bud should be cut off. The process is finished by tying the bud with bass matting, soft cotton twine, or woollen yarn. The operation just described is called "shield-budding," and is more rapidly performed than grafting.

Bud'dlea, a genus of shrubs of the natural order Scrophulariaceæ, comprises many species, which are natives of warm climates. Some of them are prized for the beauty of their flowers. *Buddlea globosa,* a native of Chili, is cultivated in gardens, and is hardy enough to bear the climate of England. It has globose heads of orange-colored flowers. *Buddlea Neemda,* a native of India, has beautiful flowers.

Bude Light, a name originally applied to a brilliant light invented by a Mr. Gurney of Bude, in Cornwall, England. He introduced a stream of oxygen into a flaming jet of oil or gas. The expense of this system has prevented its general use. The same name is sometimes inappropriately given in England to other similar inventions.

Budg'ell (Eustace), an English essayist, born at Exeter in 1685, was a friend of Addison. He contributed to the "Spectator" a number of essays signed "X." Having lost about £20,000 by the South Sea Bubble, he committed suicide May 4, 1737.

Bud'get [Fr. *bougette*], originally a bag, a small sack with its contents; hence a stock, a store, or collection of things. In England the term is applied to a condensed statement of the revenue and expenditure of the nation; an annual financial statement which the chancellor of the exchequer presents in a speech to the House of Commons. It comprises an exposition of the relative amounts of money received and expended during the past year, an estimate of the probable expenditures of the ensuing year, and sometimes a scheme to meet by a loan or new taxes the actual or anticipated deficit. Budget is also used in France to denote the annual financial statement.

Bud'ington (William Ives), D. D., a Congregational clergyman, born April 21, 1815, at New Haven, Conn., graduated at Yale College in 1834, studied theology at the Yale Divinity School and at Andover, leaving the latter institution in 1839. He was ordained pastor of the First church, Charlestown, Mass., April 22, 1840, where he remained fourteen years. In 1855 (April 22) he took charge of the Clinton avenue Congregational church, Brooklyn, N. Y. In 1845 he published "History of the First Church, Charlestown, Mass.," and also published occasional sermons. He was an eloquent and acknowledged leader in the denomination to which he belonged. D. at Brooklyn, N. Y., Nov. 29, 1879.

Budukhshan. See Badakhshan.

Bud'weis, or **Bud'witz,** a city of Bohemia, on the Moldau, 77 miles S. of Prague. It is well built, consisting of an old town surrounded by walls and three suburbs; has an interesting cathedral, a gymnasium, and an academy; also manufactures of woollen cloths, muslins, damasks, etc. It has a railway (the first on the European continent) extending to Linz. Pop. in 1880, 23,845.

Buel (Jesse), a journalist, born at Coventry, Conn., Jan. 4, 1778. He founded the "Albany Argus," a Democratic journal, in 1813, and in 1834 became the first editor of the "Albany Cultivator," an agricultural paper. He also published the "Farmer's Companion." Died Oct. 6, 1839.

Bu'ell (Don Carlos), an American officer, born Mar. 23, 1818, near Marietta, O., graduated at West Point in 1841, and after serving in the infantry till 1848, became, July 17, 1862, assistant adjutant-general U. S. A., rank of colonel, and Mar. 21, 1862, major-general U. S. volunteers. He served in the Florida war 1841–42, on frontier duty 1843–45, in the military occupation of Texas 1845–46, in the war with Mexico 1846–48, engaged at Palo Alto, Resaca de la Palma, Monterey (brevet captain), Vera Cruz, Cerro Gordo, and Churubusco (severely wounded and brevet major), and as adjutant of the Third Infantry 1847–48, as assistant adjutant-general at Washington, D. C., 1848–49, and at head-quarters of various departments 1849–61. In the civil war he was in command of the department of the Ohio 1861–62, in command of the army of the Ohio 1862, engaged at the battle of Shiloh, siege of Corinth, operations in Northern Alabama, and the retreat to Louisville to cut off the army of Bragg, which he drove from Kentucky, and before a commission to investigate his operations 1862–63. He resigned from the army June 1, 1864, and in 1865 became president of the Green River (Ky.) Iron-works.

George W. Cullum.

Buena Vista, Col. See Appendix.

Buena Vista, cap. of Marion co., Ga. (see map of Georgia, ref. 5-G, for location of county. Pop. in 1870, 525; in 1880, 529.

Buena Vista, a hamlet in Mexico, situated about 90 miles S. W. of Monterey and 7 miles S. of Saltillo, famous for the battle fought in its vicinity between the American forces under Gen. Zachary Taylor and the Mexican army under Santa Anna, Feb. 22–23, 1847. Gen. Taylor, having become assured, from reconnoissances on Feb. 20, that the enemy was in heavy force at Encarnacion, 30 miles in front of Agua Nueva, with the evident intention of attacking his position, withdrew his army on the 21st from the camp at Agua Nueva, which could be turned on either flank, and took up a strong line a little in front of Buena Vista, 7 miles south of Saltillo. A cavalry force left at Agua Nueva to cover the removal of supplies was driven in during the night, and on the morning of the 22d the Mexican army appeared immediately in front of Buena Vista, and at 11 A. M. (Feb. 23) a flag was sent from Santa Anna with a summons of unconditional surrender, to which Gen. Taylor laconically replied that he "declined to accede to the request."

The line occupied by the American troops was one of remarkable strength. The road at this point becomes a narrow defile, the valley on its right being rendered impracticable for artillery by a system of deep and impassable gullies, while on the left a succession of rugged ridges and precipitous ravines extends back towards the mountain which bounds the valley. The features of the ground were such as nearly to paralyze the artillery and cavalry of the enemy, while his infantry could not derive all the advantage of his numerical superiority. The action was commenced about 3 o'clock in the afternoon of the 22d, between the light troops on the left, and skirmishing continued till dark, but no serious attack was made until the morning of the 23d. During the night of the 22d the Mexicans had occupied the mountain-side by light troops, with the intention of forcing the left flank of the American army, and it was here that the action commenced on the 23d, and an obstinate and sanguinary conflict was maintained, with short intervals and varying success, throughout the day, resulting in the repulse of the enemy from our lines, which, however, had been much contracted since morning. An attack of cavalry upon Buena Vista and a demonstration upon Saltillo were also repelled, and during the night Santa Anna abandoned his position and fell back upon Agua Nueva. A reconnoissance made on the 26th disclosed the fact that the retreat had been continued in the direction of San Luis Potosi, and Gen. Taylor resumed his former camp at Agua Nueva on the 27th.

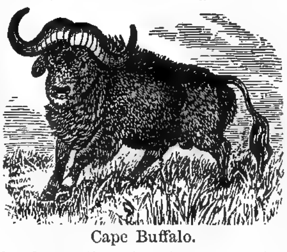
The American force engaged was about 5200, while the Mexican army was stated by Santa Anna in his summons to be 20,000 strong. The American loss was 746, of which 267 were killed; the Mexican loss in killed and wounded was about 2000. Much of the credit of final success in this unequal contest is due to the uniform bravery and efficiency of the regular artillery; the volunteers, though at times displaying the greatest courage, were wanting in discipline and experience, and but for the steady behavior of the regular troops the result must at least have been less decisive and complete.

Buen Ayre, one of the Dutch West India Islands, is near the coast of Venezuela, 30 miles E. of Curaçoa. Length, 20 miles; average width, 4 miles. It has a tolerable harbor, and produces cattle and salt. Pop. in 1879, 4898.

Bue'nos Ay'res, a province of the Argentine Republic, is bounded on the N. E. by the Rio de la Plata, on the E. and S. E. by the Atlantic Ocean, and on the S. W. by the Rio Negro, which separates it from Patagonia. The area is estimated at 63,000 square miles. The surface is an alluvial plain, in which timber and stones are scarce; the soil is mostly fertile. Here are vast treeless, grassy plains, called *Pampas,* which afford pasture to immense herds of cattle and horses. These constitute the principal riches of the inhabitants. This province is not liberally supplied with rivers or running streams, but contains a great number of salt lakes. The principal river besides the Paranâ (La Plata) is the Rio Colorado, which traverses the S. W. part of the province. The climate in the N. part is mild, and has a mean summer temperature of 90° F. It became independent of Spain in 1810, seceded from the Argentine Republic in 1853, and was reunited to it in June, 1860. A large number of Europeans have recently emigrated to this province. Capital, Buenos Ayres. Pop. in 1882, estimated at 612,000.

Buenos Ayres, a seaport of South America, and the capital and largest city of the Argentine Republic, is on the right bank of the La Plata, and 150 miles from the ocean; lat. 34° 36′ S., lon. 58° 22′ W. It is the capital of the state or province of Buenos Ayres, and is nearly opposite to Montevideo, which is 100 miles distant. The streets cross each other at right angles, are paved with granite, and bordered by low brick houses, which usually have each a garden adjoining. The principal public buildings are a large cathedral, numerous churches, the house of representatives, and a college, with which are connected a large library, an observatory, and a normal school. The adjacent country is alluvial, and nearly destitute of timber. The climate is dry and healthy, but variable. Among the disadvantages of this city is a scarcity of fresh water. Its trade and prosperity are impeded by the want of a safe and commodious harbor. The chief exports are precious metals, hides, beef, wool, tallow, horns, and skins. Its growth has been retarded by civil wars and political commotions. Pop. in 1882, 295,000.

Buf'falo, a name given to two species of ruminant animals of the family Bovidæ, the *Bubalus Buffelus* and *Bubalus Caffer*. The former is a native of India, where it has been long domesticated, and is an important and useful animal. It is generally used as a beast of burden in India and also in Italy, where it was introduced about 600 A. D. It is larger and more powerful than an ox, and has a larger head in proportion to the size of the body; the dorsal line rises into a considerable elevation above the shoulders. It has large crooked horns, which are curved first outward and downward, and next backward and upward. The buffalo is partial to marshy places, and is addicted to wallowing in the mud and shallow water. Its flesh is inferior to that of the ox, but the milk of the female is said to be excellent in quality. The tame buffaloes of India are easily managed and guided by a mere rope, and the driver often rides on their backs. The jungles of India are also infested by wild buffaloes of the same species, sometimes called arna or arnee, a fierce and dangerous animal, which is more than a match for a tiger. The Cape buffalo (*Bubalus Caffer*) is a native of South Africa, and has not been domesticated. It has large horns, the bases of which are close together. The horns spread or diverge laterally, are next bent downward, and have the point curved upward and inward. The animal measures about eight feet from the base of its horns to its tail, and is about five and a half feet in height. It is a dangerous animal and will attack men without provocation, but it is sometimes mastered by the lion. Its hide is so thick and tough that the Caffers make of it shields impenetrable to a musket-ball. Vast herds are found in S. Africa. (For the American buffalo see Bison.)


Cape Buffalo.

Buffalo, capital of Wright co., Minn. (see map of Minnesota, ref. 9–E, for location of county), on a small lake about 45 miles W. N. W. of St. Paul. Pop. in 1880, 143; of township in 1885, 928.

Buffalo, capital of Dallas co., Mo. (see map of Missouri, ref. 6–F, for location of county), 4 miles W. of Niangua River and 33 miles N. E. of Springfield, has fine iron and lead ore, several mines in operation, and also has coal. Pop. in 1870, 278; in 1880, 437.

Buffalo, a city, port of entry, and important R. R. and commercial centre, capital of Erie co., N. Y. (see map of New York, ref. 5–C, for location of county), in lat. 42° 53′ N., lon. 78° 55′ W., at the foot of Lake Erie, and at the head of Niagara River. It is also the western terminus of the Erie Canal. In population and wealth it is the third city in the State. The city is delightfully situated, having a water-front of about five miles, with numerous substantial and extensive piers, breakwaters, basins, and canals, constructed at an expense of several millions of dollars, partly by the Federal government and partly by the State and municipal authorities. It has one of the finest harbors on the lakes, formed by the Buffalo River, navigable for about two miles from its mouth. The entrance is protected by extensive breakwaters. The city extends down the Niagara River and Lake Erie about five miles, and at right angles with it the same distance.

Buffalo is noted for its wide and beautiful streets, and the profusion of trees and shrubbery with which they are decorated. The report of the State assessors for 1881 puts the valuation, for the purpose of taxation, at $92,256,315; and exempt from taxation, $11,163,970. The bonded debt of the city, Dec. 31, 1881, was $7,351,613.89, a decrease during the year of $378,586.27. The city treasurer received from all sources $3,519,252.11. The Niagara is here crossed by a fine iron truss railroad bridge, completed in 1873 at a cost of $1,500,000.

Buffalo has extensive waterworks, the property of the city; several gas companies; a magnificent park, and boulevards almost surrounding the city; a State normal school and normal school of practice, a central high school, and sixty first-class district schools, besides forty private academies, colleges, and schools. The city and county hall, built of granite, was completed in 1876 at a cost of $1,400,000. The State is erecting an insane asylum, to accommodate 1000 patients, and to cost over a million dollars. The city contains the Fitch Institute, a music-hall, and a Merchants' Exchange. There are four large markets, thirty-eight grain-elevators, a stone post-office belonging to the U. S. government, a State armory and arsenal, a commodious hall and library building belonging to the Young Men's Association and another of the Young Men's Christian Union Association, and over one hundred church edifices. Of the latter, two (one Roman Catholic and the other Episcopalian) are imposing cathedrals. With literary, benevolent, and educational institutions Buffalo is well supplied. Among them may be named the Young Men's Association, with a library of 50,000 volumes, and real estate and buildings worth $350,000; the Society of Natural Science, with an extensive collection and a large museum of casts of fossil remains; a well-endowed art-gallery; an historical society, law library, decorative art society, mechanics' institute, Young Men's Christian Union, Grosvenor Library (free), five hospitals, orphan asylums, a medical college, a female seminary, and several Catholic colleges. Buffalo has over twenty cemeteries. It has thirty newspapers and periodicals, ten of them dailies. There are eleven banks of discount, with an aggregate capital of $3,500,000, and four savings banks, with deposits amounting to about $23,600,000.

Commerce.—Buffalo is the great N. terminus of the lake commerce, especially of the grain, cattle, and lumber trade. In 1883, grain receipts by lake, 76,079,930 bushels (including flour estimated as wheat), and 25,042,775 by Lake Shore and Michigan R. Rs.; by other R. Rs., not reported. The lumber trade is very extensive; imports of all kinds of coal in 1883 were 4,169,021 tons; exports by lake, 1,253,940 tons, and the coal trade is rapidly increasing; the receipts of live stock in 1883 were 603,755 cattle, 2,379,580 hogs, 1,622,000 sheep, 17,040 horses; the exports, 35,855 car-loads of cattle, 13,958 of hogs, 4660 of sheep, and 999 of horses; stock slaughtered in 1883 (estimated), 47,260 cattle, 570,630 hogs, 238,800 sheep. In 1883 the arrivals and departures of 6790 vessels aggregated 4,500,000 tonnage.

The manufactures are rapidly increasing. The census of 1880 reports 1183 manufacturing establishments; capital, $26,847,937; hands employed, 18,021; wages paid, $7,442,109; value of products, $42,937,701. Its stove works, iron and nail, and malleable iron works, planing-mills, grape-sugar, and starch works are very extensive. The census of 1880 gives the following: Value of products of foundries and machine-shops, $3,577,029; of slaughtering and meat-packing products, $3,441,280; glucose, $3,075,000; men's clothing, $2,747,475; flouring and grist-mill products, $2,251,848; malt, $2,002,893; leather, $2,268,100.

In Dec., 1813, the village, then containing about 200 inhabitants, was burned by the British. After the war it speedily began to increase, and in 1828 contained about 7000 inhabitants, the completion of the Erie Canal in 1825 giving a strong impetus to its growth. It became a city in 1832, and then had 15,000 inhabitants; in 1835 it contained 15,700; in 1840, 18,200; in 1845, 30,200; in 1850, 42,300; in 1855, 74,200; in 1860, 81,130; in 1865, 94,210; in 1870, 117,714; in 1880, 155,134; and in April, 1884, about 200,000.

William Thurstone,
Commercial Editor of "Courier and Republic," and Sec. of Buffalo Merchants' Exchange.

Buffalo, capital of Johnson co., Wy. (see map of Wyoming Territory, ref. 5–E, for location of county). Pop. not in census of 1880.

Buffalo Bayou (or **River**) of Texas flows eastward through Harris co., passes by Houston, and enters Galveston Bay. Steamboats can ascend from its mouth to Houston, which is about 40 miles from the bay.

Buffalo Gap, capital of Taylor co., Tex. (see map of Texas, ref. 3–F, for location of county). Pop. not in census of 1880.

Buffalo Springs, mineral springs of Mecklenburg co., Va., 7 miles W. of Clarksville. The waters of the springs are remarkably stimulant, and belong to the saline chalybeate class. They are especially recommended for various diseases of the mucous membranes.

Buffon, de (Georges Louis Leclerc), Comte, a celebrated French naturalist and philosopher, born at Montbar, in Burgundy, Sept. 7, 1707. He was liberally educated, and travelled in his youth in Italy and England. In 1739 he was elected to the Academy of Sciences, and appointed intendant of the royal garden in Paris. He published in 1749 the first three volumes of his "Natural History," in which he was assisted by Daubenton. Twelve other volumes of it appeared between 1749 and 1767. This work, which made an epoch in the study of the natural sciences, displays a brilliant imagination and presents many ingenious ideas. He was admitted into the French Academy in 1753. Among his most admired works is the "Epochs of Nature" ("Epoques de la Nature"), which appeared in a supplement to his "Natural History." He received from the king the title of Count de Buffon in 1776. Died in Paris April 16, 1788. (See Condorcet, "Éloge de Buffon;" Cuvier, "Éloge de Buffon," prefixed to an edition of the "Natural History," 36 vols., 1826; Flourens, "Buffon: Histoire de sa Vie, etc.," 1844.)

Bufonidæ. See Toad.

Buford (John), an American officer, born in 1826 in Kentucky, graduated at West Point in 1848, captain Second Dragoons Mar. 9, 1859, and Dec. 16, 1863, major-general U. S. volunteers. He served on frontier duty 1848–61, as quartermaster of the Second Dragoons 1855–58, in the Sioux expedition 1855, engaged at Blue Water, in quelling the Kansas disturbances 1856–57, on the Utah expedition 1857–58. In the civil war he served as assistant inspector-general (major), making inspections 1861–62, in command of cavalry brigade in Northern Virginia campaign 1862, engaged at Madison Court-house, Kelley's Ford, Thoroughfare Gap, and Manassas (wounded), as chief of cavalry of the Army of the Potomac in Maryland campaign, engaged at South Mountain and Antietam, in Rappahannock campaign, commanding cavalry brigade, 1862–63, engaged at Fredericksburg, Stoneman's raid, and Beverly Ford, in command of a division of cavalry in the Pennsylvania campaign 1863, engaged at Gettysburg and numerous skirmishes, in Central Virginia 1863, engaged at Culpeper, Bristow Station, and numerous movements and skirmishes. He was an admirable cavalry officer, and from the effects of exposure and wounds died Dec. 16, 1863, at Washington, D. C.

George W. Cullum.

Buford (Napoleon B.), an American officer and engineer, born Jan. 13, 1807, in Woodford co., Ky., graduated at West Point in 1827, and April 15, 1862, brigadier-general U. S. volunteers. He served, while lieutenant of artillery, on garrison and topographical duty, and as assistant professor at the Military Academy till Dec. 31, 1835, when he resigned. He was civil engineer on the Licking River improvement 1835–42, iron-founder at Rock Island, Ill., 1843–61, president of the Rock Island and Peoria R. R. 1857–61, and president of the bank of the Federal Union, Rock Island, 1858–61. In the civil war he was colonel of the Twenty-seventh Illinois Volunteers till promoted brigadier-general, engaged in the battle of Belmont, demonstration on Columbus, Ky., attack of Island No. 10, capture of Union City, Ky., expedition to Fort Pillow, siege and battle of Corinth, Miss., siege of Vicksburg, and in command of Helena, Ark. Brevet major-general U. S. volunteers Mar. 13, 1865, for gallant and meritorious services, and Aug. 24, 1865, mustered out of volunteer service. He was superintendent of a mining company in Colorado, special U. S. Indian commissioner 1867–68, and Union Pacific Railway commissioner 1868–69. D. Mar. 28, 1883.

George W. Cullum.

Bug, or **Bog,** a river of Russian Poland, rises in Galicia, flows nearly northward and north-westward, and after a course of about 400 miles enters the Vistula at the fortress of Modlin, about 18 miles N. W. of Warsaw.

Bug, or **Bog** (anc. *Hypanis*), a river of Russia, rises in Podolia, flows nearly south-eastward, and enters the estuary of the Dnieper 30 miles W. of Kherson. Its whole length is estimated at 400 miles. It is navigable for small vessels from its mouth to Vosnesensk, upwards of 100 miles.

Bugeaud (Thomas Robert), duc d'Isly, a French general, born Oct. 15, 1784. Soon after the revolution of 1830 he was created a marshal of France. Having won several victories in Algeria, he was appointed governor-general of the same in 1840. He defeated the army of the emperor of Morocco at Isly in 1844. During the revolution of Feb., 1848, he commanded the army at Paris. Died of cholera in Paris June 10, 1849.

Bu′genhagen (Johann), surnamed Pomeranus, a learned German Protestant Reformer, born at Wollin, in Pomerania, June 24, 1485. He was converted to the doctrines of Luther in 1520, and became professor of theology at Wittenberg in 1522. He was a devoted friend of Luther, whom he assisted in the translation of the Bible, and he wrote several religious works. He organized the churches of Hamburg, Brunswick, and Denmark. Died April 20, 1558.

Bu′gis, a people of the Malay Archipelago, chiefly inhabiting Celebes and Macassar. They are noted for their commercial enterprise, and own many vessels employed in the navigation of the East Indian seas. They are muscular, middle-sized, and of a light-brown color, and have made considerable progress in civilization. They manufacture cotton cloth, build durable sailing-vessels, and are said to be skilful workers in copper and iron.

Bu′gle, a brass musical wind instrument, which has been improved by keys so as to be capable of all the inflections of the scale.

Bugle (*Ajuga*), a genus of plants of the natural order Labiatæ, has an irregular corolla with a very short upper lip and trifid lower lip. The species are mostly natives of the colder parts of Europe or Asia. The *Ajuga reptans* is common in British pastures and woods. The Alpine bugle (*Ajuga Alpina*) has beautiful flowers.

Bu′gloss [Gr. βούγλωσσος, *i. e.* "ox tongue," perhaps from the shape and roughness of its leaves], a common name given to several species of plants of the order Boraginaceæ and of the genera *Anchusa* and *Lycopsis*. The *Lycopsis arvensis* is a common weed in the grain-fields of Great Britain. The *Lycopsis* has a funnel-shaped corolla with a curiously curved tube. The *Echium vulgare*, called viper's bugloss, is a native of Europe and naturalized in the U. S.

Bugul′ma, a town of Russia, in the government of Samara, 170 miles S. E. of Kasan. Pop. 5279.

Buguruss'lau, a town of Russia, in the government of Samara, 65 miles S. of Bugulma. Pop. 12,870.

Buhl-Work, or **Boule-Work,** a kind of marquetry or inlaid work in wood, gilt metal, or tortoise-shell, the name of which is derived from its inventor, Boule, a French cabinetmaker (1642–1732). He employed veneers of dark-colored tortoise-shell, inlaid with brass, and was patronized by several sovereigns. A German named Reisner made cabinets which were highly prized, in which he used woods of contrasted colors in the production of flowers and other ornamental designs.

Bujalan'ce, a town of Spain in the province of Córdova, about 18 miles E. of Córdova. It is surrounded by a wall flanked with old towers, and has an old Arabian castle and a college. Here are manufactures of woollen goods, glass, and pottery. Pop. 9974.

Bukâ'a, the Arabic name of Cœle-Syria (which see).

Bukovi'na, a province of Austria, is bounded on the N. by Galicia, on the E. and S. by Roumania, and on the W. by Hungary, Transylvania, and Galicia. Area, 4035 square miles. With the exception of both banks of the Pruth, its chief river, the country is mountainous throughout. The climate is severe, but healthy. It has very little commerce and industry. The chief occupations of the inhabitants are agriculture and cattle-raising. Iron, copper, and rock-salt are mined in large quantities. Bukovina was originally a part of Transylvania, with which country it passed under Turkish rule in 1529, was ceded to Austria in 1777, united with Galicia in 1786, and organized as a separate crown-land in 1849. Pop. in 1880, 569,599.

Bula'ma Boil, a painful affection of the skin somewhat resembling an ordinary boil in appearance. It prevails in Bulama and the neighboring islands, known as the Bissagos (which see). It is said to be caused by the larva of some insect, and that the only cure for it is to remove the larva, which burrows beneath the skin.

Bulb [Gr. βολβός; Lat. *bulbus*], in botany, a short stem or bud (usually subterraneous), covered with imbricated scales, having at their base a disk, from which the roots grow downward, while from the middle of the scales an annual herbaceous stem grows upward. The scales are regarded as modified leaves, and are sometimes all fleshy; sometimes the outer scales are membranous, as in the onion. The corm of the crocus is often called a solid bulb. Plants which are produced from bulbs are usually called bulbous-rooted. The bulb is generally subterranean, but sometimes grows above ground in the axils of the leaves, as in the tiger lily. When the scales are broad and enwrap all that is within, so as to form a succession of coats one over another, the bulb is said to be tunicated. The onion, tulip, and hyacinth are familiar examples of such bulbs. Most bulbs, if removed from the ground when vegetation is most dormant, may be kept in a dry place without injury. The Cape of Good Hope has many bulbous-rooted plants.

Bul'bul, the Persian name of the nightingale, is sometimes used by English poets. The same name is given by the people of India to a different species of bird, the *Pycnonotus hæmorrhous*, of the tribe Dentirostres. It is a small bird of brilliant plumage, and remarkable for its pugnacity and its sweet song.

Bulga'ria (anc. *Mœsia Inferior*), a new principality of Europe, is bounded on the N. by the Danube, on the E. by the Black Sea, and on the S. by the Balkan Mountain range, which separates it from Rumili, and on the W. by Servia. Area, 24,360 square miles. The surface is level in the N. and mountainous in the S., and is generally well wooded. The soil in some parts is fertile. It is drained by numerous small tributaries of the Danube. The chief articles of export are horned cattle, grain, wine, iron, wood, hides, wax, and attar of roses. The principal towns are Varna, Widin, Silistria, Sophia, and Schoomla. The Bulgarians belong to the Greek Church, but have for many years been endeavoring to become independent of the patriarchate of Constantinople, and to have all the Bulgarian dioceses of Turkey united under one Bulgarian exarch. The demand was granted by the Turkish government in 1872. They are of the Finnish-Ugrian race, but adopted very early the Slavonian language. This country was conquered by the Turks in 1392. By the treaty of Berlin, in 1878, it was made an autonomous and tributary principality under the sultan of Turkey. Pop. 1881, 1,998,983. Capital, Sophia. In Oct., 1885, Eastern Roumelia (area about 13,500 square miles, with 815,946 pop. in 1880) was annexed to Bulgaria.

Bulk'heads, in a ship, are the partitions between the several portions of the interior, whether to separate it into rooms or as a safeguard in case of wreck. In ships of war the bulkheads or partitions between the several cabins or storerooms are chiefly of wood, and most or many of these are removed when prepared for action, in order to obtain clear space for working the guns. In emigrant ships the bulkheads between the cabins are frequently mere lattice-work.

Watertight bulkheads are among the improvements in modern shipbuilding; they are iron walls running athwart the hold, as a means of dividing it into several portions; the interior is thus cut off into cells, each watertight in reference to its neighbors. When such a ship is leaking in any one of the compartments, there is thus a chance that the others may be kept dry until the damage is repaired. Most of the large passenger-steamers are to some extent provided with these bulkheads.

Bulk'ley (Eliphalet Adams), born at Colchester, Conn., June 29, 1803, graduated at Yale in 1824, became a lawyer of Hartford, Conn., was for many years the president of life insurance companies, and accumulated a large fortune. Died Feb. 13, 1872.

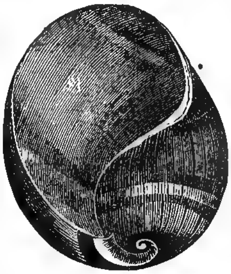
Bull [Lat. *taurus;* Fr. *taureau*], the male of animals belonging to the family Bovidæ and genus *Bos*. (See Bovidæ and Ox.) Also the name of one of the twelve signs of the Zodiac, and of a constellation which does not coincide with the sign. (See Taurus.)

Bull [Lat. *bulla*, a "seal;" so called from the seal mentioned below], or **Papal Bull,** an ordinance or decree of the pope, equivalent to the edicts, proclamations, or letters-patent of secular sovereigns, some of which are, however, called bulls. (See Bull, Golden.) All bulls are written in Latin, except those addressed to the United Greek churches. They are generally designated by the first words of the text; thus the bull issued in 1536 against heretics was called the bull "In Cœna Domini," and that directed against the Jansenists in 1713 was the bull "Unigenitus." The publication of a bull is termed fulmination (from the Lat. *fulmino, fulminatum*, to "hurl a thunderbolt," *fulmen*). Bulls are written on parchment, and the leaden seal of the Church is appended to every bull by means of a silken cord if the bull be a gracious one, but if it be severe the cord is of hemp.

Bull (Ole Bornemann), a famous Norwegian violinist, born at Bergen Feb. 5, 1810. He visited Paris in his youth, and afterwards performed in Italy and England with great applause. In 1845 he came to the U. S., purchased a large tract of land in Pennsylvania, and founded the colony of Oleona. This proved to be a failure, and he returned to Europe. He has since resided in the U. S. several times. D. at Bergen, Norway, Aug. 18, 1880.

Bul'la, a Latin word signifying a "bubble," also a stud or boss with which the ancient Romans ornamented their dress or military equipments; an amulet or ornament, in the shape of a heart, worn round the neck by noble Roman children until they were seventeen years old, when the bulla was consecrated to the Lares.

Bulla, a genus of gasteropodous mollusks, having the male and female organs of sex in the same individual. They have a convoluted and generally thin shell, which serves as a protection for the gills, and which in some species is large enough for the entire animal; in others it is itself enveloped in the mantle. The mouth of the shell is large, extending the whole length, widening towards one end, the lip being acute. The gizzard is very muscular, and among its thick coats, in some species, are found calcareous plates, which, being moved against each other by muscles, serve to grind the food. All the species are marine, and some are found on the American coasts. Some, from their form and fragility, are called bubble-shells. The *Bulla velum* of the Indian and European seas is one of the most elegant.



Bulla velum.

Bull-baiting, a sport once very common in England, and in which all classes delighted, but now rare even among the lowest. It consists in causing a bull to be attacked by dogs; and that the bull may be made as furious as possible, his nose is sometimes blown full of pepper. Another form of this sport is to fasten the bull by a rope, and to send bull-dogs against him, one at a time, to seize him by the nose; this is called *pinning* the bull. No small enjoyment is derived from the success with which the attacks of the dogs are met by the bull lowering his head and receiving them on his horns, often tossing them to a great distance.

Bull-dog [so-called from the now obsolete practice of causing this animal to fight with the bull], a variety of the dog especially bred in England, and more remarkable for courage, persistency, and strength than for docility or intelligence. It is now much less frequently bred than in past times. The size of the neck and fore quarters of this dog is quite in excess of the development of the other parts. The bull-dog is one of the most fierce, and even dangerous, of his species. Its chief value at present is for crossing with other breeds. The greyhound, the terrier, and the pointer, each have their courage and persistency much improved by this cross, if judiciously made.

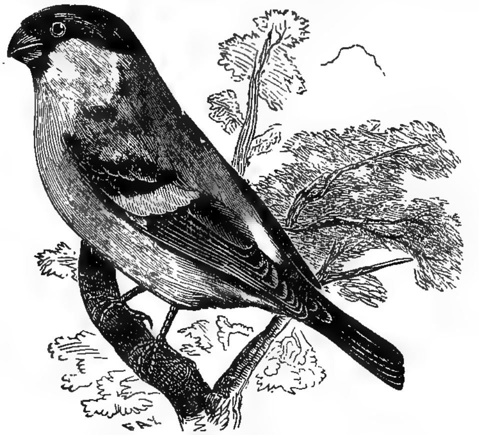
Bulldozing. See Appendix.

Bull'et [Fr. *balle;* Ger. *Kugel*], a projectile of lead to be discharged from various kinds of small-arms. For smooth-bore arms bullets are usually spherical, but for rifled musketry various forms of the elongated bullet are used. Most of these bullets have an expansive base, either hollow or plugged with wood; the design being to force the soft lead outward, so as to cause it to fit the grooves of the rifle, and thus give the bullet a rotation around its long axis during the motion forward. This rotation, as is well known, increases the range and precision. Bullets were formerly always cast, but now they are more frequently stamped in steel dies.

Bull'etin [Fr.], in diplomatics, a term equivalent to schedule, and variously applied to different public acts. In recent times the word is often used to denote an official report, a despatch of a military commander, and in a wider sense any public notice or announcement, especially of recent events. In France the ticket or slip of paper which each elector uses in voting at elections is called a bulletin. In the U. S. official bulletins of the weather are issued daily by the war department.

Bull-fight [Sp. *corrida de toros* or *fiesta de toros*], a combat of men with bulls for public entertainment. They were common in Thessaly and in Rome under the emperors, where they were introduced by Julius Cæsar B. C. 45, though in later times they were forbidden. They were introduced into Spain by the Moors before 800 A. D. They are still a favorite pastime in Spain, Spanish America, etc. In Spain they were abolished by Charles IV., but Joseph Bonaparte re-established them, the mass of the population being passionately fond of the sport. Bull-fights were at one time instituted by the monarchs themselves; at present they are held either as private speculations or for the benefit of public institutions. In Madrid the proceeds go to the hospital. The fights take place in the Plaza de Toros, round which the seats rise like the steps of a stair, with a tier of boxes over them. This plaza at Madrid is capable of containing 10,000 people, who pay a high price for admission. The men employed in the fight have generally been bred to it, but amateurs may take part. The bull-fight is divided into three acts. The performers in the first are the *picadores;* in the second, the *chulos;* the last act devolves on the *matador*. The picadores are mounted, dressed like knights of the olden time, and armed with a lance; they take position in the middle of the arena. The chulos, on foot, are gay with ribbons and bright-colored cloaks. The matador, or chief combatant, is on foot. He is handsomely dressed, and holds a sword and a *muleta*, a stick with a piece of scarlet silk attached. On a sign given by the magistrate a bull is let out; the picadores stand waiting his charge. With a brave bull they act on the defensive; with a cowardly one, on the offensive; and should their stabs be ineffectual in rousing the animal, the beast is hooted by the crowd, and stabbed ingloriously. The bull frequently kills several horses, and sometimes one or more men. When the bull begins to tire the picadores are succeeded by the chulos with *banderillas*—darts about two feet long, ornamented with flags—which they stick into the animal. Sometimes these darts have fire-crackers attached. The matador now enters alone. As soon as the bull sees the muleta, he generally rushes at it, and the matador dexterously plunges the sword in before the left shoulder, and the animal falls. The matador is greeted with acclamations, and not less so the bull should he wound or kill the matador, in which case another matador steps into the arena. Ten and sometimes even twenty bulls are despatched in a day, twenty minutes being about the time taken for one.

Bull-Finch (*Pyrrhula Europæa* and *major*), a European bird of the family of Fringillidæ, is about the size of the common sparrow, now naturalized in the U. S., and often kept as a cage-bird, especially by the Germans. It is easily trained. The genus is characterized by its short, thick, rounded bill, of which the sides are inflated and bulging, and the tip of the upper mandible overhangs that of the lower. The plumage is bluish-gray above, the breast is of a bright tile red, and the crown of the head and the greater wing-coverts are black. It builds on bushes or trees near the ground, and feeds chiefly on seeds, berries, and buds. Its song is not naturally very agreeable, but it can be improved by education, and trained bull-finches are sold for high prices. The pine bull-finch (*Pinicola eucleator*), is a beautiful northern bird of both hemispheres. The male is of a splendid red, the female an orange-green.



Bull-Finch.

Bull-frog (*Rana pipiens*), a frog found in the U. S., is of an olive-green color, and is generally eight to twelve inches long, though in some cases it attains the length of nineteen to twenty-one inches. It derives its name from the remarkable loudness of its voice, which is bass and resembles the bellowing of a bull. It is almost wholly aquatic. The hind legs of this frog are often used as food.

Bull, Golden, a term applied to a decree or enactment of Charles IV., emperor of Germany, published in 1356, in two diets held in succession at Nuremberg and Metz, in order to fix the laws in the election of emperor and to regulate the number and privileges of electors. It is preserved at Frankfort-on-the-Main. Another "golden bull," of Andrew II. of Hungary in 1222, fixed the privileges of the nobles, and was regarded as a national constitution.

Bull'head, the popular name of small fishes of the genus *Cottus*, of which there are several species in Europe and America. Another name commonly given them is "miller's thumb." The common catfish and several others are locally known as bullheads.

Bullinger (Heinrich), born at Bremgarten, in the canton of Aargau, July 18, 1504, died in Zürich Sept. 17, 1575, studied theology in Cologne, but was by the writings of Luther, Melanchthon, and Zwingli led to embrace the Reformation. In 1529 he was chosen pastor of his native city and married, and in 1531 he succeeded Zwingli as pastor of Zürich. He wrote with great dignity against Luther in the controversy concerning the Lord's Supper, but he finally came to an agreement with Calvin; and he drew up the Second Helvetic Confession, 1566, the most elaborate Reformed creed. Of his numerous writings—commentaries, sermons, dogmatical expositions, polemical treatises against the Lutherans, the Anabaptists, etc.—there is no collected edition; but they enjoyed great authority in their time, especially in England, and were often reprinted. His "Life" was written by Carl Pestalozzi (1858) and by Roget Christoffel (1875). (See also G. R. Zimmermann, "Die Züricher Kirche und ihre Antistes," Zürich, 1877.)

Bullion, uncoined gold and silver in bars or other masses. In political economy the term is also used to denote gold and silver coin. The word was originally applied to the mint, or place where the precious metals were alloyed and converted into stamped money. In 1810 a celebrated bullion report was made to the British Parliament by Francis Horner and Sir Robert Peel, who promoted the resumption of specie payments, which had long been suspended.

Bul'lions (Peter), D. D., a learned divine and educational writer, born in Perthshire, Scotland, in 1791, removed to America in 1817, and became in 1824 professor of Latin and Greek in the Albany academy. He published a "Latin Reader," a "Greek Reader," a "Latin-English Lexicon," etc. which are highly esteemed. Died Feb. 12, 1864.

Bullitt (Alexander Scott), born in Prince William co., Va., in 1761, emigrated to Kentucky in 1784, became a prominent politician, was president of the State senate for several years, and lieutenant-governor (1800–04). Died in Jefferson co., Ky., April 13, 1816.

Bullock (Alexander Hamilton), LL.D., b. in Royalston, Mass., Mar. 2, 1816, and graduated at Amherst in 1836. He was called to the bar in 1841, became a resident of Worcester, Mass., and held many important public offices. He was governor of Mass. (1866–69). D. Jan. 17, 1882.

Bullock (Archibald), a native of Charleston, S. C., was a delegate to the Philadelphia Congress from Georgia in 1775, and in the following year president of the executive council of Georgia, the highest office in the State. Died in 1777.—His son, William B. Bullock (died Mar. 6, 1852), was in 1813 U. S. Senator from Georgia.

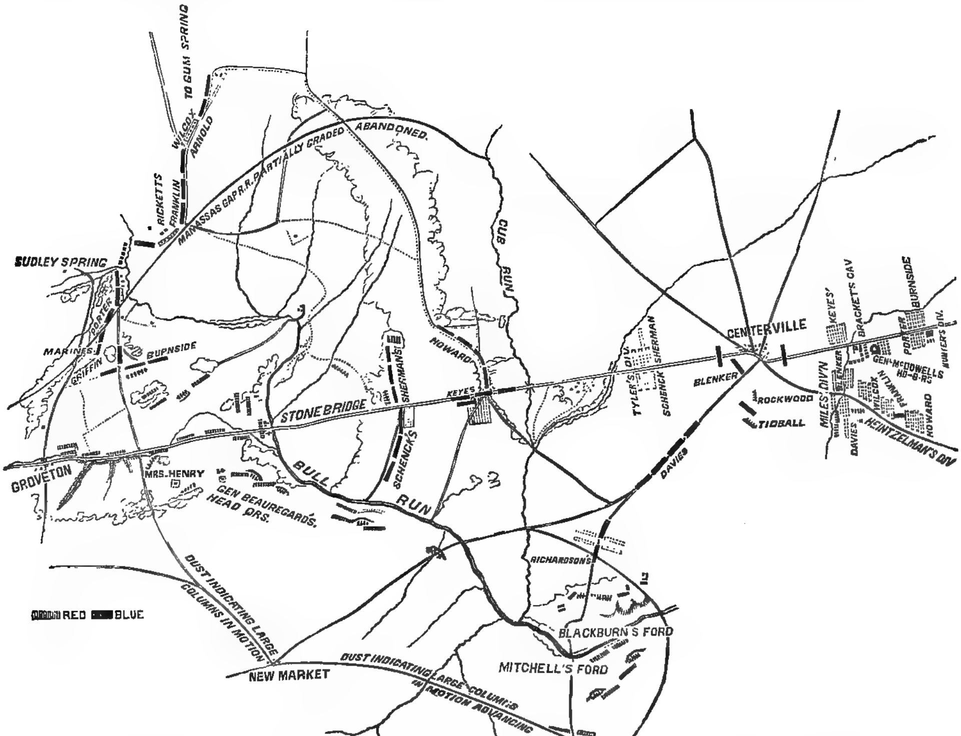
Bullock (Charles), born in 1829, educated in St. Bee's College, Cumberland, was appointed rector of St. Nicholas, Worcester, 1860; removed to Blackheath in 1874; founded and edited several periodicals—"The Fireside," "Home Words," "The Day of Days," and "Hand and Heart," afterward called "The Church Standard;" he also published "England's Royal Home," "The Home-Life of the Prince-Consort," etc.

Bullock (Rufus B.), the first governor of Georgia under the new constitution adopted in pursuance of the reconstruction measures of Congress. He was a native of New York, but had resided some years before and during the war in the city of Augusta, Ga. He was a member of the constitutional convention which was called in 1867, and took an active part in its proceedings. On the adoption of the constitution formed by it, he was declared to be duly chosen at the same election in 1868 governor of the State under it for the term of four years. This office he held until the fall of 1871, when he resigned it and abandoned the State.

Bull Run, Battle of. The battle of Bull Run has, with propriety, been classed as one of the "Decisive battles of the War." As the *first* pitched battle—the first trial of strength between the North and South—its inception and issue were pregnant with grave consequences to the future of a struggle in which the two combatants were yet hesitating to engage. In its purely *military* results it has been well said that "the cannon of Bull Run echoed henceforth on every battle-field of the war." The bombardment of Fort Sumter found the government completely destitute of an organized force—the army scattered on distant frontiers (a large portion indeed captured through the agency of its commander), and the navy dispersed to remote quarters of the earth. For no inconsiderable period the possession of the national capital seemed to be due rather to hesitation or irresolution of the Confederates than to its capability of vigorous defence. But the President's call for 75,000 volunteers for "three months" (his power to call out the militia to "suppress insurrection" being thus legally limited) had assembled in Washington and elsewhere a large militia force which, strengthened by such portions of the regular force as could be made available, had been diligently trained under direction of army officers.

Simultaneously with our occupation of the Virginia shore of the Potomac, the Confederates had established themselves at "Manassas Junction," a point on the railroad twenty-five miles west from Alexandria, and the junction of the great southern railroad route (connecting Washington with Richmond and the South) and the Manassas Gap Railroad, leading to the valley of the Shenandoah, where another Confederate force under Johnston confronted Patterson, who had recently crossed the Potomac at Harper's Ferry.

The occupation of Manassas was recommended to the Confederates by the fact that it controlled the railroad routes, and was itself a strong position. An elevated plateau, in the crotch, formed by the Occoquan and its principal tributary from the north, Bull Run, of which the beds are canal-like cuts in horizontal strata of red sandstone, it was of difficult approach to an attacking army, while the general character of the country, broken, wooded, with few roads fit for the movement of an army, was favorable to the defence.



Map of the Battle of Bull Run, July 21, 1861.

Leading almost directly west from Alexandria, diverging slightly to the north from the railroad, a macadamized road led to Centreville, twenty-two miles distant.

From Centreville, a little west of south and six or seven miles distant, lay Manassas Junction. About midway between these two points flowed the rivulet of Bull Run (the real defensive line of the enemy) in a general direction from north-west to south-east.

A road led from Centreville almost directly to the "Junction," crossing Bull Run three miles from Centreville at "Mitchell's Ford," a short distance below which is "Blackburn's Ford." The turnpike before mentioned continued its westerly course towards Warrenton, in a nearly straight line beyond Centreville, crossing Bull Run at the "Stone Bridge," four miles distant. Somewhat eastwardly of south, a country road from Centreville crossed Bull Run and the railroad at "Union Mills."

The Confederate force was distributed along Bull Run from Union Mills to the Stone Bridge (nearly eight miles), with reserves and a fortified position at or near the Junction.

The line was a strong one, for the stream, though containing but little water at that season, was, owing to the character of the bed and to the abrupt and wooded slopes of its right bank, a formidable obstacle.

The army of General McDowell, which marched to the attack of this position, numbered about 30,000 men. Save perhaps 700 or 800 regular troops (fragments of regiments) of the old army, it was composed wholly of raw volunteers, none of whom had been in a soldier's garb more than two or three months, and at least half of whom were enlisted only for a term of three months, then just about expiring. Such an army as this was certainly not the best suited for an offensive campaign. Troops *utterly* raw; brigades and divisions, the component parts of which had never been brought in contact before, commanded by officers who, though generally of ability, were for the first time exercising these extensive commands, and who had hardly seen the troops they commanded.

Such was the army which marched from the banks of the Potomac on the afternoon of July 16th. It moved in four columns, one by the turnpike, one by the lateral country roads on the right, one on the left of the railroad, and another between the turnpike and railroad, following what is known as the "Braddock" road, from its having been made by that general on his memorable march to Fort Duquesne in 1754, which terminated in his disastrous defeat and death.

The "plan" of the campaign organized by General McDowell had been carefully studied by him in conjunction with his staff officers for a week or two before the movement commenced. It was a feature of it, after reaching Fairfax Court-house, to make a sudden movement to the left, crossing the Occoquan just below the junction of that stream with Bull Run, aiming at the enemy's railroad communications. His personal reconnaissances in that direction, made on the 18th, led him to consider the country impracticable for the operations of his army.

However imperative it was (for many reasons) to lose no time (a regiment the term of which expired on the eve of the battle, actually marched "to the rear," as Gen. McDowell expressed it, "to the sound of the enemy's cannon") it was out of the question to attack until some plan could be devised which would promise success. A day was accordingly spent in reconnaissances.

The "Stone Bridge," already mentioned as forming the left of the enemy's defensive position, was a single arched structure over the narrow stream. The passage was found to be guarded by field-guns, and the road and adjacent ground beyond obstructed by formidable abattis. Several roads were ascertained to lead to fords between Blackburn's and the Stone Bridge, but they were mere by-paths, the opposite banks of the stream generally steep and tangled, and probably obstructed.

It was found that a couple of miles above the Stone Bridge there was a good ford at "Sudley Spring," which was but slightly guarded, and that above that point the stream was, almost everywhere, easily passable. No continuous road communicated from the turnpike with the "Sudley" ford, but our reconnaissances showed that the intervening country was almost everywhere practicable to all arms.

The writer finds in his note book the following memorandum of a "plan of battle" or attack, which, founded upon the above results of reconnaissance, was submitted to Gen. McDowell.

1st.—One division to advance on Warrenton Turnpike at 3 o'clock to-morrow morning. The leading brigade to threaten the bridge over Bull Run—throwing skirmishers into the woods on both flanks. No serious effort will be made on the bridge but artillery may be opened upon it, as if to open the way for an assault, and the operation to be conducted *as if* an assault were intended.

The 2d, 3d, and 4th Brigades to turn to the right at the road ½ to ¾ of a mile beyond "Cub Run." On reaching the forks to the two fords a Brigade will turn off on the *left* fork advancing on it *just enough* to clear the route for the passage of the two following Brigades which take the *right* fork towards Sudley Spring. The ford at Sudley Springs will be turned by a march around and some 200 yards above it. The leading brigade will be followed by the one in rear and the whole force advance rapidly by the road from Sudley Spring southward to reach the Warrenton 'Pike by the shortest route. The brigade left on the road to the lower ford will then pass over. Detachments from the advanced brigades should be sent to take in rear the defenders of the lower ford and Warrenton 'pike bridge. The brigade left at the Stone Bridge will cross over and join the other two.

2d.—Another division should follow to take position behind Bull Run to be ready to pass over if necessary—but unless ordered from Hd. Qrs. to remain on the E. side.

3d.—Another division should simultaneously with the commencement of the first operation commence the semblance of an attack on Blackburn's Ford. Every appearance of a formidable assault should be made, but *no attempt to force the passage,* unless the enemy shows unmistakable signs of retiring.

4th.—Another division should remain in reserve at Centreville.

This plan was adopted by the General, modifying the composition only of the different columns thus,

One division under Colonel Miles to remain in reserve at Centreville, and to make, with one of its brigades, a false attack on Blackburn's Ford; another division (Tyler's) to move by the turnpike up to the Stone Bridge and threaten that point, and, at the proper time, to carry it and unite with the principal column, which, consisting of the two divisions (of Hunter and Heintzelman) of about 12,000 men, was to diverge from the turnpike, and, by a flank movement, reach the Sudley Ford, and descending the right bank of the stream, take the defences of the Stone Bridge in the rear. The united force would then give battle, strike at the enemy's railroad communication, or act otherwise, as circumstances might dictate.

This plan was carried out in its main features, but it failed in one important particular. It was calculated that the marching column should diverge from the turnpike by early daylight (the route being so wooded that a night march was deemed imprudent) and reach Sudley Ford by six or seven A. M. The Stone Bridge division did not clear the road over which both, for a certain distance, had to pass, so that the column could take up its march until near six o'clock. The route through fields and woods to Sudley proved to be far longer and more difficult than was believed. The column did not reach the Sudley Ford till near half-past nine, three or four hours "behind time." When it reached the ford the heads of the enemy's columns were visible, on the march to meet the attack.

This loss of time caused the loss of the battle. It might have been unwarrantable to have *counted* on punctuality with an army so utterly inexperienced in tactical manœuvres and in marching; nevertheless the immediate end aimed at was gained—the passage of Bull Run was accomplished and the Confederate left turned. While the appearance of Tyler's column in the front of the Stone Bridge had disconcerted his plan of attacking *our* left by crossing at the lower fords. Hunter, having crossed at Sudley Spring, led his column down to take in reverse the Stone Bridge position. Evans who held the confederate left at that point had had his attention occupied through the morning hours by Tyler in his front; but the march of Hunter's column became evident long before the ford was reached and ere it reached the bridge, Evans, sending for re-inforcements, had formed "*en potence*" across Hunter's line of march. A sharp combat ensued which resulted in forcing the confederate position and in opening the Stone Bridge to Tyler's division, two of the brigades (W. T. Sherman's and Keyes') immediately passed and joined their force with Hunter's. Thus had been gained the *immediate* end of the tactical plan of the operation. The Confederate left had been turned, the Warrenton turnpike taken from them (opening to us the Stone Bridge); and their line had been driven back a mile and a half. Gen. McDowell had thus brought nearly all his three divisions into position on the enemies left flank and was advancing nearly 18,000 strong. The Confederate left (all his troops that had been engaged) had been thrown into confusion. Gen'ls Johnston and Beauregard hastened to the scene, ordering up to their routed left all the brigades which could be spared from the centre and left of their line. "We came," says Johnston, "not a moment too soon," for "the long contest had greatly discouraged the troops of Bee and Evans." He found "that the aspect of affairs was critical;" but by great efforts, "and some example," the "battle was re-established," and, after a time, "many of the broken troops, fragments of companies, and individual stragglers, were re-formed and brought into action."

The position on which a stand was now made was a broad table land in which the slopes from Young's Creek (crossing our line of march at right angles and emptying into Bull Run near the Stone Bridge) terminate in the general level of the country. To carry the position, McDowell advanced the brigades of Wilcox and Howard on the right, supported by part of Porter's brigade, and the cavalry under Palmer; the brigades of Franklin and Sherman in the centre and up the road, and Keyes' brigade on the left. Schenck's brigade (of Tyler's division) was still at Centreville; but the positions of these troops, coupled with the demonstrations made, still detained several Confederate brigades confronting them.

A severe contest ensued for this position with varying success; the result of which was at 3 P. M., the possession of the hill; the fighting having commenced at 10.30 A. M. of a July day. The men who had been up since two o'clock in the morning were exhausted by fatigue, want of food and water, and somewhat demoralized by the vigorous resistance they had encountered.

"It was at this time," says Gen. McDowell, "that our adversary's reinforcements came to his aid from the railroad train, understood to have just arrived from the valley with the residue of Johnston's army. They threw themselves in the woods on our right, and toward the rear of our right, and opened a fire of musketry on our men, which caused them to break and retire down the hill-side. This soon degenerated into disorder, for which there was no remedy. Every effort was made to rally them, even beyond the reach of the enemy's fire, but in vain. According to the statement of the Confederate commander, Gen. Beauregard (Gen. Johnston, the ranking officer, having waived the command for the reason that, just arrived, he was unfamiliar with the country and troops), it was not wholly "reinforcements just arrived from the Valley" *viâ* Manassas Junction —Elzey's brigade, under Gen. E. K. Smith—which at *this* critical moment "threw themselves on our right, etc.," with consequences described by Gen. McDowell. In fact, our extreme right was flanked by Early's brigade of Beauregard's forces, which having been employed in partial execution of his plan of attack on our left and rear at Centreville, had been thus decisively brought up when that plan failed by the miscarriage of his orders to Ewell (who was to begin the movement from his extreme right), coupled with the development of our attack on his left.

Enough has been written to show how greatly misrepresented and misunderstood has been this battle. It was one (and the first) of the few battles of the whole war deliberately *planned* beforehand, *executed* (except as to punctuality in time) in full accordance with its plan, and *successful* up to a point at which it was believed the final result must be decided. That the success so far accomplished did not, as it should have done, prove decisive, was due to causes inherent in the raw and otherwise unsuitable character of the attacking force for tactical movements and long-continued *aggressive* action. The battle was pronounced by the Confederate President, himself a soldier, who at Buena Vista had learned the meaning of such words, "a hard-fought field."

On the authority of Gen. Jordan, Beauregard's chief of staff, Ewell's, Longstreet's, Jones's, Holmes's, and half of Bonham's brigades, not engaged at all, Early's and Elzey's brigades and other regiments, some newly arrived—in all over 15,000 men—were "in excellent condition:" the real obstacle to an advance after the battle was "the lack absolutely of one day's rations, coupled with insufficient transportation for the indispensable small-arms and artillery ammunition—as the advance would have been, not upon the Federal position at Arlington, but by crossing the Potomac somewhere about Edwards' Ferry, and taking Washington in reverse." On our part, Miles's whole division, in reserve at Centreville, and Runyon's, seven miles farther back, guarding communications, had been unengaged, whilst Howard's and Keyes's brigades were nearly fresh. Both sides had received severe handling, and the language already quoted from Gen. Johnston shows the critical aspect and gloom on the Confederate side of the field up to the moment when the elation of scarcely-expected victory came to dispel it.

And concerning the "panic" which, although *military* writers have generally been free from this injustice, has been so commonly held up as *the* picture of the battle the instances even with armies of veteran troops like Napoleon's (Albuhera and Vittoria, &c.) are so numerous that the exceptional case of Bull Run, when the army was almost wholly made of three months' men, should excite no surprise: moreover, it was not such as to prevent a stand at Centreville, "the apparent firmness" of which, says Gen. Johnston, "checked our pursuit." The disorder and mob-like appearance was rather, as described by Major (now Brevet Major-General) H. J. Hunt, the result of "sheer fatigue." They were, says he "footsore, hungry, and tired; but had we been attacked I have little doubt that a stout resistance would have been made."

Let us rather admire the courage and fortitude with which men just from their farms and firesides, for whom the battle-field and the cannon's roar had been divested of none of their horrors, unsustained by the confidence in each other which association and discipline engender, vindicated, in this the first great battle of the long and saddening series, the American claim to those qualities, and to the patriotism which could call forth their exhibition.

J. G. Barnard.

Bull Run, Second Battle of. A junction, upon the Rappahannock, of the forces under Gens. McClellan and Pope having been determined upon, McClellan was ordered (Aug. 3, 1862) to transfer his army from Harrison's Landing to Acquia Creek; to which point Burnside was also ordered (Aug. 1). The latter moved promptly, arriving Aug. 3, but the evacuation of Harrison's Landing was not commenced until Aug. 14.

To gain time and facilitate the withdrawal of the Army of the Potomac, Pope crossed the Rappahannock, occupied Culpeper and threatened Gordonsville. Jackson's and Ewell's forces were hurried back to the Rapidan where on the 9th of August they encountered Bank's corps at Cedar Mountain, a severe contest ensuing resulting in the defeat of the latter, Jackson holding his position on the mountain for two days when he withdrew across the Rapidan. As information received showed that Lee was moving the main body of his army by forced marches, to attack Pope before a junction could be formed between him and the Army of the Potomac, Pope was advised by the Gen.-in-Chief to take up his position in rear of the Rappahannock, which he accordingly did Aug. 17–18, prepared to hold its passes as long as possible; he had been reinforced by King's division, and a part of Burnside's corps under Gen. Reno. Burnside occupied Barnett's and Richard's fords between him and Pope, and though repeated attempts were made by the Confederates to cross at different points on the Rappahannock they were all repulsed and the line of this river was held for eight days, during which time it was hoped sufficient forces from the Army of the Potomac would reach Acquia Creek, and prevent any further advance of Lee and eventually with the combined armies to drive him back upon Richmond; but the expected aid not arriving Pope telegraphed to Washington that he was overmatched and unless reinforced must retreat. He was directed on the 21st to maintain his position two days longer when he would be reinforced; but though he held his ground for four days he received during that time but about 7000 men. On the 21st a portion of Confederate cavalry under Gen. Stuart crossed the river at Waterloo Bridge and on the night of the 22d, during a furious storm, surprised Pope's headquarters at Catlett's station capturing his despatch books, and much of his personal baggage, numerous horses and wagons; the latter were burned. Pope's actual Headquarters at this time were at Rappahannock Station.

On the 24th by a flank movement Lee crossed a portion of his forces under Jackson above Waterloo bridge; but being repulsed here moved further up the river and entered the valley which lies between the Blue Ridge and Bull Run mountains; the object of this movement being to gain Pope's rear and cut off his supplies, at the same time gaining a position by which Washington could be attacked or Maryland invaded. Jackson passed through Thoroughfare Gap and reached Bristow Station Aug. 26, from whence he sent Stuart with a detachment of cavalry to capture Manassas Junction which was accomplished that night, immense quantities of commissary and quartermaster's stores, besides 8 pieces of artillery, 10 locomotives, and large trains falling into their hands: the main body of the Confederate army in the meantime engaging Pope at Sulphur Springs and Waterloo Bridge. The Confederate army at this time numbered probably 80,000, while Pope had barely 40,000; but, relying, with reason, on being reinforced by as many more veterans from the peninsula, he indicated the positions to be taken up by them on arrival and laid his plans for the impending struggle with the firm belief that it was to be fought by the combined armies.

Discovering the movement on his right flank, and failing to receive any adequate reinforcements, Pope fell back in three columns from Warrenton and Warrenton Junction, and was at this time joined by Heintzelman's corps of 10,000 (but without artillery, wagons, or horses for officers) and Porter's corps, foot-sore and fatigued by long marching night and day. Under these circumstances Pope could not maintain his front, after detaching a sufficient force to meet Jackson operating on his flank.

Gen. Pope's disposition of his troops at this juncture (27th) was as follows: the corps of McDowell and Sigel and the Pennsylvania Reserves under Reynolds were advanced to Gainesville, Reno and Kearny were directed upon Greenwich, while Hooker's division was sent against Ewell along the railroad; the movement however was too late, as a large part of Lee's army was already east of Thoroughfare Gap.

Hooker encountered the Confederates near Kettle Run (27th) and a sharp engagement ensued, resulting in driving Ewell from the field.

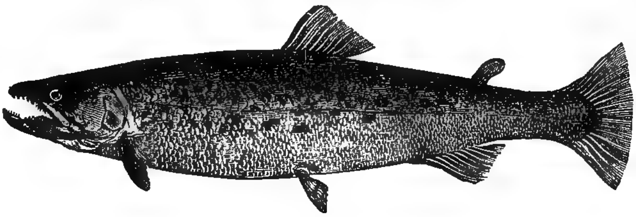
As McDowell, Sigel and Reynolds had reached their positions there was every prospect that Jackson could be overwhelmed before reinforcements could reach him. On the evening of the 27th Gen. Pope ordered Gen. Porter to be at Bristow Station by daylight on the morning of the 28th, with Morell, and also directed him to communicate to Banks the order to move forward to Warrenton Junction. All trains were ordered this side of Cedar Run and to be protected by a regiment of infantry and section of artillery. For some reasons Porter did not comply with this order and his corps was not in the battles of the 28th and 29th. (Porter was afterward tried and cashiered.)

Heintzelman's corps pressed forward to Manassas on the morning of the 28th and forced Jackson to retreat across Bull Run by the Centreville turnpike. McDowell had succeeded in checking Lee at Thoroughfare Gap, but the latter took the road from Hopeville to Newmarket and hastened to the relief of Jackson who was already in rapid retreat. A portion of McDowell's corps encountered the retreating column on the afternoon of the 28th near the Warrenton turnpike and a severe but successful contest ensued. Jackson was again attacked on the 29th near the old battle ground of July, 1861. Knowing that Longstreet was not distant he made a most desperate stand; the fight continued nearly all day, and was terminated only by darkness. It was renewed in the morning (30th), and a desperate battle continued all through the day, but Pope could not hold out against the combined strength of Lee's army, now united, and after a hard day's fighting was forced to fall back behind Bull Run. Pope's loss during this campaign was nearly 30,000 men; the Confederate loss about 15,000.

Bull's Eye, in architecture, the technical name given to a glass lens used for the purpose of concentrating the light of a given centre upon an object. It is also applied to a circular window of plain glass. On shipboard the bull's eye is a small pulley in the form of a ring, with a rope spliced round the outer edge, and another sliding through a hole in the centre. In rifle practice the small black centre in the circle on the target is called the bull's eye. In astronomy, the bull's eye is Aldebaran, a bright star in Taurus.

Bull-terrier, a dog bred by a cross, more or less remote, between the bull-dog and some one of the terriers, and frequently uniting in a remarkable degree the courage and strength of the bull-dog with the docility, activity, quick scent, and intelligence of the terrier. This little animal is especially famous for its zeal and success in killing rats.

Bull Trout, Gray Trout, Whitling, or **Sewen,** the *Salmo Eriox*, a fish of Europe closely resembling the salmon in size, appearance, and habits, but much inferior as food. It is common in England and Wales.



Bull Trout.

Bü'low, von (Friedrich Wilhelm), Baron. See Appendix.

Bü'low, von (Hans Guido). See Appendix.

Bulsar', or **Bulsaur,** a seaport of India, on the Gulf of Cambay, and in the presidency of Bombay, 44 miles S. of Surat. It has manufactures of ginghams, and an active trade in grain, salt, and sugar. Pop. about 8000.

Bul'ti, Iskar'do, or **Little Thibet,** the upper end of the Indus Valley, subject to Cashmere, having Chinese Tartary on the N., Afghanistan on the W., and Cashmere on the S., between lat. 34° 30′ and 36° N. and lon. 74° 40′ and 76° 30′ E. The inhabitants are Mohammedans of Thibetan origin. The climate has greater extremes than that of Cashmere; the soil produces grains and fruits in abundance. This region is also called Baltistan.

Bul'wark [Fr. *boulevard*], in fortification, a rampart or bastion; an outwork for defence; that which secures against an enemy; a shelter or means of protection. On shipboard a bulwark is the parapet raised round the deck for the purpose of protecting men and goods from slipping overboard, and of excluding the waves from the deck. In ships of war the bulwark is sufficiently high and solid to afford the crew some protection against the shot of the enemy.

Bulwer (Edward George Earle Lytton), Baron Lytton, a celebrated English novelist, born in Norfolk in May, 1805, was the youngest of the three sons of William Earle Bulwer and Elizabeth Lytton. Both parents were descended from ancient families. His early education was superintended by his mother, a woman of intellectual tastes and culture. Having entered Cambridge, he gained the chancellor's prize for English verse by his poem on "Sculpture" (1825), and in 1826 graduated at Trinity Hall. He soon after visited France, and published after his return his novel of "Falkland" (1827), which was followed by "Pelham, or the Adventures of a Gentleman" (1828), "The Disowned" (1828), "Devereux" (1829), "Paul Clifford" (1830), "The Siamese Twins," a poem (1831), and "Eugene Aram" (1832). In 1831 he was returned to Parliament for St. Ives, and from 1832 to 1841 he represented the city of Lincoln. He published in 1833 "England and the English," and the same year visited Germany and Italy. He produced in rapid succession "The Pilgrims of the Rhine," "The Last Days of Pompeii," "Rienzi, the Last of the Tribunes" (1835), and "The Student," a series of contributions to the "New Monthly Magazine," of which he was for some time editor. His drama entitled "The Duchess of La Vallière" (1836) was not well received. In 1837 he brought out "Athens, its Rise and Fall," and "Ernest Maltravers," a novel, which was continued under the title of "Alice, or the Mysteries." His dramas entitled "The Lady of Lyons" (1838) and "Richelieu" were very successful, as well as the comedy of "Money," which came out soon after. His "Night and Morning," a novel, published in 1841, was followed by "Zanoni" (1842), "The Last of the Barons" (1843), "Lucretia, or the Children of the Night" (1846), and "Harold, the Last of the Saxon Kings" (1848). His novels entitled "The Caxtons" (1850), "My Novel" (1851), and "What will he Do with It?" (1858) first appeared in "Blackwood's Magazine," to which Bulwer has been a frequent contributor. "A Strange Story" came out in "All the Year Round" in 1861. Although his reputation rests chiefly on his novels, he has distinguished himself in various departments of literature. His translations of Schiller's poems (1844) were received with favor, and he has published original poems—"O'Niel, or the Rebel" (1827), "The New Timon" (1846), and "King Arthur" (1848). His novels have great popularity in England, America, and on the Continent, and have been translated into several languages. Bulwer was made a baronet in 1838, and in 1844, on the death of his mother, came into possession of the Knebworth estates and assumed the name of Bulwer-Lytton. He had published in 1835 a liberal political pamphlet entitled "The Crisis," which caused a great sensation. He was elected lord rector of the University of Glasgow in 1856, and in 1858 he held for a time the office of secretary of state for the colonies. He was made a peer in 1866 with the title of Baron Lytton. In 1827 he married Miss Rosina Wheeler of Limerick (b. 1807), who wrote "Chevely, or the Man of Honor" (1839), "Bianca Capello," "The Budget of the Bubble Family," etc. The union was unhappy, and the parties separated in 1836. Died Jan. 18, 1873. J. Thomas.

Bulwer (Edward Robert). See Lytton (Edward Robert Bulwer-Lytton).

Bul'wer (Henry Lytton Earle), Baron Dalling and Bulwer, an English diplomatist and author, a brother of the preceding, was born in 1804. He was elected to Parliament in 1830, and was sent as ambassador to Madrid in 1843. In 1849 he was transferred to Washington, and in 1851 was created a knight grand cross of the Bath. He became minister plenipotentiary at Constantinople in 1858. He was afterwards ennobled. Among his works are "France, Social and Literary," and a "Life of Lord Byron." Died May 27, 1872.

Bulwer-Clayton Treaty. See Clayton-Bulwer Treaty, in Appendix.

Bummalo'ti (*Saurus ophiodon*), a fish of the family Scopelidæ, which is regarded as a subdivision of the family Salmonidæ. It is a native of the seas of India, from which it is exported in large quantities, salted and dried, being highly esteemed for its flavor. In commerce it is called "Bombay duck." It is long, with a very large mouth, the gape of which extends behind the eyes, and which is furnished with many long, slender, barbed teeth.

Bum'stead (Freeman Josiah), M. D., born at Boston, Mass., April 21, 1826, graduated at Williams College in 1847, studied medicine in Paris, and became a practitioner in New York, where he was appointed professor of venereal diseases in the College of Physicians and Surgeons, also surgeon to the Eye and Ear Hospital and the Charity Hospital. He published "Pathology and Treatment of Venereal Diseases" (1861), and valuable translations from Ricord and Cullerier. D. at New York Nov. 28, 1879.

Bunce (Francis M.), U. S. N., born Dec. 25, 1836, in Hartford, Conn., graduated at the Naval Academy in 1857, became a lieutenant in 1861, a lieutenant commander in 1863, a commander in 1871. Had charge of the naval howitzers in the combined army and navy expedition of July 10, 1863, which resulted in the capture of a part of Morris Island. Participated in all the important attacks on the defences of Charleston harbor during the summer and fall of 1863, and was in the disastrous assault upon

Fort Sumter of Sept. 18, 1863, where, for his "gallant support and zealous co-operation," he received the thanks of his commanding officer, Captain Thomas H. Stevens; was afterward captain, and in 1886 became commanding officer of the steel cruiser Atlanta.

Foxhall A. Parker.

Bun'combe. The phrase "talking for Buncombe," often heard among politicians, was first used by a member of Congress from Buncombe district, N. C. During a long speech which he made, several members, who had not patience to listen, retired from the hall. He then told the remaining members that they also might go, for he "was only talking for *Buncombe*."

Bun'delcund', or **Bundlecund,** a territory of Hindostan, is bounded on the N. E. by the river Jumna. It extends from lat. 24° to 26° 26′ N., and from lon. 78° to 81° 36′ E. Area, about 18,000 square miles, of which about 8700 square miles are subject to the British, while the rest of the country is governed by numerous native princes, who are tributary to the British. It is situated in the North-western Provinces. It is said to contain diamonds and rich beds of iron ore. The chief towns are Calpe, Banda, Jhansi, and Callinger. Pop. 2,592,800.

Bundemeer' (anc. *Araxes*), a river of Persia. It flows through a richly wooded valley, emptying into the Bakhtegan Lake after a course of 150 miles.

Bun'galow [from the Hindostanee *bŭnglâ*, a "summer-house"], the name of a kind of rural dwelling very common among the Europeans in India. Bungalows usually have but one story, and are always surrounded with a verandah, the covering of which affords shelter from the sun. Besides private bungalows, there are military bungalows for the use of soldiers in cantonments, and for the accommodation of travellers there are public bungalows belonging to the government on all the principal roads in India. Travellers sometimes carry their provisions, servants, etc. with them, paying a rupee (a half dollar of our money) per day for the use of the bungalow. But on the most frequented roads one can nearly always find native cooks, or rather "stewards" (*khânsâmân*), as they are called, who furnish food for travellers, and cook it.

Bungener (Felix), born at Marseilles in 1814, died at Geneva June 14, 1874, studied theology at Strasburg; was ordained at Geneva, but devoted himself to literature; edited the "Etrennes Religieuses" 1853–74, and published "History of the Council of Trent" (1855, 2 vols.), "Julien" (4 vols., 1854), "The Preacher and the King" (1843), "The Priest and the Huguenot" (1849, 2 vols.), all of which have been translated into English in Boston and New York. He also wrote "Calvin" (1863), "Lincoln" (1865), "Saint Paul" (1867), etc.

Bun'ion, or **Bunyon** [said to be from the Gr. *βούνιον*, the "earth-nut," from its fancied resemblance in shape], is a painful inflammation of the *bursa mucosa*, or membraneous sac of the joint which connects the great toe with its metatarsal bone. The pressure of a boot causes this bursa to inflame and swell, and this may go on to suppuration. Rest and poulticing are generally sufficient to subdue the attack, and wearing a shoe which is so constructed as to save the bunion from pressure will generally prevent a recurrence.

Bunka'ra, or **Blue River,** of Colorado, rises near South Park, among the Rocky Mountains, and unites with the Grand River about 20 miles W. of Hot Sulphur Springs. Total length, estimated at 100 miles.

Bunker Hill, on R. R., Macoupin co., Ill. (see map of Illinois, ref. 8–D, for location of county), is situated 37 miles N. E. of St. Louis, Mo. Pop. in 1880, 1441.

Bunker Hill, city, on R. R., former capital of Russell co., Kan. (see map of Kansas, ref. 5–E, for location of county), 176 miles W. of Topeka. Pop. in 1885, 649.

Bunker Hill, a rounded eminence in Charlestown, now a part of Boston, Mass. It is about 110 feet high and connected by a ridge with another small eminence 700 yards distant called Breed's Hill. These two elevations are famous for the battle fought here between the British and American forces June 17, 1775. The American redoubt was on Breed's Hill, but by common usage the event is known as the battle of Bunker Hill.

After the stirring events of the spring of that year the troops organized in New England had taken up a line extending from Roxbury to Cambridge under command of Gen. Artemas Ward; Putnam, Starke, Prescott, Gridley, and Pomeroy were there, and by the middle of June not less than 20,000 men had assembled.

Gen. Gage was in chief command of the British at Boston, and had been recently largely reinforced by Gen'ls Howe, Burgoyne and Clinton.

It having been ascertained by the provincial army that Gage meditated seizing and fortifying Bunker Hill and the heights of Dorchester on the night of the 18th, it was determined by the Americans to forestall this design, and, on the night of the 16th, a detachment of 1000 men under command of Col. Wm. Prescott, was despatched from Cambridge to Charlestown for the purpose of fortifying Bunker Hill. They were joined at Charlestown Neck by Gen. Putnam and Major Brooks and at a council it was decided to fortify Breed's Hill not as high as Bunker Hill but nearer Boston. By daylight a formidable work had been thrown up on the spot now marked by the Bunker Hill Monument. This being discovered by daylight the "Lively" opened fire upon it which soon extended to all the shipping and the battery on Copp's Hill in Boston; the British troops were called to arms and preparations for an attack were made; Prescott meanwhile continued to strengthen his position and sent to Cambridge for reinforcements; the entire American force engaged, however, did not probably exceed, at any time, 1500.

A force of British under Gen'ls Howe and Pigot, covered by the guns of their shipping, had embarked in boats and landed at Morton's Point east of the foot of Breed's Hill. This movement produced the greatest excitement in Cambridge and reinforcements were hastened to Charlestown, Gen'ls Warren and Pomeroy arriving at 2 P. M. at the moment Howe, whose force by this time had been increased to about 4000, began his advance around the eastern slopes of Breed's Hill and along the Mystic river with the intention of gaining the rear of the American lines; but this movement having been anticipated Knowlton had taken up a position near Bunker Hill and thrown up a breastwork nearly two hundred and fifty yards in length, and another line had been built in front of a stone and rail fence between which was placed new mown hay, and between the breast work and the rail fence the artillery was placed. The Conn. and N. H. troops were west of the redoubt and a force was posted at the foot of the S. W. side of Breed's Hill, near Charlestown, and a work had been commenced on Bunker Hill. Gen. Warren, who was with Prescott in the redoubt, having refused to take command from either Prescott or Putnam, saying he came to fight as a volunteer. Howe was foiled in his flank movement and compelled to make a direct attack and having ordered the guns of the shipping and the battery at Copp's Hill to open fire on the redoubt moved forward under its cover up the slopes of Breed's Hill in two wings, the right under his own command the left under Pigot: Gen. Howe with his command to carry the position at the rail fence while Pigot attacked the redoubt. Prescott's orders to his men were to reserve their fire on the advancing columns till the whites of the men's eyes could be seen. The British opened fire when within gunshot but no reply was heard from the breastworks till they were within close range when volley after volley was poured into their ranks causing them to fly in disorder toward their boats. Howe succeeded, however, in quickly rallying his troops and being reinforced by some 400 marines and provided with artillery, of which latter they were deficient in the first attack, a second advance was made over the same ground.

In the meantime reinforcements had been sent to Prescott but those sent from Cambridge were prevented from crossing Charlestown Neck by the severe fire of the batteries and shipping of the British, and but few additional troops reached the redoubt before the second attack.

As before the Americans reserved their fire till the British line was at short range when it was delivered with the same deadly effect.

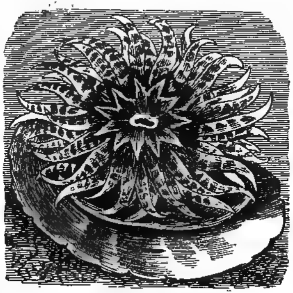
Hot shot from Copp's hill having meanwhile set fire to some houses in Charlestown the whole town was soon in flames and Gen. Howe hoped to storm the redoubt under cover of the smoke; but a light wind which had just sprung up cleared away the smoke and disclosed the advancing columns which were again broken and driven in confusion by the fatal fire from the patriots within the redoubt. Howe was now reinforced by Clinton and a third attack was made upon this little band whose ammunition was now nearly exhausted and Howe, having discovered the weakness of this part of the line, attacked the position between the rail fence on the east of the redoubt and the breastwork, sweeping it with his artillery and forcing its defenders within the redoubt. The ammunition of the Americans was now completely exhausted and the British advancing scaled the work but were met by the Americans with muskets clubbed and a hand to hand conflict ensued. But the superiority of the British in numbers was too great and Prescott was compelled to order a retreat, himself and Warren being the last to leave the works. Stark and Knowlton maintained their position at the rail fence until the retreat had been effected, when they retired slowly and in good order. Warren had hardly left the redoubt when he fell shot through the head; Prescott escaped uninjured. Falling back across

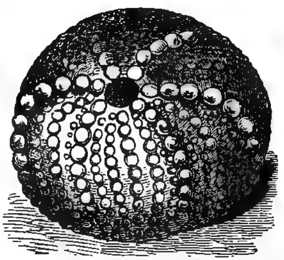
Bunker Hill, Putnam here made an ineffectual attempt to rally the retreating army within the partially finished works. The retreat continued across Charlestown Neck where many were killed by a severe fire from the shipping and batteries; but the British did not continue their pursuit beyond this point.

The British loss in killed and wounded was about 1050; the American loss was not over 450.

A granite obelisk 221 feet in height now marks the scene of this important struggle on Breed's Hill, and is known as Bunker Hill Monument. Gen. Lafayette laid the corner stone June 17, 1825, and Daniel Webster delivered one of his most memorable orations on the occasion. The monument was completed in 1842 and was dedicated June 17, 1843 in the presence of the President of the U. S. and his Cabinet, Daniel Webster being, as before, the orator of the occasion.

Buno'des Gemma'cea, called in English *gem pimplet*, a zoophyte of the order Actinoida (sea anemones; see ANEMONE, SEA). When open it bears a striking resemblance to a flower, but when closed it assumes a spherical form, having the appearance of an echinus stripped of its spines. The generic name is from the Greek βουνώδης, signifying "resembling an eminence or a woman's breast" (referring to its form when closed); the specific name is from the Latin *gemma*, a "bud," or small protuberance, and has allusion to the wart-like protuberances on the exterior surface.


Bunodes, open.


Bunodes, closed.

Bun'sen (ROBERT WILHELM), a very distinguished German chemist, born at Göttingen Mar. 31, 1811, became in 1851 professor of chemistry at Breslau, and in 1852 at Heidelberg. He is the author of several works, the most important perhaps being on gas analysis. His investigations on organic compounds of arsenic, kakodyl, etc., in 1841, attracted much attention. He has invented several most important pieces of apparatus, several of which bear his name, as the Bunsen battery, gas-burner, photometer, filter pump, etc. His most brilliant discovery was probably that of spectrum analysis and the SPECTROSCOPE (which see), made in connection with Kirchoff. This instrument established a new era in astronomy, and has already led to most valuable discoveries in chemistry. By its aid Bunsen himself discovered two new alkaline metals, *cæsium* and *rubidium*, and Lamy and Crookes discovered *thallium* and Riche and Richter *indium*. He also devised a new system of analysis by flame reactions. His laboratory is still a favorite resort for Americans studying chemistry in Europe. C. F. CHANDLER.

Bunsen, von (CHRISTIAN KARL JOSIAS), PH. D., D. C. L., CHEVALIER, an eminent German writer and diplomatist, born at Korbach, in Westphalia, Aug. 25, 1791. He studied the Oriental languages in his youth. He was appointed secretary to the Prussian embassy at Rome in 1818, where he remained many years and devoted much time to philology and historical research. In 1827 he succeeded Niebuhr as Prussian minister at Rome. He was sent as ambassador to London in 1841, and acquired a greater influence and a higher position in English society than any German diplomatist had ever enjoyed. His principal works are "Die Verfassung der Kirche der Zukunft" (1845), "Egyptens Stelle in der Weltgeschichte" (5 vols., 1845–57), "Christianity and Mankind" (7 vols., 1854), and "Gott in der Geschichte" (2 vols., 1868). He had a high reputation as an Egyptologist, and was liberal in religion and politics. He was recalled from the court of St. James in 1854, and was raised to the peerage as Freiherr (baron) in 1858. Died at Bonn Nov. 29, 1860. (See "Memoirs of Baron Bunsen," by his wife, 2 vols., 1868.)

Bunt. See MILDEW.

Bun'ter Sand'stein ("variegated sandstone"), a German term imported into English geology, and applied to the "new red sandstone," the lowest portion of the triassic series, called *grès bigarré* by French geologists. As the trias is more perfectly developed in Germany than in Great Britain, the German beds are considered the typical group of the triassic period. Large quantities of bunter sandstein flank the Vosges Mountains. It is there generally a fine-grained, solid sandstone, useful as a material for building, and is often of a blue, red, or greenish tint. The most remarkable fossils of this formation are the remains of huge batrachians, including the *Labyrinthodon*.

Bun'ting [cognate with the Ger. *bunt*, "variegated," a term appropriate to many of the species], a name properly given to numerous small birds of the genera *Emberiza*, *Euspiza*, and *Plectrophanes*. These birds are mostly European, but some are found in America. One of their number is the ortolan of Europe, so highly prized for the table. The bobolink is sometimes called rice-bunting, and several other birds are often improperly called buntings.

The Cirl Bunting (*Emberiza cirlus*).

Bunting (JABEZ), D. D., an English Wesleyan minister, born at Manchester May 13, 1779. He gained distinction as an eloquent preacher, and had much influence in the Church. Died June 16, 1858. (See his Life by T. P. BUNTING, 1859.)

Bunt of a Sail is that portion nearest the central perpendicular line. If a sail be divided into four equal portions from side to side, the bunt would comprise the two middle strips.

Buntz'lau, or **Bunzlau,** a town of Prussia, in Silesia, is on the Bober, 28 miles by rail W. N. W. of Liegnitz. It has a normal school, and manufactures of woollen goods, hosiery, linens, etc. Pop. in 1880, 10,790.

Buntzlau, or **Bunzlau, Jung** (*i. e.* "Young Buntzlau"), a city of Bohemia, on the river Iser, 37 miles N. E. of Prague. It has an old castle, a gymnasium, and manufactures of cotton and woollen fabrics, leather, and soap. Pop. in 1880, 9681.

Bun'yan (JOHN), author of "Pilgrim's Progress," was born near Bedford, England, in 1628, and learned the trade of a tinker. He was dissipated in his youth, and enlisted in the army of the Parliament about 1645. He married about the age of twenty, soon quitted the army, and joined the Baptists. After passing through severe spiritual conflicts he became a preacher in 1655. He preached at Bedford until 1660, and was then committed to Bedford jail, in which he was confined twelve years. In this jail he wrote "Pilgrim's Progress" (1678), and other religious works, amounting in all to sixty volumes, large and small. After his liberation he resumed his ministerial labors at Bedford. Died Aug. 31, 1688. "We are not afraid to say," says Macaulay, "that though there were many clever men in England during the latter half of the seventeenth century, there were only two great creative minds. One of these produced the 'Paradise Lost,' and the other the

'Pilgrim's Progress.'" (See Macaulay, "Essay on Southey's edition of 'Pilgrim's Progress;'" Ivimey, "Life of John Bunyan," 1809.)

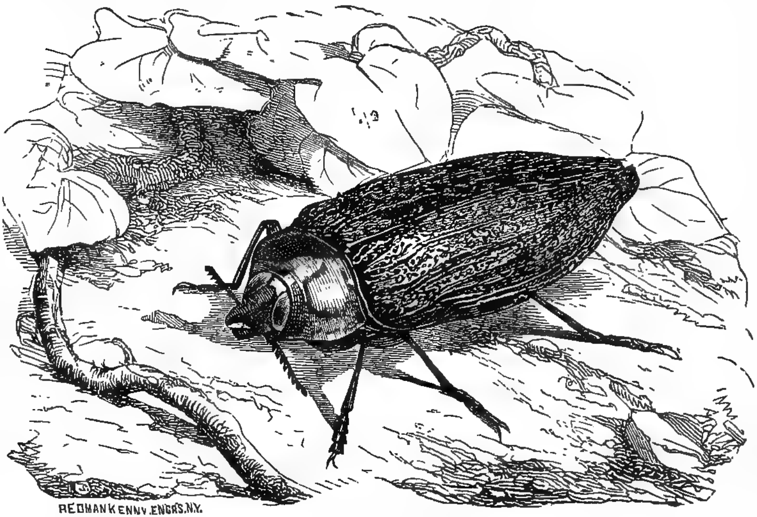
Bu'ol-Schau'enstein, von (Karl Ferdinand), Count, an Austrian diplomatist, born in Switzerland May 17, 1797. He was sent as ambassador to St. Petersburg in 1848, and was transferred to the court of St. James in 1851. He was minister of foreign affairs from 1852 to May, 1859. Died Oct. 28, 1865.

Buoy (pron. bwoy or boy), a floating body usually intended as a mark for the guidance of mariners. It is made either of wood or metal, and is often hollow. Buoys are generally moored by chains to the bed of the channel. They are of various shapes, sizes, and colors, partly to render them conspicuous, and partly to distinguish them one from another. Sometimes buoys point out the best channel; sometimes they warn the mariner away from shoals; sometimes they form a continuous double line between which ships can with safety pass. A hollow conical buoy is called a "can-buoy," a double conical buoy is called a "nun-buoy," a floating wooden spar is a "spar-buoy." The bell-buoy is a contrivance for rendering a buoy audible, whether it is visible or not; so long as any stream of water, caused by a tide or current, passes through the lower part of the buoy, it moves an undershot wheel, which rings a bell. In laying submarine telegraphs buoys are used when cables are thrown overboard in stormy weather. Such weather might severely strain the telegraphic cable, but it may be cut, buoyed, and abandoned during the rough weather, and afterwards picked up and repaired, and the work of laying the cable can go on as before the storm.

A buoy-rope, on shipboard, is the rope which connects the anchor with a buoy floating above it. It is simply intended to point out the locality of the anchor, but if it be strong it is useful in assisting to raise the anchor at times when the proper cable is cut or injured.

Buphaga. See Beefeater.

Bupres'tis [from the Gr. βούπρηστις, the name of an insect whose bite is said to have caused cattle to swell up; derived from βοῦς, an "ox," and πρήθω, to "puff up" by blowing], a genus of coleopterous insects of the family Buprestidæ, which includes more than 1000 species. They are remarkable for the splendor and richness of their colors. They are found in North America, but are more abundant in tropical countries. The *Buprestis gigas*, of Cayenne, is about two inches long, and is larger than any of the North American species.


REDMAN KENNY ENGRS.N.Y.

The Giant Buprestis.

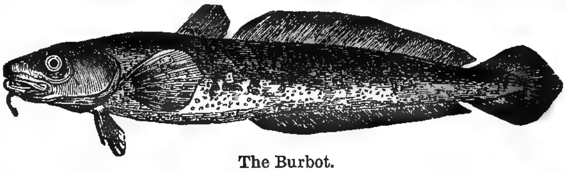
Bur, a rough, prickly covering (involucre) of the seeds of some plants, as the chestnut. The term is also applied to the flower-head or involucre of the *Arctium lappa* (burdock), the prickles of which are hooked at the point. In engraving on steel or copper, bur is a slight ridge raised on the edges of a line by the graver or the dry-point.

Bura'no, an island and town of Italy, in the Adriatic, 5 miles N. E. of Venice. The inhabitants are employed in fishing and cultivating vegetables for the market of Venice. Pop. 5693.

Bur'bage (Richard), an English actor, one of Shakspeare's associates. Died in 1619. He seems to have belonged to one of those companies of travelling actors, which under the name of "Englische Comödiachen" now and then visited the Continent, more especially North Germany, Holland, and Denmark, and which exercised considerable influence on the development of the drama and the theatre in those countries. He was famous for his performance of Richard III. and other Shakspearian characters.

Bur'beck (Henry), an American officer, born in Boston June 8, 1754. He was a soldier in the Revolution, and was appointed captain under the Confederation May 1, 1787. In 1789 he was commissioned a captain of artillery, major in 1791, lieutenant-colonel in 1798, and colonel in 1802. He served with distinction in the Revolutionary war, that of 1812 with Great Britain, and on frontier service. He was brevetted brigadier-general 1813, and retired from the army June, 1815. Died at New London, Conn., Oct. 2, 1848.

Bur'bot (*Lota vulgaris*), a fish of the same genus as the ling, is found in certain rivers of England, and is the only British fresh-water species of the family Gadidæ. It is also found in the northern parts of the continent of Europe, and in Asia. The larger specimens weigh eight or ten pounds. It has two dorsal fins, the second of which is very long, and a very long anal fin. Its flesh is white, firm, and is esteemed as food. It is capable of living a long time out of water. Several burbots are found in the U. S.



The Burbot.

Bur'bridge (Stephen Gano), an American general of volunteers, born in Scott co., Ky., Aug. 19, 1831; educated at Georgetown College and at Kentucky Military Institute, Frankfort; studied law in the office of the late Senator Garrett Davis at Paris, Ky. In 1849 he returned to Georgetown, and engaged in mercantile business till 1853, when he turned his attention to farming, and at the outbreak of the recent civil war was conducting a large farm in Logan county. He at once ardently espoused the cause of the U. S., and by his voice and influence raised the famous Twenty-sixth Kentucky, which he led in the field until the battle of Shiloh, where, for distinguished gallantry, he was promoted to be a brigadier-general of U. S. volunteers. Upon Bragg's invasion of Kentucky in 1862 he was ordered there, remaining till Bragg was driven from the State, when he was ordered to join the expedition against Vicksburg. He led the charge at Arkansas Post and at Port Gibson, being among the first to enter each place. In the various actions about, and at the siege of, Vicksburg he was conspicuous. He subsequently commanded the military district of Kentucky, and it was during this time that he defeated John Morgan in his raids, and drove him into Tennessee. For this service he received the thanks of President Lincoln, and was brevetted major-general. He resigned in 1865.

Burck'hardt (Johann Ludwig), an enterprising Swiss traveller, born at Kirchgarten, near Lausanne, Nov. 24, 1784. After studying at Leipzic and Göttingen he went to London in 1806, carrying with him a letter of introduction from the celebrated Blumenbach to Sir Joseph Banks, and entered the service of the African Association, which in 1809 sent him to explore the interior of Africa. He spent about two years in Syria, and prepared himself by the study of Arabic and medicine, and inuring himself to all kinds of hardships and privations. He travelled through Cairo and Nubia to Mecca, where he arrived in 1814. Disguised as a Moslem hâjî, he made a pilgrimage to Mount Ararat and to Medina with peril to his life. He died at Cairo Oct. 15, 1817, and bequeathed his Oriental MSS. to Cambridge Univ. He was eminently qualified for the part of a traveller and explorer. His "Travels in Nubia" (in English, 1819), "Travels in Syria and Palestine" (1822), "Travels in Arabia" (1829), "Notes on the Bedouins and Wahabis" (1830), and "Manners and Customs of the Modern Egyptians" (1830), are highly esteemed.

Bur'den (Henry), born at Dumblane, Scotland, April 20, 1791, was educated at Edinburgh, and in 1819 came to the U. S., where he finally became a large iron manufacturer at Troy, N. Y. He made the first cultivator used in America, and invented several useful machines. His horseshoe machine he brought out in 1835, and the hook-headed spike used on railroad tracks in 1843. Died Jan. 19, 1871.

Burden of Proof, the obligation or necessity of proving the fact in dispute in an issue joined in a court of justice. The general rule is, that the burden of proof is with the party who asserts the affirmative of the issue. The same rule is applied if he grounds his case on negative statements or allegations. The rules concerning the burden of proof are of great importance in criminal prosecutions. The burden of proof is on the government throughout the whole case.

Burdett (Sir Francis), a popular and liberal English legislator, was born Jan. 25, 1770. In 1793 he married a rich heiress, Sophia Coutts. He was elected to Parliament about 1795, became an effective speaker, opposed the ministry, and advocated parliamentary reform. He represented Westminster for many years (1807–36), and was the idol of the London populace. Died Jan. 23, 1844.

Burdett-Coutts (Angela Georgiana), Baroness, a daughter of Sir Francis Burdett, born April 25, 1814. She gained distinction by the liberal use of her vast fortune. She built churches, among which is the beautiful church of St. Stephen's at Westminster. She endowed the bishoprics of Adelaide, Cape Town, and British Columbia. She aided emigrants on a great scale, and provided a "Home" at Shepherd's Bush for such women as had lapsed into evil ways. She is now a baroness in her own right.

Burdette (Robert Jones), born at Greensboro', Pa., July 30, 1844, removed to Peoria, Ill., in his youth; enlisted in 47th Illinois Volunteers in 1862 as a private, and served through the war; became one of the editors of the Peoria "Transcript" in 1869, and afterward associate editor of the Burlington "Hawkeye," his humorous contributions to which made him famous. He has delivered various lectures on facetious subjects and published "Hawkeyes," etc.

Bur'dock (*Lappa officinalis*), a plant of the order Compositæ, has a globular involucre with imbricated coriaceous scales, each tipped with an abrupt and spreading, awl-shaped, hook-pointed appendage. This involucre, which is called a *bur*, catches hold of the clothes of persons who come into contact with it. It is a native of Europe and naturalized in the U. S., growing as a weed in waste places, fence-corners, and near dwellings. It is used in medicine as a diuretic and diaphoretic.

Burd'wan, a town of India, in Bengal, is on the Dummodah, and on the Grand Trunk Road, 68 miles by rail N. W. of Calcutta. It has manufactures of silk and cotton fabrics, and a large palace, but the houses are generally rather mean. Pop. estimated at 50,000.

Bu'reau, a French word, much used also in various other languages. In France it signifies a writing-table, a desk, an office in which public business is transacted. It is also applied to each one of the numerous committees of the French National Assembly. The parliamentary phrase *déposer sur le bureau* signifies "to lay upon the table." In the U. S. the term bureau is commonly applied to a chest of drawers, a piece of furniture for a bed-chamber. Soon after the end of the civil war in the U. S., a department called the Freedmen's Bureau was organized, in order to protect, feed, and clothe the liberated slaves. The term is also applied to the minor divisions of the executive departments at Washington.

Bureau Véritas. See Appendix.

Burg, a German word signifying a "castle," a "fortress," is the end of the names of many towns of Europe.

Burg, a town of Prussian Saxony, is on the river Ihle, 17 miles by rail N. E. of Magdeburg. It was settled by French and Walloon colonists, and has been for many centuries celebrated for its manufactures of woollen cloth. Here are also manufactures of linen, machinery, pottery, etc. Pop. in 1880, 15,877.

Burgaw, on R. R., capital of Pender co., N. C. (see map of North Carolina, ref. 5–H, for location of county). Pop. not in census of 1880.

Burg'dorf [Fr. *Berthoud*], a town of Switzerland, in the canton of Berne, on the river Emmen, 13¾ miles by rail N. E. of Berne. It has a castle and manufactures of ribbons and silk. Pestalozzi opened a school here in 1798. The Sommerhaus baths are in the vicinity. Pop. in 1880, 6581.

Bür'ger (Gottfried August), a popular German poet, born near Halberstadt Dec. 31, 1747. He studied at Göttingen, and his literary career was greatly influenced by reading Shakspeare. His works consist chiefly of ballads and songs, which, though very popular, did not relieve him from poverty. Among his best productions are "Lenore" (1772) and the "Wild Huntsman." Died June 8, 1794.

Bur'ges (Tristam), LL.D., an American statesman and orator, born at Rochester, Mass., Feb. 26, 1770, and graduated at Brown University in 1796. He studied law, which he practised with success at Providence, R. I., and became a leader of the Federal party. He was for a time chief-justice of Rhode Island, and afterwards a professor in Brown University. In 1825 he was elected a member of Congress, in which he continued ten years, and gained a high reputation. He was eminently logical and terribly sarcastic. Died Oct. 13, 1853.

Bur'gess, a citizen or freeman of a borough; a representative or magistrate of a borough. This title was formerly given to members of the lower branch of the Virginia legislature.

Burgess (Rt. Rev. George), D. D., born at Providence, R. I., Oct. 31, 1809, graduated at Brown University in 1826, and was a tutor there for a time. He studied in Germany two years, was rector of Christ church (Protestant Episcopal), Hartford, Conn. (1834–47), and was in 1847 consecrated bishop of Maine, acting also as rector of Christ church, Gardiner. He went to Hayti to found a mission, and died there of apoplexy April 3, 1866. He published "Pages from the Ecclesiastical History of New England," "The Last Enemy Conquering and Conquered," a volume of sermons, and other works.

Burgess (John W.), LL.D. See Appendix.

Burgk'mair (Hans), a noted German painter and engraver on wood, was born in Augsburg in 1472. He was a friend of Albert Dürer. Died in 1531.

Bur'glary [from *burg*, a "town," and the Old Fr. *laire* (Lat. *latro*), a "thief"], in criminal law, the act of breaking and entering into a dwelling-house of another or a church in the night-time, with intent to commit a felony therein. There are four circumstances necessary to constitute the offence, referring to place, time, the acts done, and the intent. The place is a dwelling-house or a church. It is not necessary, in order to constitute a "dwelling-house," that there should be any person residing in the house at the time. It is enough if it be habitually used as a dwelling, though it may at the time be closed, as in the case of a person having two or more residences. Difficult questions sometimes arise as to buildings connected with the house and within the curtilage, and as to the case of lodgers having separate rooms and entering by a common door. In the last instance the inquiry would be whether each lodger has a distinct dwelling-house. (Consult Bishop or Wharton on "Criminal Law.")

As to time, the rule is that the offence must be committed by night. The better opinion is, that both the breaking and entering must be by night, though the two acts, so far as they are distinct in their nature, may be committed on separate nights. It is held to be night when a person cannot by the light of the sun clearly discern the face of another. This is quite indefinite, and as burglary is a heinous offence, some fixed though arbitrary rule seems desirable. In some of the States the time is fixed by statute. The fact that the face can be seen by moonlight does not affect the question.

The acts to be done are breaking and an entry. The word "breaking" is not to be construed so as to require any great degree of force or violence. Unlatching a door or raising a window is sufficient. If a door or window be left open, an entry through them would not be a breaking, though the act of coming down a chimney would be. Any entry will suffice, such as thrusting the hand or an instrument through a broken pane of glass. The act of discharging a loaded pistol or gun through a door or the glass of a window would be both a breaking and an entry. It is doubtful whether the act of *breaking out* of a house will be sufficient, though the other ingredients of the offence, except breaking in, be present.

Finally, there must be an intent to commit a felony. If a felony be actually committed, the intent may be inferred. It will be immaterial whether the felony exists at common law or is created by statute. An intent to commit a trespass will not suffice.

The common-law ingredients of this crime have been modified in this country by statute. Burglary is sometimes divided into degrees; some of these degrees would include breaking and entry in the daytime, or into buildings other than dwelling-houses and churches, or breaking out of a building, as well as into it. In some of the States, statute law makes the intent to commit any crime sufficient.

T. W. Dwight.

Bur'gos, a province of Spain, in Old Castile, is bounded on the N. by Santander, on the E. by Biscay, Alava, and Logroño, on the S. E. by Soria, on the S. by Segovia, and on the W. by Valladolid and Valencia. Area, 5651 square miles. It is drained by the Douro and the Ebro, which rises within its limits. The surface is partly mountainous. Gold, silver, copper, iron, and lead are found in it. Pop. in 1877, 332,461.

Burgos [Lat. *Burgi*], a city of Spain, capital of the above province, is situated on the river Arlanzon, at the foot of the Sierra de Oca, 140 miles by rail N. of Madrid; lat. 42° 20′ N., lon. 3° 45′ W. It was formerly the capital of Old Castile, and was far more populous than it is now. It was founded in 844 A. D., and has many antique buildings. The court was removed from Burgos to Madrid in the sixteenth century, after which the importance of the former declined. The most remarkable edifice here is the cathedral of white marble, which is one of the noblest specimens of Gothic architecture in Europe. This was commenced in 1221. Burgos is the seat of an archbishop, and has a college and some manufactures of woollen and linen fabrics. The railway which connects Bayonne with Valladolid passes through this town. Pop. 29,683.

Burgoyne (John), a British general and dramatist, born in 1730. He commanded a force which captured Alcántara, in Spain, in 1762. In the summer of 1777 he took command in Canada of an army of about 8000 men, which was ordered to enter New York State and operate against the revolted colonists. He was repulsed at Stillwater in September, and was captured with his whole army at Saratoga in Oct., 1777, by Gen. Gates. He wrote successful dramas called "The Maid of the Oaks" (1780), "Bon Ton," and "The Heiress" (1786). Died June 4, 1792.

Burgoyne (Field-Marshal Sir John Fox), son of the general above named, and godson of Charles James Fox, was born in London July 24, 1782, entered the Royal Engineers as second lieutenant in 1798. "During a period of 73 years' service, he slowly but steadily ascended, until at an age far beyond the scriptural limit of the life of man, he reached that summit of his professional career, which, in a published letter, dated Wilhelmshohe, Oct. 29, 1870, earned for him from the French Emperor, Napoleon III., the designation of

"Le Moltke de l'Angleterre."

He served as Commanding Engineer under General Frazer at the assault of Alexandria and siege of Rosetta (Egypt) in 1807; and under Sir John Moore in his Portuguese campaign and retreat, in 1808. Through the Peninsular war, as an engineer officer he took a prominent part in its greater sieges and battles, *e. g.* the siege of Ciudad Rodrigo, the two sieges of Badajoz, as Commanding Engineer at the desperate siege of Burgos and of that of Sebastian (shot through the neck in the assault) and the battles of Busaco, Salamanca, Bidassoa, Nivelle, &c. He came out of the Peninsular war, aged 32, the senior officer of Engineers who had been engaged in the sieges of Spain. As commanding engineer under Gen. Pakenham he was present at the assault of Gen. Jackson's lines below New Orleans, January 8, 1815, as also at the capture of Fort Bowyer (Mobile Point) February 11. He was called again to the field (aged 72) for the Crimean war, rendering distinguished services both in the debarkation, the battle of the Alma and subsequent march, and in the siege. Against the opinion of the French engineers he pointed out at the beginning the Malakoff as the proper and decisive object of the siege operations. On his recall he resumed his position at the War office as Inspector General of Fortifications, to which place he had been appointed in 1845. His services in this capacity and his home services during the long interval between the Peninsular and Crimean wars are numerous and important and his various reports and official writings have been deemed of such importance as to justify the publication of a work entitled "Military Opinions" of Sir John Burgoyne. After 70 years' service he retired in 1868 with promotion to the rank of Field Marshal, and the appointment of Constable of the Tower of London. Though then aged 86 his physical powers were good and his mind unimpaired. "Seventy years of work have left in me," he writes, "a train of thought that I now continue to indulge in." A past history and experience of 70 years had had no effect in blunting his mind to the *present* and its progress. His interest in all that concerned our own great war was unflagging and his mind keenly open to every "improvement" he could discern. Our reports on military bridges, military railway transportation, sieges, torpedoes, submarine blasting, &c., he sought for and appreciated. How much longer a noble life and a grand career might have been protracted it is useless to speculate, for a blow fell in September, 1870, in the loss of his only son, Capt. Hugh Burgoyne, V. C., Commander of the ill-fated "Captain," from the effects of which he never rallied. He died Oct. 7, 1871. For one who "has done more under fire than any soldier in Europe," even though, to use his own modest explanation, he "had been a long time about it," whose life is a shining illustration of the motto of the Royal Engineers, "*Quo fas et gloria ducunt Ubique,*" this tribute from one who was honored with his friendship and who reverently followed his remains to their last resting place, in the historic Tower of London, is due.

J. G. Barnard.

Bur'gundy [Fr. *Bourgogne ;* Lat. *Burgundia*], one of the most important of the former provinces of France, now forming the departments of Côte d'Or, Saône-et-Loire, Yonne, part of Ain, and part of Aube. The whole population of the departments of Ain, Saône-et-Loire, Côte d'Or, Yonne, Aube, Haute-Marne, and Haute-Saône amounts to 2,460,730. The name was derived from an ancient German tribe called in Latin *Burgundi* or *Burgundiones*, who settled in this part of Gaul about 408 A. D. Gondemar, king of Burgundy, was defeated and killed in 534 by the Franks, who then obtained possession of Burgundy. The kingdom of Burgundy re-established in 561 was much more extensive than the province of that name, and its extent varied in different periods. It included the provinces of Burgundy, Franche-Comté, Dauphiné, a part of Switzerland, Lyonnais, and nearly all the basin of the Rhone. In 879 A. D., Burgundy renounced its allegiance to the weak Carlovingian king, and became an independent state ruled by King Boso. It afterwards in part belonged to the kingdom of Arles (933–1032). Upper Burgundy was a kingdom from 888 to 933. In these ages there were often several lines of princes claiming the title of king of Burgundy, and ruling over parts of the country. King Rudolf III., dying without male issue in 1032, bequeathed his kingdom to the emperor Conrad II. Conrad's son, Henry, erected it into a duchy, feudal to Germany, sometimes called Little Burgundy. Meanwhile the north-western portion of old Burgundy remained a fee of the French crown, governed by a line of dukes. This line became extinct in 1361, but John II. of France made his son, Philip the Bold, duke in 1364. After this Burgundy became an important state, which was much of the time virtually independent. Several of the dukes who reigned over it were powerful and famous princes. On the death of Charles the Bold, in 1477, the ducal line became extinct, and the duchy was annexed to France. From 915 to 1384 Franche-Comté was under a line of counts of Burgundy, but Philip the Bold made it a part of his dominions in 1384. (See De Barante, "History of the Dukes of Burgundy," 13 vols., 1826.)

Burgundy, Dukes of. See Charles the Bold, Philip the Bold, Philip the Good.

Burgundy (Louis), Duke of, dauphin of France, born in 1682, was a grandson of Louis XIV. and the father of Louis XV. He was a youth of violent passions and extremely haughty, but his character was, it is said, reformed by Fénelon, who was his preceptor. He married Adelaide of Savoy about 1698. On the death of his father he became dauphin and heir-apparent to the throne. Died in 1712.

Burgundy Pitch (*Pix Burgundica*), a resinous substance, is a concrete exudation from the *Abies excelsa* or Norway fir. It is prepared by melting it in hot water, by which process part of the volatile oil which it contains is separated from it. By straining it through a coarse cloth some impurities are removed. It is of a yellowish-white color, is hard and brittle when cold, but is softened by a moderate degree of heat. It has a pleasant resinous odor and a slightly bitter taste. It is used in medicine as an external application in the form of a plaster. The Burgundy pitch of commerce comes chiefly from the neighborhood of Neufchâtel, Switzerland.

Burgundy Wines, the name of excellent French wines produced in the former province of Burgundy, chiefly on the range of hills called Côte d'Or, between Dijon and Châlons. These hills are about 800 to 1000 feet high. The wines are celebrated for richness of flavor and perfume. The best red wines of Burgundy are called Clos-Vougeot, Chambertin, Romané-Conti, Volnay, Pomard, and Richebourg. The white wines of Burgundy are said to be the finest in France, but the quantity produced is less than that of the red. The total annual product of Burgundy wines is from 2,500,000 to 3,500,000 hectolitres.

Bu'ri, a name of a species of palm, a native of the Philippine Islands. Its trunk is employed in the construction of houses; sugar and spirituous liquors are made of the sap; the pith yields a valuable article of food (sago); and mats and sails are made from its fibre. This palm is the *Saguerus saccharifer*.

Bu'ri, or **Bure** [from a root cognate with the Anglo-Saxon *bora*, "one who bears" or produces, because, being the first of the gods, he was the progenitor of all the others], the first of the gods of the Norse mythology (Æsir). It is related that when the mythic cow Audhumla (whose name, from *audr*, "desert," and *hum*, "darkness," may be said to symbolize the original chaotic darkness) began to lick the frost-covered rocks of the primeval chaos, there came forth a beautiful and mighty being in human form called Buri, whose son Bör (that is "born," and hence, like the Latin *natus*, signifying a "son") was the father of Odin.

Buridan (Jean), a French scholastic philosopher, born at Béthune, in Artois, flourished about 1350. He was a pupil of Occam, lectured at Paris, and belonged to the Nominalist school. He wrote commentaries on Aristotle's "Metaphysica," and other works, and was the reputed author of a celebrated sophism called "Buridan's Ass." The subject of this was an ass placed between two equidistant and equal bundles of hay, and starving on account of the equal balance of the two motives.

Bu'rin, a post-town and port of entry of Newfoundland, capital of Burin district, has a fine harbor on the W. side of Placentia Bay, and has a jail. Pop. 1850.

Burke (Edmund), LL.D., an eminent statesman, orator, and writer, born in Dublin Jan. 1, 1728, or, according to some writers, in 1730. He was the son of Richard Burke, a distinguished attorney, and Miss Nagle, a lady of a Roman Catholic family. He was one of four children, the only survivors of a numerous family, and at an early age became the pupil of Abraham Shackleton, a Quaker of superior attainments and excellent character, who taught a school at Ballitore. Having entered Trinity College, Dublin, he devoted himself to history, philosophy, the classics, etc., not neglecting poetry and other works of imagination. He afterwards studied law at the Middle Temple, but returned to Ireland in 1751, and took the degree of A. M. His "Vindication of Natural Society," an ironical criticism of Lord Bolingbroke's attacks on Christianity, came out anonymously in 1756. "The imitation of Bolingbroke's style and manner was so perfect," says Prior, "as to constitute identity, rather than resemblance." This was followed by a "Philosophical Inquiry into the Origin of our Ideas of the Sublime and Beautiful," which was highly commended by Dr. Johnson. Burke married, in 1757, Mary Jane, daughter of Dr. Nugent of Bath, and the union appears to have been a very happy one. Soon after this he formed an intimacy with Dr. Johnson and Garrick; the former, from his first acquaintance with Burke, felt the warmest admiration for his talents, and was accustomed to say that "no man of sense could meet Mr. Burke, by accident under a gateway, to avoid a shower, without being convinced that he was the first man in England." In 1759 he became private secretary to William Gerard Hamilton, through whose influence chiefly he received a pension from the government of £300 per annum; but finding that his political independence would be compromised by its acceptance, he threw it up at the end of the year. He was returned to Parliament for Wendover, in Buckinghamshire, about 1765, and re-elected in 1768. Having soon after purchased an estate, he wrote to his friend Shackleton, "I have made a push with all I could collect of my own, and the aid of my friends, to cast a little root into this country. I have purchased a house with 600 acres of land in Buckinghamshire, 24 miles from London." The "Letters of Junius," which appeared about this time, were almost universally ascribed to Burke, but his repeated denials were not generally believed until the publication of the "Grenville Papers." His "Thoughts on the Cause of the Present Discontent" came out in 1770, and in 1771 he was appointed agent to the colony of New York. In 1772, Sir Charles Colebrook, in the name of the directors of the East India Company, offered to Burke, who had already considerable knowledge of Indian affairs, "the first position in a supervisorship of three, empowered to trace out in detail the whole administrative system of India, and to remedy all they could find amiss." This offer he declined, feeling perhaps unwilling to leave Parliament at a time when American affairs were becoming more complicated, and the condition of France filled him with anxious forebodings. Soon after his return from a short residence in Paris he said in a speech in Parliament, "I see propagated principles which will not leave to religion even a toleration, and make Virtue herself less than a name." In April, 1774, he made a speech on American taxation, and he appears to have been the only member of Parliament who fully comprehended the dangers which threatened the American colonies. An intelligent American gentleman, who was present on this occasion, is said to have exclaimed, "You have got a most wonderful man here; he understands more of America than all the rest of your House put together." In Nov., 1774, Burke represented the city of Bristol in Parliament, and in Mar., 1775, made an admirable speech in favor of conciliatory measures towards the American colonies. Fox said of this oration, "Let gentlemen read this speech by day and meditate upon it by night; they would there learn that representation was the sovereign remedy for every evil." In 1780 he delivered his speech "On the Economical Reform," and in 1782 became a privy-councillor and paymaster-general of the forces under the Rockingham ministry. His speech on the "East India Bill" in Dec., 1783, is esteemed one of his best. The bill was lost in the House of Lords, although it passed that of the Commons. Burke retired from office soon after the accession of Pitt as prime minister, and held no position afterwards under the government. In Feb., 1785, he made a speech on the debts of the nabob of Arcot, which, says Prior, "was one of those outpourings of a fertile and vigorous intellect which on an unpromising theme seemed to combine all that could instruct, dazzle, and even overpower the reader." His prosecution of Hastings, the most arduous enterprise of his life, was commenced in Jan., 1786. The articles containing the different charges were so numerous and extensive as to require the attention of the House for a considerable part of two sessions. After Sheridan's speech on the Begum case in Jan., 1787, a committee of impeachment was formed, and on the 10th of May, Burke, as chairman of the committee, accused Hastings at the bar of the House of Lords in the name of the Commons of England. On the 15th of Feb., 1788, Burke made his memorable speech in Westminster Hall, in the presence of an immense assembly. Although a verdict of acquittal was passed in 1795, the noble efforts of Burke led the way to great reforms in the government of India. "Never," says Lord John Russell, "has the great object of punishment, the prevention of crime, been attained more completely than by this trial—Hastings was acquitted, but tyranny, deceit, and injustice were condemned." In 1790 Burke published his "Reflections on the Revolution in France," of which more than 30,000 copies are said to have been sold within a few months. It was translated into French, and received with enthusiasm in all parts of Europe. Soon after this he published "An Appeal from the New to the Old Whigs," in which he refutes the charge brought against him by Fox of having abandoned the principles of his party. About 1795, Burke received considerable pensions granted at the desire of the king, and without solicitation on his part or that of his friends. His acceptance of these well-merited rewards exposed him to severe attacks upon his character, in reply to which he wrote his "Letter to a Noble Lord," which was received with great favor. Burke's only son, Richard, a young man of great promise, had died in 1794, and this severe affliction probably hastened the father's death, which took place July 9, 1797. "If we are to praise a man in proportion to his usefulness," says Schlegel, "I am persuaded that no task can be more difficult than to do justice to the statesman and orator Burke. This man has been to his own country, and to all Europe, a new light of political wisdom and moral experience. He corrected his age when it was at its height of revolutionary frenzy; and without maintaining any system of philosophy, he seems to have seen farther into the true nature of society, and to have more clearly comprehended the effect of religion in connecting individual security with national welfare, than any philosopher of any preceding age." A writer in the "London Quarterly Review" observes of Burke's speeches on the Stamp Act, "This was the appropriate start of a man who, whether as a statesman, a thinker, or an orator, was without an equal. Pitt and Fox were great, but Burke belongs to another order of beings, and ranks with the Shakspeares, the Bacons, and the Newtons. . . . By the incessant practice of composition he learned to embody his conclusions in a style more grandly beautiful than has ever been reached by any other Englishman with either the tongue or the pen" (*London Quarterly Review for January and April,* 1858). (See Prior, "Life of Burke;" Dr. Geo. Croly, "Political Life of Edmund Burke;" Lord Jeffrey, "Miscellanies.") J. Thomas.

Burke (Sir John), a genealogist, born in Ireland in 1786. He published, besides other works, a "Dictionary of the Peerage and Baronetage of the British Empire" (1826). The twentieth edition was published by his son. He was for some time Ulster King of Arms. Died in 1848. —His second son, Sir John Bernard Burke, LL.D., born in 1815, became in 1853 Ulster King of Arms, and was knighted in 1854. He has written many works on heraldry and kindred subjects, *e. g.* "Anecdotes of the Aristocracy" (1849–50).

Burkesville, capital of Cumberland co., Ky. (see map of Kentucky, ref. 5–G, for location of county), on the Cumberland River, about 125 miles S. by W. of Frankfort. Pop. in 1880, 434.

Bur'leigh (WILLIAM **Cecil**), LORD, an able English statesman, born at Bourne, in Lincolnshire, Sept. 13, 1520. He graduated at Cambridge, studied law, and married Mildred, a daughter of Sir Anthony Cook. In 1548 he was appointed secretary of state. As he was a Protestant, he resigned office on the accession of Queen Mary in 1553. He was one of the few eminent Protestants who escaped from persecution in that reign. He was again appointed secretary of state by Queen Elizabeth in Nov., 1558, and he was virtually prime minister for forty years from that date. In 1571 he received the title of Baron Burleigh, and in 1572 became lord treasurer. According to Hume, "he was the most vigilant, active, and prudent minister ever known in England." He died Aug. 4, 1598, and left no less than 300 landed estates. "Lord Burleigh," says Macaulay, "can hardly be called a great man. He was not one of those whose genius and energy change the fate of empires. Nothing that is recorded either of his words or actions indicates intellectual or moral elevation. But his talents, though not brilliant, were of an eminently useful kind. He had a cool temper, a sound judgment, great powers of application, and a constant eye to the main chance." (See ARTHUR COLLINS, "Life of William Cecil," 1732; MOTLEY, "History of the United Netherlands," chaps. vi., viii., and xviii.; FROUDE, "History of England," vol. v.)

Burleigh (WILLIAM HENRY), an American poet, born at Woodstock, Conn., Feb. 2, 1812. He was an opponent of slavery and editor of several journals. In 1848 he produced a volume of poems. Died March 18, 1871.

Burlesque [It. *burlesco*, from *burla*, a "jest," "mockery"], a species of ludicrous composition. The Italian "poesia burlesca" signifies comic or sportive poetry. The term in French and English is commonly restricted to compositions of which the humor consists in a ludicrous mixture of things high and low, as high thoughts clothed in low expressions, or *vice versâ*, ordinary or mean topics invested with the artificial dignity of poetic diction. Scarron's works and Butler's "Hudibras" are remarkable examples of the burlesque.

Burlet'ta, an Italian word, signifies a comic operetta or musical farce.

Bur'lingame, city and R. R. junction, former capital of Osage co., Kan. (see map of Kansas, ref. 6–I, for location of county), 24 miles S. S. W. of Topeka. Coal is found in abundance here, also a fine quality of fire-clay. The surrounding country is unsurpassed in productiveness. Pop. in 1870, 655; in 1880, 1370; in 1885, 1574.

Burlingame (ANSON), LL.D., an American diplomatist, born at New Berlin in Chenango co., N. Y., Nov. 14, 1822, and graduated at Harvard in 1846. He became a lawyer and a resident of Boston, and represented the fifth district of Massachusetts in Congress from 1854 to 1860. He acted with the Republicans, and gained distinction as an orator. In 1861 he was sent as commissioner to China, and in 1867 was appointed ambassador from China to the U. S. and the great powers of Europe. Died Feb. 23, 1870.

Burlington, city, important R. R. centre, and river-port of Iowa, capital of Des Moines co. (see map of Iowa, ref. 7–K, for location of county), is situated on the Mississippi River, 207 miles W. S. W. of Chicago, 250 miles by water above St. Louis, and 296 miles by railroad E. of Omaha. The river is here a broad, deep, and beautiful stream. The plan of the city is regular, and the houses are mostly of brick or stone. Many of the private residences are built on high bluffs which afford extensive views of river-scenery. This place is the seat of Burlington University, and contains about twenty-five churches, and numerous manufactories. Here occurs a valuable variety of carboniferous limestone. (See BURLINGTON LIMESTONE.) Burlington is sometimes called the "Orchard City." It has two English and one German daily and three weekly newspapers. Pop. in 1860, 6706; in 1870, 14,930; in 1880, 19,450; in 1885, 23,459. "THE HAWKEYE."

Burlington, R. R. junction, a city, capital of Coffey co., Kan. (see map of Kansas, ref. 6–I, for location of county), on the right bank of the Neosho River, 28 miles S. E. of Emporia and 65 miles S. of Topeka. It has an abundant water-power, a public school-house costing $30,000, and first-class mills. Pop. in 1870, 960; in 1880, 2011; in 1885, 2819.

Burlington, capital of Boone co., Ky. (see map of Kentucky, ref. 2–H, for location of county), is 16 miles S. W. of Cincinnati. Pop. in 1870, 277; of district, 1557; in 1880, 1640.

Burlington, a city and R. R. centre of Burlington co., N. J. (see map of New Jersey, ref. 5–D, for location of county), on the Delaware River, nearly opposite Bristol, 20 miles above Philadelphia and 12 miles S. W. of Trenton. The river is here nearly 1 mile wide, and encloses an island of 300 acres. The city is the seat of Burlington College (Episcopalian), founded in 1846, and contains a public library. Pop. in 1880, 6090; in 1885, 6653.

Burlington, city, R. R. centre, and capital of Chittenden co., Vt. (see map of Vermont, ref. 4–B, for location of county), is situated on Burlington Bay of Lake Champlain, 40 miles W. from Montpelier, the capital of the State. It was incorporated as a city in 1865, and is the largest place in the State. Pop. in 1840, 4271; in 1850, 7585; in 1860, 7713; in 1870, 14,387; in 1880, 11,364. Area of original township, 6 square miles; about two-fifths were included in the municipal limits, the rest forming a new town called South Burlington.

The heaviest trade in the city is in lumber. The capital invested is over $1,000,000. There are large quarries of building-stone, of limestone, and of fine marble within or near the city limits; lime-kilns and brick-yards are in active operation, and steam marble-mills, machine-shops, foundries, sash-factories, chair and furniture factories, paper-mills, and many smaller manufacturing trades, are thriving. On the N. E. limit of the city the abundant water-power of the Winooski is utilized for woollen and cotton mills, flour-mills, machine-shops, chair factories, etc. A line of passenger steamers and a large fleet of tugs and barges ply between Burlington and every port on the lake.

The University of Vermont and State Agricultural College is situated here; it was chartered in 1791, has a flourishing medical department, and ranks as one of the best institutions in the country. Since 1872 young women have been admitted to the classical and scientific departments on the same terms as young men. The college buildings stand on the crown of the hill on whose side the city is built, overlooking the lake in a most beautiful and commanding position. The library and museum are in a fireproof building, and the third story of the edifice contains an art-gallery. A park of 7 acres lies in front of the college buildings, and lands of the university are in the rear. The city schools are under control of a board of commissioners elected by the people. The high-school building, erected in 1871 at a cost of $20,000, is one of the best in the State. There are also two large Roman Catholic schools and an Episcopal institute for boys within the city limits, and several private schools. St. Mary's (Roman Catholic) cathedral is one of the finest church edifices in this part of the country. There are two orphan asylums—one Roman Catholic, and one Protestant. The chief public buildings are the city hall, the county court-house (a handsome stone building, erected in 1872), the county jail, and the U. S. post-office and custom-house (a large fireproof brick building, erected in 1858). The libraries are the University Library, Young Men's Association, Young Men's Christian Association, and the Fletcher Free Library, under control of the city.

The city is supplied with water from the lake, raised by steam-pumps to a reservoir on the hill, which gives a head of 280 feet; the water-works are under the control of the city. Lakeview Cemetery, opened by the city in 1868, on the bluff overlooking the lake, is already a beautiful spot, and Green Mount Cemetery, on the eastern side of the city, overlooking the valley of the Winooski, a magnificent location, contains the monument to Ethan Allen, who was one of the early settlers and buried here—a shaft of granite surmounted by a heroic statue of Allen in marble, which was unveiled with imposing ceremonies July 4, 1873.

Burlington was first settled in 1773, but no permanent residences were made till the close of the Revolutionary war, and in 1800 the population was 600. The principal streets are four rods wide, laid out at right angles, many of them well shaded with elm and maple trees. The location of the city is unequalled in this part of the country, and the beauty of its scenery unsurpassed anywhere. The geographical position of the city, midway of the eastern shore of Lake Champlain, and the facilities for transportation by rail and water, make the whole valley of the lake tributary to it in the way of business.

Burlington, Racine co., Wis. (see map of Wisconsin, ref. 7–F, for location of county), on R. R. and the Pishtaka or Fox River, 27 miles W. by S. of Racine. It has several factories and mills. Pop. in 1880, 1611; in 1885, 1656.

Burlington Limestone, a variety of sub-carboniferous magnesian limestone, which derives its name from Burlington, Ia., the typical locality where it was first studied. It also occurs as a surface-rock in Missouri and Illinois, adjacent to the Mississippi River. It is a valuable building-stone, and is peculiarly interesting to naturalists. The upper bed is of a light gray color, and is nearly pure carbonate of lime. The lower bed contains more magnesia. "It is," says A. H. Worthen, "exceedingly rich in fossils, especially Crinoidea, and has afforded a greater number both of species and individuals than all the other palæozoic rocks of this continent combined."

Bur'mah, or **Birmah,** a former kingdom of Farther India, once extensive and influential, in 1885 included, besides Burmah proper, Northern Burmah and the Shan tributary states, whose allegiance was little more than nominal, having an area of 192,000 square miles. It extends from 19° 29′ to 28° N. lat., and from 93° to 100° E. lon. Burmah proper (capital Mandelay) occupies the lower valleys of the Irrawaddi and Salwen, an area of 44,500 square miles.

Topography, Rivers, etc.—Northern Burmah is mountainous; the E. has high hills and some mountains; Burmah proper is a rolling upland declining toward the Bay of Bengal, with alluvial basins, swamps, and sudden ridges of hills; the Irrawaddi and Salwen rivers and their affluents drain the whole; both are navigable for several hundred miles.

Climate.—Two seasons—the rainy, from Oct. to Apr.; the dry and hot, from May to Oct.; they are regulated by the N. E. and S. W. monsoons. The dry season, healthy but hot; the rainy, pestiferous, especially in the jungles.

Minerals.—Gold, silver, and lead in the N. and E.; iron, copper, rubies, sapphires, amber, and petroleum abundant in Burmah proper.

Vegetation and Soil.—Magnificent forests; seven or eight species of palms, teak, mesua or iron-wood, camphor shrub, peepul, evergreen oaks, pine, and other tropical trees; flowers and shrubs of great beauty.

Products.—Rice, maize, millet, beans,yams, cotton, tobacco, indigo, bananas, plantains, and other tropical fruits.

Exports.—Teak-timber, petroleum, gold-leaf, silver, copper, indigo, tobacco, cotton, ivory, horns, and gums.

Animals.—The elephant, tiger, leopard, rhinoceros, and buffalo; the elephant and buffalo are domesticated.

People.—The Burmese are Mongols; their language is monosyllabic; they are industrious and ingenious in the mechanical arts; the Karens and Shans are of a different race, less intelligent, and not so advanced in industrial pursuits, but learn readily.

History.—Two kingdoms, Ava and Pegu, were rivals for many centuries; in 1364 the kingdom of Ava obtained the advantage, and retained it for 369 years. Pegu regained the power in 1733, but was conquered by Alompia in 1756. His descendants ruled until 1886. The present capital is Mandelay. The kingdom of Burmah was at its zenith in 1822, but two wars with Great Britain, in 1826 and 1852, caused it to lose its prestige and 88,556 square miles of its territory (see BURMAH, BRITISH), and in 1885 a war with Great Britain resulted in the annexation, on Jan. 1, 1886, of the whole kingdom to the British dominions.

Population, etc.—The population of the whole kingdom of Burmah is estimated at 4,000,000. Northern Burmah is inhabited by wild, warlike tribes—Singphos, Shans, Kyans, Red Karens, Kakhyens, etc.; the E. tributary states by Shans, with some Red Karens and Burmese; the natives of both these sections are not idolaters, but were demon-worshippers. The population of Burmah proper is about 1,200,000, Burmese, and Karens of several tribes. The Burmese are mostly Booddhists and of marked Mongolian race. The Karens are probably also Mongols, but with less marked features. Many of them are now Protestant Christians, through the labors of American missionaries.

L. P. BROCKETT.

Burmah, British, a collective term applied to several provinces of the Anglo-Indian empire conquered from the kings of Burmah. These are Aracan, Martaban, Pegu, and the Tenasserim provinces of Maulmain (or Amherst), Tavoy, and Mergui. Aracan and the Tenasserim provinces were ceded to the British by a treaty signed in Feb., 1826, at the end of the first war with Burmah. Pegu and Martaban were retained as compensation after the war of 1852. The American Baptist missionaries have in British Burmah one of the most successful missions of modern times. The area of British Burmah is 88,556 square miles. Pop. in 1881, 3,707,646. On Jan. 1, 1886, the whole kingdom of Burmah became part of the dominions of Great Britain. (See ARACAN and PEGU.)

Bur'mann (PETER), an eminent philologist, was born at Utrecht July 6, 1668. He became professor of history, eloquence, and the Greek language at Leyden in 1715. He edited Horace, Ovid, Vergil, Quintilian, Lucan, and other classics, and wrote several works, among which is a treatise "On the Revenues of Rome" ("De Vectigalibus Populi Romani," 1694). His writings are esteemed for their accurate erudition. Died Mar. 31, 1741.

Bur'meister (HERMANN), a German naturalist, born at Stralsund Jan. 15, 1807, became professor of zoology at Halle in 1842, and in 1860 director of a museum of natural history in Buenos Ayres. Among his works are a "Manual of Entomology" (4 vols., 1832–44) and "The Animals of Brazil" (2 vols., 1854–56).

Bur'nap (GEORGE W.), D. D., born at Merrimack, N. H., Nov. 20, 1802, graduated at Harvard in 1824, became in 1823 pastor of a church in Baltimore, and was the author of numerous works, principally for the defence and exposition of the school of Unitarianism to which he belonged. Died at Philadelphia Sept. 8, 1859.

Burnes (Sir ALEXANDER), a noted traveller and Orientalist, born at Montrose, Scotland, May 16, 1805. He entered the army of India in his youth, and by his knowledge of Oriental languages gained a rapid promotion. In 1832 he started from Lahore on an exploring expedition in Central Asia, and visited Balkh, Bokhara, Astrâbâd, Teheran, etc. Having returned to England in 1833, he published "Travels into Bokhara." In 1838 he was sent on a mission to Cabool, where he passed some years as political resident. He was murdered there Nov. 2, 1842, by the Afghan insurgents.

Bur'net, the popular name of two genera of plants, the *Sanguisorba* and *Poterium,* generally referred to the natural order Rosaceæ. The great burnet (*Sanguisorba officinalis*) is cultivated in Germany as a forage-plant, and yields a good crop on poor soils. A similar species grows wild in North America. The common burnet (*Poterium Sanguisorba*) furnishes valuable pasturage for sheep on the English downs. It is sometimes seen in American gardens, and is used in salads.

Burnet, on R. R., capital of Burnet co., Tex. (see map of Texas, ref. 4–H, for location of county), is 45 miles N. W. of Austin, and 10 miles E. of the Colorado River. Pop. in 1870, 280; in 1880, 490.

Burnet (GILBERT), F. R. S., an eminent British historian and prelate, born in Edinburgh Sept. 18, 1643. He became professor of divinity in the University of Glasgow in 1668, resigned that chair in 1675, and removed to London. In 1679 he published the first volume of his "History of the Reformation in England" (3 vols., 1679–1715). He refused a bishopric which was offered to him by Charles II. He was a courageous and able asserter of civil liberty in the important crisis which preceded the revolution of 1688, and gained the favor of William III., who appointed him his chaplain, and in 1689 bishop of Salisbury. Among his works are a "Life of Sir Matthew Hale" (1682) and a "History of his Own Times" (2 vols., 1724–34). Died Mar. 17, 1715. "The utmost malevolence of faction," says Macaulay, "could not deny that he served his flock with a zeal, diligence, and disinterestedness worthy of the purest ages of the Church." (*History of England.*)

Burnet (JACOB), LL.D., an American jurist, born at Newark, N. J., Feb. 22, 1770. He graduated at Princeton in 1791. He was one of the founders of Cincinnati, whither he removed in 1796. He became a judge of the supreme court of Ohio in 1821, and was elected to the Senate of the U. S. in 1828. He wrote "Notes on the Early Settlement of the North-west Territory." Died April 27, 1853.

Burnett (WALDO IRVING), M. D., a naturalist and microscopist, born at Southborough, Mass., July 12, 1828. He wrote, besides other works, "The Cell; its Physiology, Pathology," etc. Died July 1, 1854.

Burnett Prizes, The, are two premiums founded by Mr. Burnett, a merchant in Aberdeen, who for many years spent £300 annually on the poor. On his death in 1784 he bequeathed his fortune to found the above prizes, as well as to relieve poor persons and to support a jail-chaplain in Aberdeen. He directed the prize-fund to be accumulated for forty years at a time, and the prizes (not less than £1200 and £400) to be awarded to the authors of the two best treatises on the evidence that there is a Being all-powerful, wise, and good, by whom everything exists; "and particularly to obviate difficulties regarding the wisdom and goodness of the Deity, and this independent of written revelation and of the revelation of the Lord Jesus; and from the whole to point out the inferences most necessary and useful to mankind." The competition is open to the whole world, and the prizes are adjudicated by three persons appointed by the trustees, with the ministers of the Established Church of Aberdeen, and the principals and professors of King's and Marischal Colleges. On the first competition in 1815 the judges awarded the first prize, £1200, to Dr. Wm. L. Brown of Aberdeen for an essay entitled "The Existence of a Supreme Creator;" and the second prize, £400, to the Rev. J. B. Sumner, afterwards archbishop of Canterbury, for an essay entitled "Records of Creation." In 1855 the judges awarded the first prize,

£1800, to the Rev. R. A. Thompson, for an essay entitled "Christian Theism;" and the second prize, £600, to the Rev. Dr. John Tulloch of St. Mary's College, St. Andrew's, for an essay on "Theism." The above four essays have been published.

Burnett's Disinfecting Fluid is a strong solution of chloride of zinc, with a small amount of iron, and when used it is mixed with water in the proportion of one pint to five gallons of water. The liquid acts only as a deodorizer and antiseptic, and does not exhibit the properties of a true disinfectant. It is of service in preserving dead animal tissues, as in the dissecting-room and in jars containing anatomical specimens. It has little action on steel instruments. When added to sewage water, the chloride of zinc mainly acts by decomposing the sulphide of ammonium, forming the sulphide of zinc and chloride of ammonium, both of which are odorless. It has been applied to the preservation of timber by a process called *burnettizing*. Crewe's disinfectant liquid is the same.

Bur'ney (CHARLES), F. R. S., MUS. DR., an English composer, born at Shrewsbury Apr. 17, 1726, was a friend of Dr. Johnson and Edmund Burke; wrote, besides other works, a "General History of Music from the Earliest Ages" (4 vols., 1776–89), which is highly esteemed, and a "Life of Handel." He was the father of Madame d'Arblay. He died Apr. 12, 1814.

Burney (FRANCES). See D'ARBLAY, MADAME.

Burn'ham (ALFRED A.), born in Windham, Conn., Mar. 8, 1819, studied law, and admitted to the bar in 1843; member of Connecticut House of Representatives in 1844–45, 1850, and 1858, serving in 1858 as Speaker; clerk of the State Senate in 1847; and was afterward judge of probate; lieutenant-governor of Connecticut in 1857; and Republican Representative to 36th and 37th Congresses, serving on committees on patents and on foreign affairs. Died at Windham, Conn., Apr. 11, 1879.

Burnham (HIRAM), an American general of volunteers, entered the army as colonel Sixth Maine Volunteers, leading his regiment with daring and ability through the Peninsula campaign, at Antietam, Fredericksburg, and Gettysburg. Appointed brigadier-general of volunteers 1864, and in the memorable "Wilderness" campaign of that year he took a prominent part. His entire military career was conspicuous for gallantry and coolness; at the battle of Chapin's Farm, Sept. 29, 1864, he fell in the noble performance of his duty.

G. C. SIMMONS.

Burning Glasses and **Burning Mirrors,** the names given to glasses or mirrors so formed as to collect the sun's rays which fall on them into a point or *focus*, and thereby produce intense heat. The rays of light or heat may be concentrated either by refraction or reflection; in the former case they must pass through a transparent refracting substance, as glass formed into a proper shape; in the latter they fall on a concave polished surface of silvered glass or bright metal.

The method of exciting heat or producing fire by the concentration of the sun's rays was known from remote antiquity, but the most famous recorded achievement of this kind is that of Archimedes, who is reported to have burned by means of mirrors the Roman fleet in the harbor of Syracuse. The celebrated Buffon, with 168 mirrors, each about six inches square, set fire to planks of beech 150 feet distant, and this with the faint rays of the sun at Paris in the month of March.

In preparing a burning glass, the first thing to be considered is the figure necessary to collect all the rays into the smallest possible space. Descartes, in his "Optics," showed that a disk of glass convex on the one side and concave on the other, the convex side being a portion of an elliptic surface, and the concave a portion of a sphere, would cause parallel rays falling on its convex side to converge in a single point. But as the practical difficulties of forming a glass accurately into this shape are insuperable, both sides are ground into portions of a sphere. In a lens the focal length depends on the curvature, or the radius of the sphere, and on the refractive power of the substance of which the lens is formed.

The proper form for a burning mirror is the parabola, but as a parabolic curve is exceedingly difficult to obtain either upon metal or glass, opticians frequently rest content with a spherical curvature of long focus. Recently, burning mirrors have been constructed of glass, upon the curved surface of which pure silver is precipitated by chemical means. By this plan the curved surface is produced upon glass, and thus becomes permanent, whilst the reflection is effected by the polished surface of the silver, which can be easily renewed from time to time. The focus of a burning mirror is one-half of the radius of curvature.

Among those who have experimented, in modern times, upon the effects of burning glasses or mirrors, are reckoned Baron Napier, the illustrious inventor of the logarithms, Kircher, Dr. James Gregory, Sir Isaac Newton, and many others. The most powerful solid lens ever constructed was the work of Mr. Parker, an ingenious London artist. It was made of flint glass, was three feet in diameter, 3¼ inches thick at the centre, its focal distance 6 feet 8 inches, the diameter of the burning focus 1 inch, and its weight 212 pounds. The rays refracted by this lens were received on a second, the diameter of which in the frame was 13 inches, and its focal length 29 inches. The diameter of the focus of the combined lenses was half an inch, consequently, by the addition of the second lens, the burning power was increased four times. With this lens some of the most refractory substances were fused in a very short space of time: for example, 10 grains of common slate in 2 seconds; 10 grains of cast iron in 3 seconds; 10 grains of lava in 7 seconds; 10 grains of jasper in 25 seconds, etc. One account says, "the most infusible metals were instantly melted and dissipated in vapor." The difference in the statements may be reconciled by supposing the circumstances attending the use of the glass to be different, as there is a very great difference in the power of the sun's rays at different times, and especially in different countries. This glass was afterwards carried to China by one of the officers who accompanied Lord Macartney, and left at Pekin. A remarkable lens, formed by bending or moulding two plates of glass over a parabolic mould, and filling the cavity between with ninety quarts of spirits, was constructed by Rossini of Gratz, in Styria. The diameter of the plates was three feet three inches, and they were united by a strong ring of metal. The whole was mounted on a heliostat. In its focus a diamond was instantly kindled and dissipated, and a piece of platinum twenty-nine grains in weight was melted and thrown into violent ebullition. This lens now belongs to the French government. (For detailed information on this subject the reader may consult the article "Burning Glasses" in the "Encyclopædia Britannica," 8th edition.)

REVISED BY J. THOMAS.

Burn'ley, a market-town of England, in Lancashire, on the Brun, near its entrance into the North Calder and 20 miles N. of Manchester. It is connected by railway with Blackburn, Liverpool, and other cities. It has manufactures of cotton and woollen fabrics, calico-printing works, brass and iron foundries, machine-shops, tanneries, and rope-walks. Its prosperity is partly derived from the collieries in the vicinity. Pop. in 1881, 58,882.

Burnouf (EUGÈNE), DR. LIT., an eminent French Orientalist, born in Paris Aug. 12, 1801. He studied the languages of Persia and India, was admitted into the Academy of Inscriptions, and became in 1832 professor of Sanscrit in the College of France. Among his works are a "Commentary on the Yaçna, one of the Liturgic Books of Persia" (1834), and an "Introduction to the History of Booddhism" (1845), which is highly commended. Died May 28, 1852. (See CHARLES LENORMANT, "Eugène Burnouf," 1852.)

Burns (FRANCIS), D. D., a colored bishop of the Methodist Episcopal Church, was born in Albany, N. Y., Dec. 5, 1809, was sent as missionary to Liberia, Africa, in 1834, taught in a school at Cape Palmas, joined the Liberia Conference in 1838, founded the Monrovia Academy in 1851, was ordained bishop of his denomination, in Liberia, in 1858, and, after nearly five years of eminent episcopal service, died in 1863.

Burns (ROBERT), a gifted Scottish poet, was born near the town of Ayr on the 25th of Jan., 1759. His father was the son of a farmer, and "was thrown by early misfortunes," says the poet, "on the world at large, where, after many years' wanderings and sojournings, he picked up a pretty large quantity of observation and experience, to which I am indebted for most of my little pretensions to wisdom." Although his life seems to have been one long struggle with misfortune, Burns's father was at great pains to give his children a good education. When he was able he sent them to school; and not unfrequently when the day's work was ended he taught his children himself. "I owed much," says Burns, "to an old woman who resided in the family. . . . She had, I suppose, the largest collection in the country of tales and songs concerning devils, ghosts, fairies, brownies, witches, warlocks, enchanted towers, and other trumpery. This cultivated the latent seeds of poetry." Burns was early familiarized with those trials and hardships to which the poor are so often exposed, and to which he sometimes alludes with such power and pathos in his poetry. "My father," says the poet, "was advanced in life when he married; I was the oldest of seven children, and he, worn-out with early hardships, was unfit for labor. . . . We lived very poorly. I was a dexterous ploughman for my age." The poet had a robust frame and active body, as well as a strong intellect and acute sensibilities. He is said to have done at the age of fifteen the work of a man. In a touching account which his brother Gilbert wrote of the troubles of their early years, he says: "I doubt not but the hard labor and sorrow of this period of his life were in a great measure the cause of that depression of spirits with which Robert was so often afflicted through his whole life afterwards."

In the case of Burns, as in that of Sappho, it was love that taught him song. A little before he reached his sixteenth year he "first committed the sin of rhyme." A "bonnie sweet sonsie lass" had been associated with him in the labors of the harvest-field. Her singing "made his heart-strings thrill like an Æolian harp," and first inspired him with the idea of writing songs. An irresistible attraction towards what he calls the "adorable half of the human species" was perhaps his most remarkable characteristic; and hence it was as an amatory poet that he was especially distinguished. Unhappily, this remarkable susceptibility to the tender passion degenerated, under the influence of evil company, from its first purity, and led him into illicit amours, which were the cause of his principal misfortunes. In proportion as he cast off the restraints of morality, he seems to have lost his reverence for religion. He was one day seen, says Lockhart, "at the door of a public-house holding forth on religious topics to a whole crowd of country-people, who presently became so shocked with his levities that they fairly hissed him from the ground." With his other faults and vices, intemperance went hand in hand. But he had too much sense of right, and too much feeling, to be able to drown altogether the reproving voice of conscience. He sometimes alluded to his faults in a manner full of pathos and self-reproach; and he had at least the merit of not seeking to defend his errors.

He had formed in 1785 a *liaison* (which was, according to the usage of Scotland, virtually a marriage) with Jean Armour, a person somewhat above his own position in life. She bore him twins, and although he had previously given her a written acknowledgment of marriage, her father was greatly incensed against the poet, so that he determined to leave Scotland and seek his fortune in the New World. But before quitting his native country for ever, he resolved (1786) to publish his poems. The success of the experiment induced him to change his plans. He was encouraged to visit Edinburgh, where he made the acquaintance of many men at that time distinguished in literature, including Dugald Stewart and Dr. Blair, besides many others. It was during Burns's visit to the capital that Scott, then a very young man, had an opportunity of beholding and listening to the gifted stranger. He has left a very interesting account of Burns's appearance. He seems to have been most struck with the eye of the rustic poet. "I never saw," says Scott, "such another eye in a human head, though I have seen the most distinguished men of my time. It was large and of a dark cast," and "literally *glowed* when he spoke with feeling or interest." "His conversation expressed perfect self-confidence, without the slightest presumption."

Among men of rank who interested themselves in the poet, Lord Glencairn was especially prominent. Burns always remembered his kindness with the most heartfelt gratitude, and afterwards dedicated to his memory the beautiful and touching lines entitled the "Lament for James, earl of Glencairn." Soon after his visit to Edinburgh he published (1787) a new edition of his poems. In 1788 he openly declared his marriage with Jean Armour, and about this time was appointed an officer of the excise, with a salary of fifty pounds a year; it was subsequently increased to seventy-five pounds. His intemperate habits, which had been aggravated by the excitement and irregularities of his recent life in Edinburgh, and his subsequent pecuniary distresses, gradually gained a great ascendency over him, but rarely if ever to the extent of rendering him incapable of performing the duties of his office. He removed in 1791 to Dumfries, where he passed the remainder of his life. He died July 21, 1796. Nearly twenty years after his death a splendid mausoleum was erected to his memory in the churchyard at Dumfries, whither his remains were removed on the 5th of June, 1815. (See Lockhart's "Life of Burns," 1828; Currie's "Life of Burns," prefixed to the "Correspondence" of the poet; A. Cunningham, "Life and Land of Robert Burns," 1840; Carlyle, "Miscellanies;" also F. G. Halleck's and Thomas Campbell's beautiful lines to Burns's memory.) J. Thomas.

Burns (William W.), General, was born in Ohio, and graduated at West Point in 1847. He became a brigadier-general of volunteers in 1861, major-general volunteers in 1862, and brevet brigadier-general U. S. A. in 1865. He served in the Army of the Potomac until 1863.

Burns and Scalds of the body differ in the mode of application of the excessive heat which is the cause of injury—burns arising from the application of a hot solid body or flame, and scalds from hot water or steam. Severe burns are often fatal, especially to children; quite as much, perhaps, from the shock which attends them as from any appreciable injury. Burns which are not fatal frequently leave extensive scars, which often have a tendency to contract in such a way as to lead to frightful disfiguration. When the clothes take fire, the flames should be extinguished if possible by wrapping in a blanket or rug, that being usually the most available means at hand. In all cases the clothes should be removed with great care, so as not to remove the cuticle with them. If cold water be agreeable to the patient, it may be cautiously applied. Pain and shock may often be relieved by opiates or stimulants. The injured surfaces are to be dressed with carron oil (a mixture of olive oil and lime-water), with collodion, with oiled cotton, or they may simply have flour dredged over them. When the surface takes on an unhealthy action and granulations are excessive, a weak solution of nitrate of silver or other local stimulant may produce good results.

Revised by Willard Parker.

Burnside (Ambrose Everett), an American officer and governor, born May 23, 1824, at Liberty, Ind., graduated at West Point 1847, and as lieutenant of artillery served in war with Mexico 1847–48; at various posts 1848–53; on frontier duty in New Mexico 1849–50, engaged with Jacarillo Apaches (wounded); and with Mexican boundary commission 1851–52. Resigned Oct. 2, 1853. Manufacturer at Bristol, R. I., 1853–58, of breech-loading rifles, which he had invented; cashier of land department Illinois Central R. R. Company 1858–59; and treasurer Illinois Central R. R. Company 1860–61. In the civil war, as colonel Rhode Island three-months' volunteers, served in Maj.-Gen. Patterson's operations about Cumberland, Md., and in the Manassas campaign 1861, engaged at Bull Run. Appointed brigadier-general U. S. volunteers Aug. 6, 1861, and promoted to major-general May 18, 1862, serving in organizing the coast division and in command of department of North Carolina 1862, engaged at Roanoke Island, Newbern, Camden, and Fort Macon; in command of forces (Ninth army corps) at Newport News and Fredericksburg 1862; in Maryland campaign, engaged at South Mountain and Antietam, in command of left wing; in general charge of Harper's Ferry 1862; in command of Army of Potomac Nov. 7, 1862, to Jan. 28, 1863, defeated at Fredericksburg; in command of department of Ohio 1863, engaged against Morgan's raiders, capture of Cumberland Gap, occupation of East Tennessee, in several actions and siege of Knoxville; in command of Ninth corps in Richmond campaign 1864, engaged at Wilderness, Spottsylvania, North Anna, Tolopotomy, Bethesda Church, and Petersburg, including Mine assault. Resigned April 15, 1865, from volunteer service. Civil engineer 1865–66; president of Cincinnati and Martinsville R. R. Company in 1865; of Rhode Island Locomotive Works in 1866, and of Indianapolis and Vincennes R. R. Company in 1867; and governor of the State of Rhode Island 1866–69. He was elected U. S. Senator from R. I. in 1875, and re-elected in 1880. D. Sept. 13, 1881. George W. Cullum.

Burnsville, capital of Yancey co., N. C. (see map of North Carolina, ref. 2–C, for location of county), 120 miles W. of Lexington. Pop. of tp. in 1870, 505; in 1880, 709.

Burnt Offerings. See Sacrifice.

Burnt Sien'na, a fine orange-red pigment, transparent and permanent, obtained by burning the ferruginous ochreous earth called terra di Sienna. It is used both in oil-painting and painting with water-colors. Mixed with Prussian blue, it produces a beautiful green.

Burnt Um'ber, a pigment of a russet-brown color, is semi-transparent, mixes well with other pigments, and dries quickly. It is prepared by burning umber, an ochreous earth first discovered in Umbria, Italy.

Bur Oak (the *Quercus macrocarpa*), a species of oak of medium size found in the U. S., principally E. of the Mississippi. It is also called over-cup oak and mossy-cup oak. Its timber is valuable.

Burr (Aaron), father of the Vice-President, was born at Fairfield, Conn., Jan. 4, 1716, graduated at Yale in 1735, licensed to preach in 1736, settled over the Presbyterian church in Newark, N. J., in 1738, chosen president of the College of New Jersey in 1748, and died Sept. 24, 1757. In 1752 he married Esther, daughter of the elder President Edwards. She died April 7, 1758, in the 27th year of her age. They left two children—a daughter, who married Hon. Tapping Reeve, chief-justice of the supreme court of Connecticut, and a son, Aaron, noticed below. He was both a scholarly and an eloquent man. He published a Latin Grammar, 1752, known as "The Newark Grammar," a pamphlet on "The Supreme Divinity of our Lord Jesus Christ," reprinted in 1791, and several discourses.

Burr (Aaron), born at Newark, N. J., Feb. 6, 1756, was a son of the preceding and a grandson of Jonathan Edwards. He graduated at Princeton in 1772, joined the Provincial army at Cambridge, Mass., in 1775, served as a private soldier, and afterwards as aide to Montgomery on the Quebec expedition, served on the staffs of Arnold, Washington (whom he disliked), and Putnam, becoming a lieutenant-colonel, and commanding a brigade at Monmouth. He resigned from the army by reason of ill-health in 1779. He practised law at Albany in 1782 and in New York City in 1783, and became attorney-general of New York in 1789. He was a Republican U. S. Senator 1791–97. In 1800 he and Jefferson each had 73 electoral votes for the office of President of the U. S. The choice was thus left to Congress, which, on the thirty-sixth ballot, chose Jefferson for President and Burr for Vice-President. In 1804 he mortally wounded in a duel his rival Alexander Hamilton, and in consequence lost greatly in political and social influence, and soon after embarked in a wild attempt upon Mexico and, as was asserted, upon the South-western territories of the U. S., thereby involving in ruin his friend Blennerhassett. He was in 1807 tried at Richmond, Va., on a charge of treason, but was acquitted. To escape his creditors he retired to Europe for a time, but returned to New York in 1812, and again practised law. Died Sept. 14, 1836. Burr was a man of much ability and very brilliant and popular talents, but his influence was destroyed by his unscrupulous political acts and his grossly immoral conduct in private life. (See his "Life," by M. L. Davis, 1836–37; by James Parton, 1857.)

Burr (Enoch Fitch), D. D., a kinsman of President Burr of the College of New Jersey, was born at Greens Farms, Fairfield, Conn., Oct. 21, 1818, graduated at Yale in 1839, spent several years in New Haven in scientific and other studies, became greatly broken in health, obtained partial relief by a year of foreign travel, and was settled over the Congregational church in Lyme, Conn., in 1850. After nearly twenty years of secluded and patient study, his reputation was suddenly made by several works of marked ability; published "A Treatise on the Application of the Calculus to the Theory of Neptune," 1848, "Ecce Cœlum," 1867, "Pater Mundi," 1870, "Ad Fidem," 1871, "Doctrine of Evolution," 1873, "A Song of the Sea" (an illustrated poem), 1873; "Pasce Agnos: or, What I have to Say to the Children," 1873, "Sunday Afternoons," 1874, "Thy Voyage," 1874, "Toward the Strait Gate" and "Work in the Vineyard," 1876, "From Dark to Day," 1877, "Dio the Athenian," 1881, "Tempted to Unbelief," 1882, "Ecce Terra," 1884, and "Celestial Empires," 1885.

Burrampooter. See Brahmapootra.

Burria'na, a town of Spain, in the province of Castellon de la Plana, on the Rio Seco, near the Mediterranean. It exports wine, oil, and fruit. Pop. 10,058.

Bur'rill (Alexander M.), born about 1807, graduated at Columbia College with the highest honors in 1824, studied law with Chancellor Kent, and published a number of legal works, including a "Law Dictionary." Died Feb. 7, 1869.

Burrill (James), LL.D., born in Providence, R. I., April 25, 1772, graduated at Brown University in 1788, was called to the bar in 1791, and attained eminence. He was attorney-general of Rhode Island (1797–1813), chief-justice of the State supreme court (1816), U. S. Senator (1817–20). Died Dec. 25, 1820.

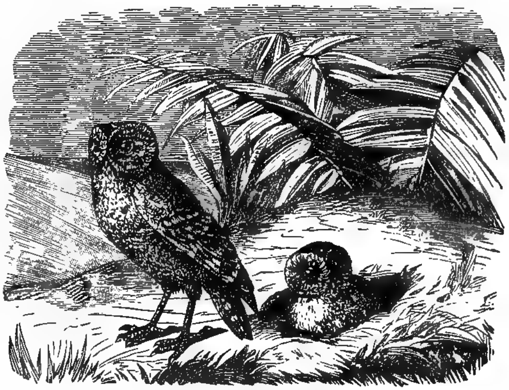
Bur'ritt (Elihu), a reformer and linguist, called the Learned Blacksmith, was born in New Britain, Conn., Dec. 8, 1811. He worked for many years at the trade of a blacksmith, and became a self-taught master of many ancient and modern languages. As a public lecturer he advocated temperance and peace in the U. S. and in England. Among his works are "Sparks from the Anvil" (1848) and "Thoughts on Things at Home and Abroad" (1854). D. at New Britain, Conn., Mar. 7, 1879.

Burr Oak. See Bur Oak.

Bur'roughs (George), a victim of the witchcraft delusion, graduated at Harvard College in 1670, and was a preacher in Salem, Mass., in 1681. He soon after went to Falmouth (now Portland), Me., where he remained until the Indians sacked the town in 1690; returning to Salem, he was accused in 1692 of witchcraft, placed on trial, and, owing to the infatuation then prevailing, was declared guilty of exercising diabolical powers, and executed Aug. 19, 1692. At the scene of execution he declared his innocence, his appeal moving the spectators to tears; and though he repeated the Lord's Prayer, which no witch was supposed to be able to do without mistake, he was doomed to suffer.

Burroughs (Stephen), a famous adventurer, the son of a Congregational minister of Hanover, N. H., was born in 1765, and early became noted for mischievous conduct. When fourteen years old he enlisted in the Revolutionary army, deserted, and entered Dartmouth College, which he soon left to serve on a privateer. He became a ship's surgeon and schoolmaster, and under an assumed name was for a time minister of the church at Pelham, Mass. He was soon convicted of passing counterfeit money, and was confined at Northampton, Mass., in irons, but set fire to the jail, and was removed to Castle William (now Fort Independence) in Boston harbor, whence he escaped, but was retaken. After his sentence was served out he again became a counterfeiter in Canada, but reformed, and was for several years an exemplary Roman Catholic instructor of youth. He appears to have always possessed engaging and popular qualities. He published a remarkable autobiography in two volumes. Died at Three Rivers, Canada, Jan. 28, 1840.

Bur'rowing Owl [*Speotyto cunicularia* or *Athene cunicularia*), called also **Coquimbo Owl,** is a remarkable bird, which, "disdaining all the traditions of its family," hunts for its prey (consisting chiefly of beetles and other insects) in broad daylight, facing the glare of the noonday sun without any inconvenience. It is a small, lively bird, and is found in many parts of America, being especially abundant beyond the Mississippi, and inhabiting the same localities as the marmot (or prairie dog), whose dwelling it often shares, the rattlesnake sometimes making the third member of this singular family. On the Pacific slope a green snake (*Bascanion*) makes a fourth member of this group. Although the Coquimbo owl prefers to dwell in the holes already excavated by the marmot, it will, if obliged to do so, dig burrows for itself; but these are not so deep nor so neatly made as those of its friends and neighbors the prairie dogs.



Burrowing Owls.

Bur'rows (William), an American naval officer, born near Philadelphia Oct. 6, 1785. He entered the navy at the age of fourteen and served on the Barbary coast; on the outbreak of war with Great Britain (1812), while on his way to the U. S., he was taken prisoner. He reached home in June, 1813, and immediately resumed his duty. He commanded the brig Enterprise in an engagement with the British brig Boxer off Portland, Me., Sept. 5, 1813, during which he was mortally wounded. He lived, however, long enough to receive the surrender of the British vessel. His remains were interred in Portland by the side of the commander of the Boxer, who was also killed in the same action.

Burr'stone, or **Buhrstone,** a silicious rock containing small cells, which give it a roughness of surface adapting it for millstones. It is a sedimentary rock, and its cavities are often produced by the removal, through solution, of its calcareous fossil shells. Burrstone occurs in several geological formations. That which comes from Paris is eocene. The Alabama burrstone is of the same age. That of Ohio, West Virginia, etc. is of the carboniferous age. There are different varieties; those in which the cells are small and regularly distributed are most esteemed. Good burrstone is found in Wales, Scotland, Germany, and Italy, also in Ohio, Pennsylvania, South Carolina, and Alabama, but the finest stones are obtained from La Ferte-sous-Jouarre, near Paris. It is not unusual to form millstones of pieces of burrstone, bound together by iron hoops. The stone is found in beds or detached masses. It is cut out into the form of a cylinder; around this grooves are cut at the intended thickness of the millstones; into these grooves wooden wedges are driven, and water is thrown upon the wedges, which, causing the wood to swell, splits the cylinder into the slices required. Millstones are not always made of burrstone, but sometimes of silicious gritstones, of sandstone, and even of granite. Burr-millstones are extremely durable.

Burs'lem, a market-town of England, in Staffordshire, 2½ miles N. W. of Newcastle-under-Line, on an eminence near the Trent Canal. The occupation of the inhabitants is earthenware manufacture, and it is the principal place in the district called the Potteries. Pop. in 1881, 26,521.

Burt (Armistead), born in Edgefield co., S. C., received a liberal education, was admitted to the bar in 1823, and settled at Abbeville, where he practised law until his death. He was member of Congress 1843–53, and during part of the 30th Congress acted as speaker to the House of Representatives. He was an ardent secessionist, and a member of the State legislature in 1865 which enacted "the Black Code." In 1876 he took an active part in the revolution which made Hampton governor. Mr. Burt was one of the ablest advocates in the State. Died Oct. 30, 1883.

Burt (William A.), born in Worcester, Mass., June 13, 1792, became a surveyor of Erie co., N. Y., and in 1824 removed to Michigan, surveyed Northern Michigan (1840–47), introducing important improvements in surveying. At the World's Fair in London, 1851, he obtained a medal for his solar compass. He was for a time a judge in one of the Michigan State courts, and one of the originators of the canal at Sault Ste. Marie. Died Aug. 18, 1858.

Burton (Asa), D. D., was born at Stonington, Conn., Aug. 25, 1752, graduated at Dartmouth College in 1777, and on Jan. 19, 1779, was settled over the Congregational church in Thetford, Vt., where he died May 1, 1836. He was the champion of the so-called "Taste scheme," in opposition to the "Exercise scheme" of Dr. Emmons, and conducted the controversy with great ability. Besides occasional sermons, he published, in 1824, a volume of "Essays on Some of the First Principles of Metaphysics, Ethics, and Theology."

Burton (John Hill), LL.D., F. R. S. E., a Scottish historian and advocate, born at Aberdeen Aug. 22, 1809. He published, besides other works, "The Life and Correspondence of David Hume" (2 vols., 1846), "Political and Social Economy" (1849), and "The History of Scotland from Agricola's Invasion to the Revolution of 1688" (1867), which is highly esteemed. D. Aug. 10, 1881.

Burton (Richard Francis), an eminent English traveller, born in Norfolk in 1821. Having served many years in the Indian army, he published in 1851 "Sindh, and the Races that inhabit the Valley of the Indus." Disguised as a Mussulman, he performed a perilous exploration of Arabia in 1853, and published a "Personal Narrative of a Pilgrimage to El Medinah and Meccah" (3 vols., 1856). He also undertook extensive explorations in Central Africa, along the Congo, in the highlands of Brazil, etc., and published "The Lake Regions of Central Africa" (1860), "The Highlands of Brazil" (2 vols., 1869), "Zanzibar" (2 vols., 1872), "Two Trips to Gorilla-Land and the Cataracts of the Congo" (1875), "The Gold-Mines of Midian" (1878), "The Gold Coast" (1882).

Burton (Robert), an English clergyman, born at Lindley, in Leicestershire, Feb. 8, 1576, was educated at Oxford. He became rector of Segrave in 1628. He was author of a quaint and popular work entitled "The Anatomy of Melancholy; what it is, with all the Kinds, Causes, Symptoms, Prognostics, and several Cures of it: Philosophically, Medicinally, Historically opened and cut up, by Democritus Junior" (1621). It is an amusing medley of quotations and reflections. Died Jan. 25, 1640.

Burton (William Evans), a comedian and writer, born in London in Sept., 1802. He acted with distinguished success both in England and America. While in England he wrote a drama, "Ellen Wareham," which for a time enjoyed a great popularity. He compiled the "Cyclopædia of Wit and Humor." He was also very successful as a manager. He built the National Theatre in Philadelphia, and in New York purchased Palmo's Opera-house, and afterwards the Metropolitan Theatre on Broadway. Died in New York Feb. 10, 1860.

Burton-on-Trent, a town of England, in Staffordshire, on the river Trent, 11 miles by rail S. W. of Derby. The Trent is here crossed by a stone bridge of thirty-six arches, which was built before the Norman conquest, and is 1545 feet long. Burton has large breweries of celebrated ale; also iron-works and manufactures of cotton goods. It is on the Grand Trunk Canal. Pop. in 1881, 39,285.

Burt'scheid, or **Borcette,** a town of Rhenish Prussia, about half a mile from Aix-la-Chapelle, of which it is properly a suburb. Here are warm sulphur springs and manufactures of woollen cloths and cassimeres. Pop. in 1880, 10,989.

Bu'ry, a manufacturing town of England, in Lancashire, on the river Irwell, 10 miles by rail N. W. of Manchester. It is on a railway which connects it with Bolton and Liverpool. It contains more than twenty churches and dissenting chapels, several public libraries and literary institutions. Here are important manufactures of cotton and woollen goods, machinery, and paper, also calico-printing works and dye-works. Mines of coal and quarries of good freestone have been opened in the vicinity. Bury returns one member to Parliament. The eminent statesman Sir Robert Peel was born near Bury. Pop. of the parliamentary borough in 1881, 51,582.

Burying Beetles are certain insects of the order Coleoptera and family Sylphidæ, famous for their valuable habits of interring the bodies of dead animals. When the carcass of a mouse or other small animal is found, several of them collect around it, and by digging the earth from beneath gradually sink it several inches below the surface. In it the female deposits her eggs, and when the larvæ are hatched, they find themselves in the midst of suitable food.

Bury St. Edmunds, or **St. Edmundsbury,** an ancient borough of England, in the county of Suffolk, is finely situated on the river Larke, 26 miles by rail N. W. of Ipswich and 95 miles by rail N. E. of London. It is well built and remarkably clean. It has a botanic garden, a guildhall, a fine Gothic church (St. Mary's), a celebrated grammar-school founded in 1550, and some remains of a large Benedictine abbey (505 feet by 212), which was founded by Canute, and became the richest (except one) in England. Here is an old belfry or quadrangular tower about eighty-five feet high, which is one of the finest remains of Saxon architecture extant in Britain. Parliaments were held here in 1272, 1296, and 1446. Bury has a large trade in wool, butter, grain, and cheese. Sir Nicholas Bacon was born here. Pop. in 1881, 16,211.

Bus'becq, or **Bousbecq** (Augier Ghislen), [Lat. *Busbequius*], an eminent Flemish scholar and traveller, born at Commines in 1522. He was employed on several important diplomatic missions, and was sent as ambassador from the emperor Ferdinand to Solyman II. of Turkey. He wrote a valuable account of this embassy, entitled "Legationis Turcicæ Epistolæ Quatuor" (1589). Died Oct. 28, 1592.

Bus'by (Dr. Richard), a famous English schoolmaster, born at Lutton, Northamptonshire, Sept. 22, 1606. He was head-master of Westminster School for about fifty-five years (1640–95), was a very successful teacher, and a strict disciplinarian. He is said to have educated a larger number of eminent men than any other teacher who ever lived. Died April 6, 1695.

Büsch'ing (Anton Friedrich), an eminent German geographer, born in Schaumburg-Lippe Sept. 27, 1724. He became in 1761 minister of a Protestant congregation in St. Petersburg, and in 1766 removed to Berlin, where he was employed as director of a gymnasium. He published a "Description of the Earth" (1754), which was the most complete work on geography that had then appeared; also a "Magazine for History and Geography" (25 vols., 1767–93). Died May 28, 1793.

Busen'to [Gr. Πυξοῦς; Lat. *Buxentum*], a river of Italy, in the province of Salerno, empties into the Gulf of Busento at the city of Policastro. Upon the death of Alaric, the Visigoth king, his followers turned the course of the river, and after having buried him, again led the river into its old course, thus covering all trace of Alaric's grave from the eyes of his enemies.

Bush (George), a theologian and biblical scholar, was born at Norwich, Vt., June 12, 1796, graduated at Dartmouth College in 1818, at Princeton Theological Seminary in 1821, in the same class with Albert Barnes, and from 1824 to 1829 was pastor of a Presbyterian church in Indianapolis, Ind. He became in 1831 professor of Hebrew and Oriental literature in the University of New York, and was converted to the doctrines of Swedenborg in 1847. Among his works are a "Life of Mohammed" (1832), a "Hebrew Grammar" (1835), and "Bible Commentaries" (8 vols., 1840 *et seq.*). Died Sept. 19, 1859.

Bush-Buck. See Bosch-Bok.

Bush'el [Fr. *boisseau*], an English measure of capacity, containing eight gallons or four pecks. Each gallon holds ten pounds avoirdupois of distilled water, and measures 277.274 cubic inches; consequently the imperial bushel contains eighty pounds of distilled water, and is equal to 2218.192 cubic inches. The old Winchester bushel contains 2150.42 cubic inches. The State of New York, by statute of 1829, adopted the imperial bushel, but in the revised statutes of 1851 this was abolished, and the Winchester bushel substituted. (See GALLON.)

Bushire, or **Aboo-shehr,** a seaport of Persia, on the Persian Gulf, about 120 miles W. S. W. of Sheeraz; lat. 29° N., lon. 50° 50′ E. It is at the N. extremity of a sandy peninsula, and is the principal commercial emporium on the coast of Persia. The anchorage, which is the best on the coast, consists of an outer harbor, exposed to the N. W. winds, and a safe inner harbor. It has a large trade with British India, from which it imports rice, indigo, sugar, and English cotton goods. The chief articles of export are raw silk, shawls, horses, carpets, silk goods, grain, Sheeraz wine, pearls, dried fruits, etc. Pop. about 25,000.

Bush′men, or **Bosjesmans,** a name given to some roaming tribes of savages who live in Southern Africa, along the Orange River. They are similar to the Hottentots, are very diminutive in stature, and of a dark-brown complexion. They build no houses and have no tents. They are said to be malicious and intractable.

Bush′nell, a city and R. R. centre of McDonough co., Ill. (see map of Illinois, ref. 5–C, for location of county), 60 miles W. of Peoria, 70 miles N. E. of Quincy, and 194 S. W. of Chicago. It has good schools, several manufactories, a good supply of timber, coal, and excellent water, and is in a fine, high, and healthy prairie region. Pop. in 1870, 2003; in 1880, 2316.

Bushnell (HORACE), D. D., a Congregational clergyman, was born at New Preston, Conn., April 14, 1802, graduated at Yale College in 1827, was tutor from 1829 to 1831, and was settled over the North church in Hartford, Conn., from 1833 to 1859, when the failure of his health compelled him to resign his pastorate, though he was still able to do literary work and preach occasionally. He was distinguished for the originality and boldness of his thinking, and for the brilliancy and vigor of his style. Among his published works are a Phi Beta Kappa oration in 1837 on "The Principles of National Greatness," "Christian Nurture" (1847), "God in Christ" (1849), "Nature and the Supernatural" (1858), "The Vicarious Sacrifice" (1865; revised in 1873). Died at Hartford, Conn., Feb. 17, 1876.

Bush′whackers (in the language of our late civil war) were those men who rarely or never wore a uniform, and claimed to be peaceful farmers or herdsmen when in presence of a superior hostile force, but had firearms concealed at a convenient distance, and did not scruple to use them on any opportunity to pick off a soldier from an ambush while he was moving in fancied security. Bushwhackers were especially murderous in Missouri, and were often treated, when captured, with unrelenting severity.

Business Colleges. See APPENDIX.

Busi′ris [Gr. Βούσιρις], in Greek mythology, a fabulous personage, supposed to have been a son of Neptune, and a king of Egypt, who sacrificed all the foreigners who entered his dominions, and was killed by Hercules.

Bus′kin [Lat. *cothurnus*], a covering for the leg or for the ankle and foot; a shoe reaching up to the middle of the calf and tightly laced. The word buskin is used by English writers as a translation of cothurnus, which was a high shoe worn by ancient tragic actors, and had thick cork soles. The term is also used to denote the tragic drama or tragic style, having been used in contradistinction to *soccus*, a sock or flat-soled shoe worn by comedians.

Bus′sey (BENJAMIN), born at Canton, Mass., Mar. 1, 1757, served in the Revolutionary army at Burgoyne's capture. He was a silversmith of Dedham, Mass., and afterwards a very successful merchant of Boston. Died Jan. 13, 1842, leaving $350,000 to Harvard University, half to found the Bussey School of Agriculture, and half to sustain the Law and Divinity Schools.

Bus′su Palm (*Manicaria saccifera*), a palm growing in the tidal swamps of the Amazon, the only known species of its genus. The stem is ten to fifteen feet high, curved and deeply ringed. The leaves are undivided, and are the largest of the kind produced by any known palm, being often thirty feet long and four or five feet wide. The leaves make excellent and durable thatch, being split down the midrib, and laid obliquely on the rafters, so that the furrows formed by the veins lie in a vertical direction, and serve as gutters to carry off the water. The spathe is used by the Indians as a bag, and the larger ones to make caps.

Bust [It. *busto;* Fr. *buste*], a sculptured representation of the head and upper part of the human body. The earliest busts formed by the Greeks were probably heads of Mercury, which, when elevated on quadrangular blocks of stone, received the name of Hermæ. These blocks were afterwards frequently surmounted by representations of other divinities; and they gradually assume more of the human form, but they still were called Hermæ even after Alexander's time, when busts began to be used for portraiture in Greece. During the learned period of Greece, which commenced with Aristotle, portrait-busts formed an important department of art. The artists of this period exhibited remarkable ability in expressing the character. We have well-authenticated busts of Socrates, Plato, and other philosophers; of Isocrates and Demosthenes; of Athenian statesmen and distinguished women. In Rome, representations of the kings and persons of distinction belonging to the earlier period were probably made from the images of his ancestors which every patrician preserved, and which were commonly made of wax. These were often fanciful representations. The earliest well-authenticated Roman bust which we possess is probably that of Scipio Africanus the Elder, but we possess many examples of later date. In recent times portrait busts constitute an important department of plastic art.

Bustaman′te (often incorrectly written **Bustamente**), (ANASTASIUS), M. D., a patriotic Mexican general, born in 1782. He was a physician by occupation. He obtained power as president of Mexico in 1830, was banished by Santa Anna about 1833, and was elected president in 1837. He was again banished in 1841. Died in 1851.

Bus′tard (*Otis*), a genus of birds which belongs to the order Cursores. They have three toes, which are all directed forward, long naked legs, and bills of moderate length. They are mostly inhabitants of open plains, to which all their habits are adapted. Although they are capable of flying, they often endeavor to escape from danger by running. The great bustard (*Otis tarda*) is the largest of European land-birds, and sometimes weighs thirty pounds. It is found in the eastern and southern parts of Europe, and abounds in the open plains or steppes of Tartary. The plumage is of a pale chestnut color on the upper parts, finely variegated with black. The wings are diversified with black and white, and the tail is tipped with white. The male has on each side of the chin or neck a tuft of feathers nearly nine inches long, under which is a spot of naked skin, and in the throat a sac or pouch capable of holding three or four pints of water. Their flesh is highly esteemed as food. The little bustard (*Otis tetrax*) is common in Southern Europe and Northern Africa, and is not half so large as the *Otis tarda*. South Africa produces a species called *Otis Kori*, or Kori bustard, which is five feet high or more, and is a noble-looking bird. Its flesh is good. Macqueen's bustard is a fine Asiatic bird. Several other bustards are known, all Old World species, except one, which is Australian.

Bus′to Arsiz′io, a town of Italy, in the province of Milan, 23 miles by rail N. W. of Milan, is situated on a fertile plain. It has several churches, one of which is adorned with fine old frescoes by Ferrari. Here are manufactures of cotton thread. Pop. 9978.

Busuluk′, a town of Russia, in the government of Samara, 60 miles S. of Bugurusslâu. Pop. 14,876.

Butcher's Broom (*Ruscus aculeatus*), a biennial evergreen plant of the natural order Liliaceæ, has a stem from one to three feet high, and ovate, alternate, sharp-pointed leaves. The fruit is a red berry nearly as large as a wild cherry. It is indigenous in the south of Europe, and is cultivated for ornamental purposes. The root is aperient and diuretic.

Bute, an island of Scotland, in the Frith of Clyde, separated from the mainland by a narrow strait called the Kyles of Bute, which is about 1 mile wide. The island is about 16 miles long, and has an area of nearly 60 square miles. The mildness of the climate renders it a favorite resort for invalids. The chief town is Rothesay. Here are Rothesay Castle and Dungyle, a vitrified fort on the S. W. coast.

Bute, or **Buteshire,** a county in the S. W. part of Scotland, comprises the islands of Bute, Arran, the Cumbrays, Holy Isle, Pladda, and Inchmarnock. Area, about 225 square miles, or 143,977 acres, of which 22,966 are cultivated. Chief town, Rothesay. Pop. in 1881, 17,666.

Bute, MARQUESSES OF, earls of Windsor and Viscounts Mountjoy (1796), Barons Mountstuart (1761), Barons Cardiff (1766, in Great Britain), earls of Dumfries (1633), earls of Bute (1703), viscounts of Ayr (1622), Viscounts Kingairth, Lords Mountstuart, Cumbræ, and Inchmarnock (1703), Lords Crichton and Cumnock (1633), Barons Crichton of Sanquhar (1488, in Scotland), and baronets (1627, in Scotland).—JOHN PATRICK CRICHTON STUART, the third marquess, born Sept. 12, 1847, succeeded his father in 1848. He is said to be the richest man in England.

Bute (JOHN STUART), EARL OF, a minister of state, born in Scotland in 1713. He became groom of the stole to the prince of Wales, who was afterwards George III., over whom he acquired a great influence. In Mar., 1761, he was appointed one of the principal secretaries of state. He was prime minister from May, 1762, to April 8, 1763, and became very unpopular. His policy tended to exalt the royal prerogative. He was a liberal patron of literature and art. Died in 1792.

Bu'tea [named in honor of the earl of Bute], a genus of trees and shrubs of the natural order Leguminosæ, remarkable for the length of the standard of the flower, and having a compressed, 1-seeded pod. The *Butea frondosa*, called dhak tree, and *Butea superba*, are natives of India, and bear racemes of large and beautiful scarlet flowers, which present a gorgeous spectacle. The twigs yield a resinous exudation in the form of lurid red tears, which is one variety of lac. The sap of the trunk also yields gum-kino. A beautiful dye is obtained from the flowers, and the bark has a useful fibre.

But'ler [Old English *boteler* (*i. e.* "bottle-er"), a man who has charge of the bottles], a servant or household officer who has care of the wines, plate, etc. The "chief butler" of Pharaoh, mentioned in the Bible, an officer of high rank, was more properly a cup-bearer to the king.

Butler, capital of Choctaw co., Ala. (see map of Alabama, ref. 6–A, for location of county), about 110 miles N. of Mobile. Pop. in 1880, 194.

Butler, on R. R., capital of Taylor co., Ga. (see map of Georgia, ref. 5–G, for location of county), 50 miles W. S. W. of Macon. Pop. in 1870, of dist., 2479; in 1880, 2754.

Butler, Ind. See Appendix.

Butler, on R. R., capital of Bates co., Mo. (see map of Missouri, ref. 5–E, for location of county), is in a fertile prairie, 75 miles S. by E. from Kansas City. Pop. in 1870, 1064; in 1880, 2162.

Butler, on R. R., capital of Butler co., Pa. (see map of Pennsylvania, ref. 4–B, for location of county), on the Conequenessing Creek, 31 miles N. of Pittsburg. It has an educational institute and a fine school building, is situated in the "oil region," and lines of pipe bring petroleum many miles to the railroad. Pop. in 1870, 1935; in 1880, 3163.

Butler (Alban), a learned Roman Catholic divine, born at Northampton, England, in 1710; died May 15, 1773. He wrote "Lives of the Saints" (1745) and other works.

Butler (Andrew Pickens), born in Edgefield district, S. C., Nov. 18, 1796, graduated at South Carolina College in 1817, was admitted to the bar in 1818, became a judge in 1833, and was U. S. Senator from South Carolina (1846–57).—His father, William Butler (1759–1821), was a brave soldier of the Revolution. A. P. Butler died May 25, 1857.

Butler (Benjamin Franklin), lawyer and statesman, born at Deerfield, N. H., Nov. 5, 1818, son of Captain John Butler, who commanded a company of dragoons during the war of 1812, and served under Jackson at New Orleans. Reared by an excellent mother, B. F. Butler graduated at Waterville College, Me., and in 1840 was admitted to the bar at Lowell, Mass., where he rapidly advanced to an extensive and lucrative practice, in which he acquired a considerable fortune. He served in the State militia through all grades from private to brigadier-general. A Democrat by inheritance and conviction, he took an active part in politics, and in 1853 represented Lowell in the legislature, where he lent powerful aid to the bill for reducing the hours of labor in the factories of the State from thirteen to eleven. In 1853 he was a member of the constitutional convention, and in 1859 a member of the senate of Massachusetts. On April 15, 1861, upon a call for troops to hasten to the defence of Fortress Monroe and Washington, Brigadier-general Butler, who at 5 P. M. was in court in Boston trying a cause, issued the requisite orders for mustering the regiments of his brigade. April 16, the Sixth regiment left Boston, and on the 18th General Butler, at the head of the Eighth, took his departure, having been ordered to proceed to Washington by way of Baltimore. Two regiments of his brigade had, in the mean time, sailed for Fortress Monroe, which they garrisoned, and saved from falling into the hands of the enemy. Prevented from reaching Washington by way of Baltimore in consequence of the burning of bridges, he seized Annapolis, repaired the railroad between that city and Washington, and thus the Eighth Massachusetts and Seventh New York reached the capital in time to prevent all attempts on the part of hostile forces to seize it. May 13, 1861, at the head of 900 men, he marched upon Baltimore, and encamped on Federal Hill, in the midst of the city, without opposition—a service immediately (May 16) rewarded by President Lincoln with the commission of major-general in the service of the U. S., and by assigning him to the command of Fortress Monroe, where he arrived May 22. He here refused to send back the runaway slaves to their masters, on the ground, originated by him, that the slaves were "property contraband of war." Feb. 23, 1862, he was assigned to the command of the troops, 18,000 in number, forming part of the expedition against New Orleans, Captain Farragut commanding the naval force. After the heroic passing of the forts defending the Mississippi by Captain Farragut, General Butler (May 1, 1862) landed and took possession of the city, where he remained until Dec. 16 following, when he was relieved by Major-general N. P. Banks. During his administration of the department of the Gulf he taxed the wealthy Confederate citizens to support the thousands of inhabitants reduced to destitution by the war, and governed the city with an ability and justice never surpassed. Nov., 1863, he was appointed commander of the department of Virginia and North Carolina. In the winter he conceived the project of attacking Richmond from City Point and Bermuda Hundred. On May 5, 1864, he occupied City Point and Bermuda Hundred, and intrenched himself upon that peninsula, holding it with supplies, aiding the movement of General Grant upon Petersburg, after the repulse of the Wilderness and Cold Harbor. He went with a detachment of his forces in Nov., 1864, to New York during the presidential election, a rising being expected in New York City by which the election was to be carried by the Democracy. With a small force he held the city in peace and quiet, and compelled an orderly election. He was sent against Fort Fisher in Dec., 1864, but the navy not having reduced the fort by bombardment, a storm arising so that he could not land his troops, he took the responsibility of disobeying orders and returning; the enemy withdrew their troops, deeming all further attack upon that point to be given up; so that when another command was sent down against Fort Fisher, the enemy were found unprepared. Before the second expedition Gen. Butler was relieved of his command. In 1866 he was elected to Congress from the Essex district in Massachusetts. He was nominated Sept. 19, 1882, by Mass. Democratic convention for governor, and was elected Nov. 7, 1882; was defeated Nov. 6, 1883, and was "Greenback" candidate for Pres. of U. S. in 1884. James Parton.

Butler (Benjamin F.), an American lawyer and resident of Albany, N. Y., born Dec. 15, 1795, was attorney-general of the U. S. under President Jackson from Dec., 1831, to June, 1834. Died Nov. 8, 1858.

Butler (Charles), a learned English jurist and writer, born in London in 1750, was a Roman Catholic. He wrote, besides other works, "Horæ Biblicæ" (1797), "Historical Memoirs of the English, Irish, and Scottish Catholics," and a continuation of his uncle's (Alban Butler's) "Lives of the Saints." Died in 1832.

Butler (Clement M.), D. D., an American divine and scholar, was born in Troy, N. Y., Oct. 16, 1810. He was ordained a minister of the Protestant Episcopal Church in 1836, was rector of St. John's Church at Georgetown, D. C., from 1841 to 1844, rector of Grace Church, Boston, from 1844 to 1847, and rector of Trinity Church at Washington from 1847 to 1854. He officiated as chaplain of the Senate of the U. S. from 1849 to 1853. He was subsequently rector of Grace Church at Rome (in Italy) from 1862 to 1864; in the last-named year he was appointed professor of ecclesiastical history in the Divinity School of the Protestant Episcopal Church in West Philadelphia. Besides numerous sermons and lectures, Dr. Butler has published "The Book of Common Prayer Interpreted by its History" (1849), "Old Truths and New Errors" (1850), "The Flock Fed," etc. (1859), "St. Paul in Rome" (1865), "Inner Rome" (1866), "Manual of Ecclesiastical History from the First to the Thirteenth Century" (1868); also a "Continuation of the same from the Thirteenth to the Eighteenth Century," and various other works.

Butler (Ezra), born about 1762, was in the early years of Vermont history a prominent Jeffersonian of Weathersfield and Waterbury. He held justiceships and chief-justiceships of the courts of Chittenden and Jefferson counties, Vt., 1803–26, was a member of Congress (1813–15), and governor 1826–28. Died July 19, 1838.

Butler (George), U. S. M. C., born Jan. 20, 1839, in the District of Columbia, appointed a second lieutenant in the Marine Corps Feb. 11, 1859, became a first lieutenant in 1861, and a captain in 1862. Led the marines of the Minnesota in the assault upon Fort Fisher Jan. 15, 1865, and is thus honorably referred to by Lieut.-Commander James Parker, in his official report of the assault: "Captain George Butler of the marines also deserves mention for coolness and bravery. He reached and remained near the 'palisades,' a short distance inside of them." At the close of the rebellion Captain Butler was brevetted major "for gallant and meritorious conduct." He afterward became major. FOXHALL A. PARKER.

Butler (JOHN J.), D. D., a Free-will Baptist minister, born at Berwick, Me., in 1814, graduated at Bowdoin College in 1837, studied theology at Andover, Mass., was professor of sacred literature in Whitestown Theological Seminary (1844–54), of systematic theology at the Theological School of New Hampton, N. H. (1854–70), when he was appointed professor of sacred rhetoric and homiletics in Bates College Theological Seminary, Lewiston, Me. For many years he has been connected with the "Morning Star," a religious paper of Dover, N. H. He has published several commentaries on parts of the Bible, and a work on natural and revealed theology.

Butler (JOSEPH), an English bishop and eminent writer, was born at Wantage, Berkshire, May 18, 1692. About 1714 he wrote an able refutation of Dr. Samuel Clarke's celebrated *a priori* argument. He entered Oriel College, Oxford, in 1714, was appointed preacher at the Rolls Chapel in 1718, and obtained the rich benefice of Stanhope in 1725. He became chaplain to Lord Chancellor Talbot in 1733, and bishop of Bristol in 1738. In 1750 he was translated to the see of Durham. His chief work is "The Analogy of Religion, Natural and Revealed, to the Constitution and Course of Nature" (1736). He died unmarried June 16, 1752. (See T. BARTLETT, "Memoirs of the Life of Joseph Butler, Bishop of Durham.")

Butler (PIERCE), born in Ireland in 1744, was a relative of the Ormond family and an officer of the British army. While stationed at Boston, Mass., he resigned his major's commission, removed to South Carolina, was a member of Congress (1787), a member of the convention which drew up the Federal Constitution (1788), and U. S. Senator from South Carolina (1789–96 and 1802–04). Died Feb. 15, 1822.

Butler (PIERCE M.), COLONEL, and former governor of South Carolina, born in Edgefield district, S. C., April 11, 1798. He entered the army in 1819 as second lieutenant of infantry, was promoted to first lieutenant 1822, captain 1825, resigned from the army in 1829, and was president of a bank at Columbia until 1836, when he accepted the appointment of lieutenant-colonel in Goodwin's regiment of South Carolina volunteers, and served against the Seminole Indians in Florida. On his return was elected (1838) governor of South Carolina; at the end of his term became Indian agent, and was acting as such at the outbreak of the Mexican war, when he was elected colonel of the "Palmetto regiment" of South Carolina volunteers, which he led to the seat of war, distinguishing himself at Cerro Gordo and subsequent battles; at Churubusco Aug. 20, 1847, he continued to lead his men after being wounded, when he was shot a second time, through the head, and killed.

Butler (SAMUEL), a witty English poet, born in Worcestershire Feb. 8, 1612; was liberally educated, and became in early youth clerk to a justice of the peace, and afterwards entered the service of Sir Samuel Luke, who is supposed to be the prototype of Hudibras. About 1661 he married a widow named Herbert, who had an easy fortune, but it was lost by investment in unsound securities. He published in 1663 the first part of "Hudibras," a witty and satirical poem which obtained great popularity. The second part appeared in 1664, and the third in 1678. He died poor Sept. 25, 1680. He was hostile to the Puritans, whom he satirized in his famous poem. "The sense of Butler," says Hallam, "is masculine, his wit inexhaustible, and it is supplied from every source of reading and observation. But these sources are often so little known to the reader that his wit loses its effect through the obscurity of the allusions." (See A. RAMSAY, "Butler and his Hudibras.")

Butler (WILLIAM). See APPENDIX.

Butler (WILLIAM ALLEN), an American lawyer and poet, born at Albany, N. Y., 1825, graduated at the University of New York in 1843. He wrote, besides other works, an admirable poem, "Nothing to Wear, an Episode of City Life" (1857).

Butler (WILLIAM ARCHER), a philosopher, born near Clonmel, Ireland, in 1814; became professor of moral philosophy in Trinity College, Dublin, in 1837. Among his works are "Lectures on the History of Ancient Philosophy" (2 vols., 1846). Died July 5, 1848.

Butler (WILLIAM ORLANDO), an American general, born in Kentucky in 1793. He served in the war of 1812 and the Mexican war, and became a major-general in 1846. He was the Democratic candidate for the office of Vice-President in 1848, but was not elected. D. Aug. 6, 1880.

Butler (ZEBULON). See APPENDIX.

But'lerage, an ancient duty belonging to the Crown of England, otherwise called the *prisage* of wines. This duty is mentioned in the Great Roll of Exchequer, 8 Richard I. The Crown could take two tuns of wine from every ship (English or foreign) importing into England twenty tuns or more, one before and one behind the mast; by charter of Edward I., it was changed into a duty of two shillings for every tun imported by strangers.

Butoma'ceæ, a natural order of endogenous aquatic plants, nearly related to the Alismaceæ. It derives its name from the *Butomus umbellatus* (Gr. βοῦς, an "ox," and τέμνω, to "cut," because the edges of its leaves cut the mouths of cattle), an aquatic plant which grows in ditches and ponds in many parts of Europe and Asia, commonly called flowering rush. Its root is eaten in Asia.

Butte, a French word signifying a "small hill," a "knoll," a "rising ground." In parts of the U. S. the term is applied to mountains.

Butte City, on R. R., cap. of Silver Bow co., Mon. (see map of Montana, ref. 3–C, for location of county). Pop. in 1880, 3363.

But'ter [Ger. *Butter;* Fr. *beurre;* Lat. *butyrum;* Gr. βούτυρον, supposed to be from βοῦς, a "cow," and τυρός "cheese"] is the fatty substance extracted from milk. In ancient times the Hebrews made use of butter as food, but the Greeks and the Romans used it only as an ointment in their baths; and it is probable that the Greeks obtained their knowledge of the substance from the Scythians, Thracians, and Phrygians, whilst the Romans obtained it from Germany. In Southern Europe, at the present time, butter is very sparingly used, olive oil often taking its place; and in Italy, Spain, Portugal, and Southern France it is sold by apothecaries as a medicinal agent for external application. In the East Indies the natives use *ghee,* which is butter clarified by boiling. Butter is usually made from cow's milk, which has the following average composition:

Fat (butter)	3.83
Caseine	3.88
Sugar (lactose)	4.08
Salts (alkaline and earthy)	0.76
Water	87.45
	100.00

The composition varies, however, with the breed, age, and food of the cow, the age of the calf, the time and frequency of milking, etc. The last milk drawn at a milking is richer in butter than the first. (See MILK.) The caseine, sugar, and most of the salts are in solution, while the fat is in suspension in the form of minute globules, which are readily seen by the aid of the microscope. They vary in size from $\frac{1}{800}$ to $\frac{1}{300}$ of an inch in diameter. They are quite transparent, refract light strongly, and give the milk its white color. It was formerly supposed that each globule was covered with a thin membrane or envelope, but this has been disproved by Von Baumhauer and F. Knapp.

Cream.—When milk is allowed to stand, the fat globules rise to the surface and form a layer of cream, while below remains a blue transparent fluid, serum, containing the other constituents of the milk. The separation of fat and serum is never complete; each retains a certain quantity of the other. Dr. Voelcker gives the composition of cream as follows:

Fat (butter)	33.43	25.40
Caseine	2.62	7.61
Sugar	1.56	
Salts	0.72	2.19
Water	61.67	64.80
	100.00	100.00

To allow the cream to rise for the manufacture of butter, the milk is placed in a cool cellar, at a temperature of 55° to 59° F. If much cooler than this, the cream rises too slowly; if warmer, the milk sours rapidly. The pans for holding the milk should be perfectly clean and dry. Two inches is considered the best depth for the milk. In from twenty-four to thirty-six hours the separation of the cream will be complete, when it is skimmed off and put into a stone pot, or, if a sufficient quantity is at hand, it may be churned at once. Owing to a kind of fermentation (see FERMENTATION) that takes place in milk on standing, it becomes somewhat sour before all the fat globules have separated, and as it thickens or partially coagulates the further separation of cream is prevented. In zinc pans it remains sweet four or five hours longer than in wooden or earthen vessels, and consequently yields a somewhat larger proportion of cream; but the poisonous character of zinc salts makes the use of such pans dangerous. Glass vessels are really the best, but tin (tinned iron) is the material usually employed. When the cream is to be kept for a few days before churning, it is poured into a clean stoneware vessel; and some butter-makers add a little saltpetre, which prevents moulding and keeps the cream free from a cheesy taste.

Churning.—The butter is obtained from the cream by the process of *churning*—violent agitation in a wooden vessel, a churn. The fat-globules are thus caused to unite in larger masses, and finally to separate entirely from the watery liquid, called buttermilk. The temperature of the cream when it enters the churn should be between 53° and 55° F. During the churning it rises several degrees. If the cream is too cold, the fat is hard and will not coalesce; if it be too warm, the fat is semi-liquid and will not unite. The time at which the butter separates, as well as its quantity and the quality, depends largely upon the temperature. From forty-five minutes to one hour should be occupied in churning; if the butter comes much sooner, it is generally soft and frothy; if a much longer churning is required, it is badly flavored. The butter is separated from the liquid, thoroughly washed with cold water, and kneaded or *worked* to expel the buttermilk as completely as possible. It is then fashioned into rolls or moulded into forms for immediate use, or it is packed in stone jars or wooden firkins for winter use. A little salt is generally added to improve the flavor—about a quarter of an ounce to a pound if the butter is intended for immediate use, but when it is to be packed for winter use as much as an ounce to the pound is used. Great care is necessary in selecting the salt for this purpose, as even minute quantities of the chlorides of calcium and magnesium, which are common impurities of salt, give the butter a bitter, disagreeable taste. The English *Ashton* and the Syracuse *factory-filled dairy* salt are specially adapted for dairy use. The buttermilk is never completely expelled from the butter, and although it gives an agreeable taste to the butter, it also causes it to rapidly become rancid unless some means are adopted to prevent this result. The caseine of the buttermilk acts as a ferment both upon the sugar and the butter. The former is changed to lactic acid; a little of the latter to free fatty acids and glycerine. The pure fat of butter may be kept for months without becoming rancid. To protect the butter from rancidity it is generally salted as above mentioned, or, in addition to salt, white sugar and saltpetre are added. Two tablespoonfuls of a mixture of 3 pounds of salt, 1 pound of sugar, and 1 pound of saltpetre to a pound of butter is sufficient to keep it sweet and good for a year. Butter may be completely purified, though with a serious loss of flavor, by melting it at as low a temperature as possible and allowing the buttermilk to settle out.

The average yield of butter is about one pound from twenty-four pounds or twelve quarts of milk, or about a pound of butter from two quarts of cream. It is computed that a cow will give 1800 quarts of milk per annum, producing 140 pounds of butter. In the same time she will eat 8000 pounds of hay, which contain, as shown by analysis, 168 pounds of fat. Butter is made in many localities from the whole milk, which is allowed to stand till it becomes sour. The churning is more laborious, owing to the large quantity of material and the longer time required to bring the butter. The yield is greater, however, than when cream is used, and the butter is very good. Great success has attended the establishment of butter and cheese factories in some parts of the U. S., which receive the milk daily from the farmers and manufacture butter or cheese, or both, on a large scale in the most approved manner. It is claimed that owing to the possibility of regulating temperatures with more certainty on a large scale, to the advantage of steam for cleansing vessels, and to the ability of large establishments to employ more skilful labor, the products are obtained of better quality and at less cost than when each farmer handles the milk of his own farm. At the factory of the "Wallkill Milk Association," in Orange co., N. Y., the milk is set in tin pails twenty-two inches deep and eight inches in diameter. These pails are placed in running spring-water at 48° to 56° F., where they remain over night. The cream is then skimmed with a conical cup having an upright handle. The cream is put immediately into the churns, and the skimmed milk is made into cheese. Each churn receives fifty quarts of cream and one pail of cold spring-water. The temperature is always between 56 and 64° F. The churning is effected by horse-power, and is continued forty-five to sixty minutes. The butter is then taken out, washed with spring-water, salted with 18 ounces of salt to 22 pounds of butter, and well worked. It stands till evening, when it is worked again, then packed in sixty-pound pails and sent to New York. For winter butter a small teaspoonful of pulverized saltpetre and a large tablespoonful of white sugar is added to every twenty-two pounds. The butter is worked on an inclined slab with a wooden lever. The yield was—

		Milk, qts.	Butter, lbs.	Cheese, lbs.
May 18,	from	3512	213	560
May 23,	"	3300	210	550
Sept. 12,	"	3128	200	546
Oct. 14,	"	2027	120	407

The "Orange County Milk Association" find that it requires an average of 14 quarts (wine) or 28 pounds of milk to make 1 pound of butter and 2 pounds of cheese.

When newly prepared, butter is of a yellow color, which is deeper as the pasture on which the cow is fed is richer. Hence the poorer kinds of butter are often colored with annatto, turmeric, infusion of calendula flowers, or the juice of carrots.

Butter differs very much in composition according to the care taken in working it. The pure fat varies from 77 to 95 per cent., the buttermilk from 5 to 23 per cent. The fat is a mixture of several neutral fats or glycerides, chiefly the liquid, oily fat oleine and the solid fats palmitine and stearine, with smaller quantities of myristine, butyrine, caproine, capryline, and caprine. To these latter bodies the peculiar odor and flavor which distinguish butter from other fats are due. Prof. E. N. Horsford has detected phosphorus in butter. Butter melts at from 85° to 90° F. It is generally harder and less fusible in winter than in summer, owing to the relative increase in summer of the oily constituent, oleine.

The *adulterations* most frequently found in butter are excess of water and salt. They may be detected and estimated by melting a weighed quantity of the butter and allowing them to settle out. Lard is said to be added to butter. Lactate of zinc, derived from the zinc pails and pans used in the dairy, has been reported; when present in sensible quantities, it produces violent vomiting.

Butter powders for largely increasing the yield of butter are advertised to some extent in the U. S. One of these, the "Star Butter Powder," is a mixture of equal parts of alum and sugar. The directions for its use are: "To one quart of milk, twelve hours old, add one pound of butter; warm by setting the churn in blood-warm water. Add one teaspoonful of the powder, and churn as usual. You will have two and a half pounds of delicious fresh butter." The effect of this and similar powders is to coagulate the milk and enable the operator to mix it with the butter, forming a frothy mixture (emulsion) of butter and sour milk, which is anything but *fresh and delicious.*

Artificial Butter.—Mége-Mouriéz, investigating the production of milk, noticed that cows deprived of food continued to give milk in some quantity, and that the milk continued to contain butter. This led him to infer that the fat of the animal was changed to butter, and, acting upon this hint, he succeeded in extracting from beef tallow (suet) a fat having the consistence of butter, which he converted into an excellent substitute for genuine butter. As already mentioned, butter consists chiefly of oleine, palmitine, and stearine. The same is true of suet, but the oily oleine is not present in so large a proportion as in butter. Mouriéz, therefore, removes such a proportion of the palmitine and stearine as to leave a mixed fat having the consistence of butter. His process is as follows: Fresh suet is cut very fine, placed in a vessel containing water, a little carbonate of potash, and fresh sheeps' stomachs cut in pieces are added. The whole is warmed to 112° F. Under the influence of the heat and the pepsin of the stomachs the fat separates from the cellular tissue. This fat is allowed to cool till it solidifies, when it is subjected to pressure in a hydraulic press, when it separates into two portions—a hard white stearine and palmitine, suitable for the manufacture of candles, and a liquid oil, which on cooling further solidifies into a white fat having the consistence of butter. Mouriéz calls this *oleo-margarine*, from the old idea, now disproved, that a fat margarine existed in butter and suet.

To produce butter, the oleo-margarine is poured into a churn while still liquid with about half its volume of fresh milk and nearly as much water. A little annatto is added for color, and a little water in which pieces of cows' udder and milk glands have been soaked. The mixture is then churned, yielding a sweet, palatable butter which may be salted as usual. As nothing unwholesome is used in the manufacture of this butter, its use in place of real butter is a mere matter of taste. As it can be made for from one-fifth to one-third the cost of real butter, and does not readily become rancid, it bids fair to become an important article of manufacture. It is certainly a good substitute for the olive oil so freely used in Southern Europe, or the lard which is used on bread in place of butter in many families in Germany. Mr. Alfred Paraf (1873) simplified the process, and erected a large factory for making this butter in New York, under the name of the "Oleo-margarine Company." Since that time the manufacture of artificial butter has grown to an enormous industry in this country and in Europe. In fact, it may be said that the discovery and invention of Mége has revolutionized the treatment of beef-fat, which was formerly exclusively converted into tallow. Besides making much of this kind of fat into artificial butter in this country, the manufacturers ship large quantities of *oleomargarine* to England, Holland, and other countries, to be manufactured into *butter*, which is sold as

Butterine or *Suine*. Recently lard and cotton-seed oil have been used as substitutes for oleo-margarine in making artificial butter. Oleo-margarine and lard are also used in making cheese from skimmed milk. (See CHEESE.) In using Mége's process now the sheep's stomachs are omitted in the *rendering*, and the cows' udders and milk-glands in the *churning*.

Vegetable Butters.—The name "butter" is applied to several vegetable fats, such as palm, cacao, cocoanut, nutmeg, and shea butter. The latter is made from a nut like the olive, and is used in Africa as a substitute for butter.

Metallic Butters.—In chemistry the name butter was formerly applied to certain oily compounds which resembled melted butter; as the butter of antimony, bismuth, zinc, and tin, which were the chlorides of the respective metals. *Bog butter* is a fossil butter found occasionally in the Irish peat-bogs. It is believed to have been made by man. *Rock butter* is an iron alum which appears as a pasty exudation on alum slates. C. F. CHANDLER.

Buttercup. See RANUNCULUS.

But'terfield (DANIEL), born in Oneida co., N. Y., in 1831, was educated at Union College. Soon after the breaking out of the civil war he was made brigadier-general of volunteers, and took part in many actions under Generals McClellan, Pope, and Burnside, and was chief of General Hooker's staff at Lookout Mountain, and afterwards. He was brevetted major-general for gallant and meritorious conduct.

But'terfly, the name of the Papilionidæ, diurnal lepidopterous insects, forming many genera in the recent entomological systems. Butterflies exhibit a great similarity in most respects to other lepidopterous insects. They are distinguished in most cases without difficulty by their knobbed antennæ, and by brilliancy of coloring, which in butterflies belongs to both sides of the wings, whilst the beauty of moths appears chiefly on the upper side. The abdomen is shorter and smaller than in other families. Butterflies, at rest, hold their wings erect, the under side being thus chiefly exhibited; while the other lepidopterous insects hold their wings in a horizontal or inclined position, and some have them wrapped round the body. Butterflies are the only insects of their order which have no sockets, spines, bristles, or hooks by which the second wing on each side can be attached to the first, but both when flying and at rest have all their wings quite separate. Their caterpillars have always sixteen feet, ten of which are abdominal. The pupa or chrysalis is angular, especially on the thorax, is seldom enveloped in a cocoon, is generally suspended by the tail by means of a silky substance, but is sometimes supported by bands around the middle, and generally exhibits more or less of that golden color from which both the names *aurelia* (from the Lat. *aurum*, "gold") and *chrysalis* (from the Gr. χρυσός, "gold") are derived.

Some species of butterflies possess no small power of flight. Short-lived as they are generally believed to be, some of the tropical species perform wonderful migrations. The number of species is very great; not less than 5000 species being known, and the number will doubtless be increased. There are probably 1000 species in North America. Their arrangement is difficult, on account of the similarity which prevails among them.

Some butterflies measure almost a foot across the expanded wings. The largest species are tropical. Some species are widely distributed: *Cynthia cardui* is found throughout nearly all the world. The geographical limits of other species are restricted. Caterpillars of some species are furnished with spines, those of others have fleshy prominences, horny at the tip, perhaps intended as means of defence. The hinder wings of many butterflies are prolonged into tail-like appendages, one or more on each wing, which vary in form.

These insects are objects of admiration, associated with the most lovely scenes, but they are also a cause of annoyance and vexation by the ravages of their caterpillars. There is, however, one species, the bugong (*Euplœa hamata*), which affords food to the aborigines of Australia. Butterflies of this species congregate in such vast numbers in rocky crevices that they are collected by simply making fires under the rocks, in the smoke of which they are suffocated. Bushels of them are thus procured, and baked by placing them on the heated ground, the down and wings removed, and the bodies made into cakes which resemble lumps of fat. It is probable that the oil of this species may become commercially important. As an article of food it is irritant and nauseating, even to the natives. REVISED BY C. W. GREENE.

But'terfly-Weed, a common name of the *Asclepias tuberosa*, an herbaceous plant which is indigenous in many parts of the U. S., and is sometimes called **Pleurisy Root.** It has nearly sessile leaves, varying from linear to oblong-lanceolate, and has showy orange-colored flowers. The root is diaphoretic and expectorant, and has been used in medicine. (See ASCLEPIAS.)

Butterine. See BUTTER.

But'termilk, the part of milk that remains after the butter has been separated from it. It contains casein, sugar, water, and all the original ingredients of milk, except the oily matter. It is a nutritious beverage, and is extensively used in many places as food.

But'ternut, or **White Walnut,** a name given to the *Juglans cinerea*, and its fruit, which is indigenous in the U. S. The tree grows to the height of from thirty to fifty feet, with gray bark and widely-spreading branches, and has oblong-lanceolate downy leaflets, which are serrate, pointed, and rounded at the base. The petioles and branchlets are downy also, and have clammy hairs. The fruit is oblong and clammy, and contains an oily, eatable kernel. The nut is deeply sculptured and rough, with ragged ridges two-celled at the base. The wood is valuable in the arts, and contrasts finely with black walnut. The nuts, if gathered in June, can be made into fine pickles.

Butter Tree, a name given to several tropical trees, the fruits of which yield concrete fixed oils which are similar to butter and used as food. The butter trees of India and Africa belong to the genus *Bassia* and the order Sapotaceæ. Those of Brazil and Guiana belong to the genus *Caryocar*.

But'terwort (*Pinguicula*), a genus of herbaceous plants of the natural order Lentibulariaceæ, distinguished by a 2-lipped calyx, the upper lip trifid, the lower bifid; and a spurred corolla, 2-lipped and gaping, the upper lip arched. The *Pinguicula vulgaris* is a small stemless perennial, growing in marshes and on wet rocks in Europe and the U. S. It has the power of coagulating milk, and is used for that purpose by the Laplanders.

But'terworth (JOHN), well known as the author of a concordance and dictionary of the Scriptures, born in Lancashire Dec. 13, 1727. He was pastor of the Baptist church at Coventry for fifty-two years. Died in 1803.

Buttlar, von (EVA), b. in 1670 at Eschwege, in Hesse, an only child, was in 1687 married to De Vésias, a French emigrant who lived at the ducal court of Eisenach as dancing- and fencing-master and tutor to the pages. Eva lived here for several years a very gay life, but in 1697, having met with the famous Pietist Vockerodt of Gotha, she changed the whole character of her life, left her husband, and returned to her native town. Here she met with another Pietist of a still deeper dye, Dr. Heinrich Horch, and her religious enthusiasm soon degenerated into fanaticism and blasphemy. On Jan. 2, 1702, a new "Christian" congregation was formed at Allendorf, in Hesse, in which she was worshipped first as the Holy Ghost, afterward as the mother of the Lord, who should give birth to the new Christ. The congregation settled in 1704 at Sasmannshausen, and under direction of this female Brigham Young a fantastic system of religious blasphemies, not unlike the Mormonism of our days, was developed. The immoral practices in which the members indulged soon caused public scandal. They were driven from one place to another, but for many years Eva succeeded in seducing people wherever she came. Finally, the congregation was broken up in Altona, where Eva died. The year of her death is not known, but it falls after 1717. That, however, which gave this movement its greatest importance was the circumstance that it was used as a weapon against all Pietists, and even Francke himself was compelled to defend himself against having had any connection with it. (See E. F. KELLER, "Die Buttlarische Rotte" in Niedner's "Zeitschrifft für hist. Theologie," 1845; and GOEBEL, "Geschicte des christlichen Lebens in der rhein-westphäl. evang. Kirche," 2 vols., 1852.)

Butt'mann (PHILIPP KARL), an eminent and profound German philologist, born at Frankfort-on-the-Main in Dec., 1764. He was appointed secretary of the Royal Library of Berlin in 1796, and chief librarian of the same in 1811. He was a friend of Niebuhr, and an excellent Greek scholar. He edited several Greek classics, and published, besides other works, a "Greek Grammar for Schools" (1792), a large "Greek Grammar" ("Ausführliche Griechische Sprachlehre," unfinished), and "Lexilogus, or Explanation of the Greek Words" (1818). Died June 21, 1829.

Büttner (CHRISTIAN WILHELM), born at Wolfenbüttel, Brunswick, Germany, in 1716, was for many years professor in the University of Göttingen, and died at Jena in 1801. He travelled extensively, and made very comprehensive studies of languages and of natural history. He gave the first idea of a glossography, or geography of languages, and formed rich collections of natural history. In honor of him Leopling named a species of plants belonging to the sixteenth class of the system of Linnæus, and comprising several tropical shrubs related to the cocoa tree, *Büttneria*.

Button. See APPENDIX.

Button (Sir THOMAS), an English sailor who in 1612 sailed with two vessels, the Resolution and the Discovery, to discover the N. W. passage, wintered in Hudson's Bay on its W. shore, in lat. 62°, at a place which he called "Carey's Swan's Nest," and named many places on its shores. For these services he was knighted.

Button-bush (*Cephalanthus occidentalis*), a common American shrub of the Cinchona family, has a white flower in globose heads, whence its name. When in flower it is much frequented by bees.

But'tonwood, a common name of the *Platanus occidentalis*, a tree which is a native of the U. S., and is also called PLANE TREE (which see).

But'tress [Fr. *arc-boutant*], in architecture, a projection for the purpose of giving additional support or strength to a wall; a mass of masonry or brickwork built to resist the horizontal thrust of another mass. In the classical style no buttresses were used, their place being to some extent supplied by pilasters, antæ, etc.; but in Gothic architecture they are much used to counteract the outward thrust of the arches or of the vaulting which covers the naves and aisles of cathedrals. The different stages of Gothic architecture are marked by the form of the buttresses employed almost as distinctly as by the form of the arch. The Norman buttress was broad, often semicircular, never projecting from the wall to any great extent. Early English buttresses project more boldly, and are narrower than the Norman. They are frequently broken into stages, which diminish in size as they ascend. This division into stages is almost invariable in the decorated style, the buttress being often furnished with niches terminating in pinnacles and elaborately ornamented with carving, statues, etc. In the perpendicular style they retain the forms which were introduced in the decorated period, the ornamentation being varied to suit the style. Buttresses of which the upper portion or the whole upright part is detached from the wall (with which they are connected by an arch) are called flying buttresses or arch-buttresses.

Butyl. See TRITYL.

Butyr'ic [from the Lat. *butyrum*, "butter"] **Acid,** $HC_4H_7O_2$, may be obtained by saponifying butter with potash, adding dilute sulphuric acid, and distilling about one half of the mixture, adding water, and continuing the distillation till the residue is not acid. Butyric acid may also be obtained by allowing a small quantity of milk-curd to act upon a solution of sugar at a temperature of 77° to 86°. Chalk is added to take up the butyric acid when produced. The butyrate of lime is left in the vessel, and on acting upon that by dilute hydrochloric or sulphuric acid, and distilling, the free butyric acid passes over, and is condensed. Butyric acid is a transparent, thin, oily liquid, with a most persistent rancid odor. It is miscible in all proportions in water, alcohol, ether, and sulphuric acid; has a specific gravity of .973, boils at 314°.

Butyr'ic E'ther, or **Ethyl'ic Bu'tyrate,** $C_2H_5.C_4H_7O_2$, an exceedingly fragrant liquid obtained by distilling butyric acid (or the butyrate of lime), alcohol, and sulphuric acid. Butyric ether is mixed with alcohol, and sold as artificial pineapple oil. There is little doubt that pineapples owe their flavor to the presence of natural butyric ether. A small quantity is also found in rum. The artificial variety is used for flavoring various articles and for sophisticating bad rum. Butyric ether alone cannot be used in perfumery, as, when inhaled in even a small quantity, it tends to cause irritation of the lungs and intense headache, but it is employed in the manufacture of compound perfumes. Other butyric ethers are the methylic, butylic, propylic, amylic butyrates, etc.

Buxbaum'ia [named in honor of J. C. Buxbaum, a German botanist], a genus of mosses, of which only one species is known, *Buxbaumia aphylla*, a rare European and American plant, apparently destitute of leaves. The part of it visible above the ground is merely a little conical bulb, with minute scales, which are its leaves.

Bux'ton, a town and watering-place of England, in Derbyshire, is situated in a deep valley near the source of the Wye, 32 miles N. W. of Derby, and 160 miles N. N. W. of London. Here are calcareous and chalybeate springs, which are annually visited by about 14,000 persons. Buxton is surrounded by beautiful scenery, has several good hotels, and baths which are regarded as among the finest in Europe. One of the dukes of Devonshire expended £120,000 here in the erection of a pile of stone buildings called the Crescent. Buxton was once the residence of Mary queen of Scots, then a captive. The inhabitants manufacture ornaments from alabaster and spar, and excellent lime is burned at the quarries near Poole's Hole, an immense stalactite cave about half a mile distant. Near this town is Diamond Hill, famous for its crystals. Pop. in 1881, 6021.

Buxton (Rev. JARVIS BARRY), born at Newbern, N. C., Jan. 17, 1792, was ordained pastor of a Protestant Episcopal church at Elizabeth City, N. C., in 1827, and removed in 1831 to Fayetteville, N. C., where he was distinguished for his devotion to his work as a minister. Died May 30, 1851. A volume of his "Discourses," with a memoir of his life, was published by his son in 1853.

Buxton (JEDEDIAH), an Englishman, born near Chester in 1704. Though below mediocrity in respect of intellect, he possessed such marvellous powers of arithmetical calculation that he was regarded as one of the wonders of his time. His insight into the relations of numbers was so far intuitive that he never could explain the processes by which he arrived at his conclusions, which were almost always correct. Died about 1774.

Buxton (Sir THOMAS FOWELL), an English philanthropist, born in Essex April 1, 1786, was the son of opulent parents. He married in 1807 Hannah Gurney, a sister of Joseph John Gurney and of Mrs. Fry, and was elected a member of Parliament in 1818 by the voters of Weymouth, which he represented nineteen years. He was an eminent advocate of the abolition of slavery and other humanitarian measures, and had much influence in public affairs. Died Feb. 19, 1845. (See "Life of T. F. Buxton," by his son, SIR CHARLES.)

Bux'torf [Lat. *Buxtorfius*], (JOHANN), an eminent German scholar, born at Kamen, in Westphalia, Dec. 25, 1564. He was well versed in the Hebrew language and rabbinical literature. In 1591 he became professor of Hebrew at Bâle. His chief works are a "Lexicon Hebraicum et Chaldaicum" (1607) and "Biblia Hebraica Rabbinica" (1618). Died Sept. 13, 1629.

Buxtorf (JOHANN, JR.), a son of the foregoing and father of the following, was born Aug. 13, 1599, became in 1630 professor of Hebrew at Bâle, where he later held other professorships. Died Aug. 16, 1664. He published various learned works, among which are a treatise on the Hebrew vowel-points and a Chaldee and Syriac lexicon.

Buxtorf (JOHANN JAKOB) was born Sept. 4, 1645, and died April 1, 1704. He also was a good Hebraist, but published nothing except a preface to his grandfather's "Tiberias" (1665), and a revised edition of his "Synagoga Judaica" (1680). He was professor at Bâle from 1669.

Buxtorf (JOHANN, TERTIUS), nephew of the preceding, was born Jan. 8, 1663, became professor at Bâle in 1704, and died June 19, 1732. His principal work is the "Catalecta Philologico-theologica," etc.

Buxus. See BOX.

Buzancais, a town of France, department of Indre, is situated partly on the banks of the river Indre, and partly on islands in its channel, 46 miles S. E. of Tours. Here are extensive iron-works. Pop. in 1881, 5189.

Buz'zard (*Buteo*), a genus of birds of the order Raptores and family Falconidæ, having a small bill, which bends from the base and is not notched. They resemble the eagle and falcon in form, but are inferior in size and courage. The common buzzard (*Buteo vulgaris*), a native of Europe and North America, measures nearly four feet from tip to tip of the wings. It is sluggish and inactive compared with other birds of prey. The prevailing color of its plumage on the upper parts is brown, with a mixture of black. The rough-legged buzzard (*Buteo lagopus*) is similar to the *Buteo vulgaris*, but it may be distinguished by its having the tarsi feathered to the toes. It is widely distributed in Europe and Africa, and is found in North America. Among the other species of this genus is the red-tailed hawk of the U. S. (*Buteo borealis*), which often kills poultry. The American bird called turkey-buzzard belongs to the genus CATHARTES (which see).

Buzzard's Bay, in the S. part of Massachusetts, is 30 miles long, has an average width of 7 miles, and contains the harbors of New Bedford, Fairhaven, and Wareham. It is sheltered from the ocean by the Elizabeth Islands.

By-bidding, bidding at an auction sale by a person on behalf of the owner of the property sold, and with no intent of purchasing it. It may be for either one of two purposes—either to prevent the property from being sold below its value, or to raise its price beyond its value. The former act is supposed to be lawful; the latter is illegal, and the buyer may make use of it to avoid the sale. By-bidders are sometimes called "puffers." (See AUCTION.)

Byb'los, or **Byblus** [Gr. Βύβλος], an ancient city of Phœnicia, on the Mediterranean, about 22 miles N. N. E. of Berytus, was called *Giblah* by the Hebrew writers. It was near the base of Mount Lebanon, and was said to be the native place of Adonis or Thammuz. This site is occupied by the modern town of Jubeïl, and ruins of a Roman theatre.

Byblos [Gr. Βύβλος], an ancient town in the delta of Egypt, was celebrated for its manufacture of papyrus, the chief writing-material of the civilized world. It stood in a marshy tract which produced in abundance the byblus or papyrus plant (*Cyperus antiquorum*).

Byerly (William Elwood), Ph. D. See Appendix.

Byfield (Nathan). See Appendix.

By'ford (William Heath), M. D., was born at Eaton, Preble co., O., Mar. 20, 1817, was self-educated, became an active practitioner in Chicago, president of faculty and professor of clinical surgery in the Women's Hospital Medical College, was twice president of the American Medical Association, author of "Practice of Medicine and Surgery applied to Diseases and Accidents peculiar to Women," Theory and Practice of Obstetrics," etc.

By-laws, regulations made by a corporation for its own government or that of its members. It is a general rule that the power to make by-laws is incidental to the existence of a corporation. It is sometimes conferred expressly in the charter upon the corporation, or vested in a select body of persons, such as directors. Where the charter is silent, the power appertains to the corporation itself. By-laws must be reasonable and consistent with law. If a penalty for breach of a by-law be imposed, it may be collected by action. The by-laws of municipal corporations are usually termed "ordinances." A city in making such an ordinance usually acts in a *quasi* legislative character. It would not, for example, be responsible if the ordinance should be broken by one of the citizens and a person should suffer damage by the breach. Thus, if there were an ordinance that no owner of swine should allow them to run at large, yet if an owner did so permit them to run to the injury of his neighbor, an action would not lie against the city, but only against the wrong-doer.

Byles (Mather), D. D., born in Boston, Mass., Mar. 26, 1706. His father was a native of England; on his mother's side he descended from the Rev. Richard Mather and the Rev. John Cotton. He graduated at Harvard College in 1725, and was ordained first pastor of Hollis street church, Boston, 1733. He soon attained eminence in his profession, and also attracted considerable attention by his poetical talents. He continued happily with his parish till the excitement preceding the Revolution created a distrust against him, and he was accused of being a Tory, and separated from his parish. Charges were afterwards made against him that he prayed for the king and received visits from British officers, and in May, 1777, he was publicly denounced in town-meeting. On the 2d of June following he was placed on trial, pronounced guilty and ordered to be confined on a guardship, and in forty days to be sent to England with his family; this sentence, however, was not executed, but he was confined to his own house, where a guard was placed over it, which was afterwards removed, but again replaced and again dismissed, causing him to say that he was "guarded, reguarded, and disregarded." His literary talent was recognized by many men of genius in England. He continued to reside in Boston, but was not again connected with any parish, till his death, which occurred July 5, 1788.

Bynæ'us (Anthony), a Dutch Orientalist, born at Utrecht Aug. 6, 1654, became a Protestant minister, and a proficient in Hebrew and Syriac literature, and published a treatise on Hebrew vowel-points and several sermons and commentaries. Died at Deventer Nov. 8, 1698.

Byng (George). See Appendix.

Byng (John), an admiral, a son of Lord Torrington, was born in 1704. He gained the rank of admiral of the red in 1748. In 1756 he commanded an expedition sent to relieve Minorca, then blockaded by the French. He failed, and was accused of cowardice by the ministers, who sought to divert attention from their own inefficient measures by sacrificing him to the public indignation. He was tried by a court-martial and shot Mar. 14, 1757.

Byng Inlet, a port of entry of the province of Ontario (Canada), on the N. side of Georgian Bay, Lake Huron, has very extensive saw-mills, whence 20,000,000 feet of lumber are yearly sent to the U. S. It is visited in winter by dog-sledges, and in summer by regular steamers. Pop. about 200.

Byrd (Harvey Leonidas), M. D. See Appendix.

Byrd (William), F. R. S., born at Westover, Va., Mar. 28, 1674, studied law in London, and long held important offices in Virginia. He was a patron of literature, and laid out in 1733 the towns of Petersburg and Richmond. He wrote many valuable sketches of his travels in Virginia. Some of his writings were published by Edmund Ruffin as "The Westover Manuscripts" (1841). Died Aug. 26, 1744.

Byrdstown, capital of Pickett co., Tenn. (see map of Tennessee, ref. 5-H, for location of county). Pop. not given in census of 1880.

Byrne (Mrs. William Pitt), whose husband was the proprietor of the "Morning Post," achieved a great success in 1855 by her "Flemish Interiors," published anonymously, and afterward published "Realities of Paris Life," "Red, White, and Blue," "Undercurrents Overlooked," "The City of the Single," "The City of the Gentle," etc., under the signature "The Author of 'Flemish Interiors.'"

By'rom (John), F. R. S., an English writer, born near Manchester in 1691, was educated at Cambridge. He wrote prose and verse, contributed to Addison's "Spectator," and invented a system of shorthand. Died Sept. 28, 1763.

Byron (George Anson), Capt., born in 1758, was an English naval-officer, son of Vice-Admiral John Byron, and was distinguished in the great naval victory of Lord Rodney over the French in Apr., 1782. Died in 1793.

Byron (George Gordon Noel), Lord, an eminent English poet, was born in London the 22d of Jan., 1788. He belonged to an ancient Norman family whose name was variously written Burun, Biron, and Byron. John Byron, the poet's grandfather, was a noted English admiral. Captain Byron, the son of the admiral, married Catherine Gordon, a Scottish heiress, who had only one son, the subject of this notice. Captain Byron was distinguished for nothing but his vices. Having squandered a large portion of his wife's property, he deserted her, after which she retired to Scotland, and resided for some time at Aberdeen, where young Byron received the first rudiments of his education. Before he was seven years old, with his mother he visited the Highlands, the picturesque beauty of which, even at that age, made, it is said, a powerful impression on his mind. When he was ten years old he succeeded to the estate and title of his grand-uncle, William, fifth Lord Byron, who had resided at Newstead Abbey, where he died in 1798. The poet had a congenital deformity of his feet, which rendered him lame, and which was during his whole life a bitter mortification to him. When he was about twelve years old he was sent to school at Harrow. While here he became acquainted with Miss Chaworth, for whom he conceived a romantic and passionate love. She was the heiress of Annesley, which was adjacent to Newstead, the estate to which Byron had succeeded. This appears to have been one of the truest and deepest attachments of his life, and he seems to have fully persuaded himself that if he had married Miss Chaworth he would have been a far better as well as a happier man. He went in 1805 to Cambridge, which he left two years afterwards without taking a degree. While at the university he published (1807) a volume of poems, "Hours of Idleness," which was criticised in the "Edinburgh Review." This critique was written by Mr. (afterwards Lord) Brougham, but Byron always supposed that Jeffrey was the author. In retaliation he wrote "English Bards and Scotch Reviewers," which may be said to have laid the foundation of his fame. This satire, though evincing great talent in its way, is in many parts egregiously unjust, as, for example, where the satirist speaks of Scott. It is but just to add that Byron himself afterwards deeply regretted the publication of the poem, and did everything in his power to suppress it.

In 1809, in company with his friend Mr. Hobhouse, Byron commenced his travels through different parts of Europe, Spain, Portugal, European Turkey, and Greece. After an absence of about two years, he returned to England and published the first two cantos of "Childe Harold's Pilgrimage," which were received with extraordinary favor, so that, as he himself informs us, he "awoke one morning and found himself famous." He soon after took his seat in the British House of Peers. At one time it would appear that he thought seriously of giving himself up to politics, but he soon changed his purpose and turned his attention again to poetry. Within the next two or three years he produced several minor poems of exquisite beauty—namely, "The Giaour," "The Bride of Abydos," "The Corsair," "Lara," "The Siege of Corinth," "Parisina," and "The Prisoner of Chillon." On the 2d of Jan., 1815, he was married to Miss Isabella Millbanke, only daughter of Sir Ralph Millbanke, afterwards Noel. She was regarded as a great heiress. But, if Byron may be believed, his fortune was but little improved by this marriage. He says, "All

I have ever received or am likely to receive (and that has been twice paid back, too) was £10,000." The union was a very unhappy one, as well on account of Lord Byron's licentious habits as the incompatibility of temper of the two parties.

Lady Byron gave birth to a daughter, Ada, who became afterwards the countess of Lovelace. She was Lord Byron's only legitimate child; he addresses her in "Childe Harold" as "sole daughter of my house and heart."

Not long after the birth of Ada, his wife left him, and, taking the child with her, went to her father's. He left England early in 1816, resolved never again to return to his native land. Passing through Belgium, he visited the field of Waterloo; he subsequently went to Switzerland, and resided near Geneva. Here he wrote the third canto of "Childe Harold." He afterwards abode some time in Venice. He next visited Ravenna, where he formed a *liaison* with the countess of Guiccioli, whose sprightly and imaginative character, no less than her personal beauty, powerfully attracted him. While at Pisa in 1822 he experienced a great sorrow in the tragic death of his friend, the poet Shelley. Early in 1822, Byron, Shelley, and Leigh Hunt were associated in the publication of a journal styled "The Liberal," but Byron and Hunt quarrelled soon after the death of Shelley, and "The Liberal" was discontinued.

While in Italy, Byron wrote several of his most admired poems, including the fourth canto of "Childe Harold," "Mazeppa," "Manfred," "Cain, a Mystery," "Marino Faliero," "The Two Foscari," "Sardanapalus," "Werner," and "Don Juan." He espoused with enthusiasm the cause of Greek independence, and in 1823 passed over from Italy to Cephalonia, where he spent several months. In the early part of 1824 he arrived at Missolonghi. He took, April 9, a severe cold, which caused his death on the 19th of April, 1824.

Byron's poetic genius was of a very high order, but he was more distinguished for the clearness and intensity of his intellect (if we may use this expression) than for its breadth or versatility. It has been said that Brougham's galling article in the "Edinburgh Review" "stung Byron into a poet," but this expression of course implies that he previously possessed the potentiality of genius. But whether the above remark be true or not, it is certain that Byron's intellect partook in a remarkable degree of the character of his emotional nature. It was only under the influence of intense feeling or passion that he could put forth his poetical powers with any success. And hence it is that everything he has written is so strongly colored with his own personal feelings. He was perhaps the most intensely subjective of all the great poets that ever lived. This explains why he had no genius for dramatic composition. He could only represent successfully those characters which resembled his own. His soul was not capacious nor calm enough to reflect without distortion the infinitely varied pictures presented by the comedy and tragedy of human life. But in his own department he has probably never been equalled—certainly never surpassed—by any poet either in ancient or modern times. His two most remarkable characteristics are, first, his power of expressing intense passion, particularly of the darker and fiercer kinds. "Never," says Macaulay, "had any writer so vast a command of the whole eloquence of scorn, misanthropy, and despair." Again, no poet ever displayed a more exquisite taste in the choice of his expressions, or a more admirable art in his manner of presenting to the imagination of his readers any subject, whether of the delightful or of the opposite kind. (See MOORE'S "Life of Byron;" "Recollections of the Last Days of Shelley and Byron," by E. J. TRELAWNEY, 1858.) J. THOMAS.

Byron (HENRY JAMES), an English writer of burlesque dramas, was a lawyer by profession, and contributed much to "London Fun," of which he was for a time the editor. His principal works are travesties of various popular and standard dramas and operas—"Fra Diavolo," his first effort, 1858, "The Lady of Lyons," etc.—but he produced several comedies, pantomimes, and novels—"Paid in Full," 3 vols., "Old Sailors," first brought out in 1874, and "Our Boys" in 1878. He also acquired distinction as an actor in London. Died Apr., 1884.

Byron (JOHN), VICE-ADMIRAL, grandfather of the poet and son of the fourth Lord Byron, born at Newstead Nov. 8, 1723, entered the navy, served in Anson's expedition of 1740, served against Louisburg in 1760, circumnavigated the globe (1764–66), and fought D'Estaing off Granada July 6, 1779, in the American war. Died April 10, 1786.

Bys'sus [Gr. βύσσος], a Greek word which occurs in the New Testament, translated "fine linen." (See Luke xvi. 19; Rev. xviii. 12.) Some suppose it was cotton or silk.

Byssus, a name given to a bundle of silky or shining, semi-transparent, horny filaments by which many bivalve mollusks attach themselves to rocks or other fixed substances. These filaments are secreted by a gland at the base of the foot of the animal. They are guided to their place by the foot, and expand into a sort of disk at the point of attachment. An example of the byssus may be seen in common mussels. The *Pinna* of the Mediterranean produces long and strong filaments of a silky lustre, which can be woven into cloth. This cloth is highly prized, but the *Pinna* has become so rare that it cannot be produced in large quantities.

By'ström (JOHAN NILS), a Swedish sculptor, born at Philippstad Dec. 18, 1783, studied at Rome. He became a resident of Stockholm in 1816. Among his works are "Pandora Combing her Hair," a statue of Linnæus, and a colossal statue of Gustavus Adolphus. Died at Rome Mar. 13, 1848.

Byttneria'ceæ [from *Byttneria*, one of the genera], a natural order of exogenous plants, closely allied to the Malvaceæ, consists of trees and shrubs, mostly tropical or sub-tropical, with simple leaves and monadelphous stamens, the anthers of which are turned inward. The order comprises nearly 400 species, many of which have beautiful flowers. Florida has a few unimportant species. The *Guazuma ulmifolia*, a native of Brazil, bears an edible fruit. The fibrous bark of this and other species is used in the manufacture of cordage. The *Abroma augustum*, an East Indian tree, is commended as worthy of cultivation for its fibre, which is beautiful, fine, and strong, and is produced in abundance. This tree bears beautiful purple flowers. Among the other species of the order is *Theobroma Cacao*, from the seeds of which chocolate and cacao are obtained. Several others are useful, as yielding fibres, fruits, or medicines.

Byz'antine, or **Bezant** [from Byzantium, the old name of Constantinople], in numismatics, is a term applied to a coin of the Byzantine empire. These coins were of gold, silver, and bronze, bore impressions distinct from the earlier Roman coins, and were copied in several countries. They were current in the north of Europe, and even in India. The silver bezant was worth about 10*s*. sterling. The gold bezant was worth at one time fifteen pounds sterling.

Byzantine Art, in ornament and architecture, is that symbolic system which originated at Byzantium (or Constantinople), and was developed by the Greek artists out of the Christian symbolism. During the Dark Ages, after Rome had been conquered by the Goths and Huns, and the fine arts had been nearly extinguished by the influx of barbarism, many Western artists retired to Constantinople, and founded a school by which the traditions of antique and classical art were cherished, and modified by whatever was new and peculiar in the Christian system. The great features of this style are the circle and dome, the round arch, and all the various details of form which are derived from the lily, the cross, the nimbus, and other symbols. Among the finest specimens of this style of architecture are the mosque of St. Sophia at Constantinople and the church of St. Mark at Venice.

At the Renaissance, Italian and other artists in every department derived from living Greek or Byzantine artists the technical rudiments of their respective arts, which could scarcely have been learned by a mere examination of ancient works. The school of Byzantine art, as modified by Christian ideas and symbols, commenced in the time of Justinian, and continued to flourish until 1200 or later. After it had been banished from Constantinople by the Turks, who captured that city in 1453, it was cherished by the Greek Church to form the basis of artistic life in Russia.

Byzantine Empire, also called the **Eastern** or **Greek Empire,** is the name of a former empire of Europe which came into existence in 395 A. D., upon the death of the Roman emperor Theodosius the Great, who divided his empire between his two sons, Arcadius and Honorius. While the latter received the western half as his portion, Arcadius became ruler of the Eastern empire, then comprising Syria, Asia Minor, Pontus, Egypt, Thrace, Mœsia, Macedonia, Crete, and Greece, with the capital, Constantinople. The history of the Byzantine empire extends from 395 A. D. to 1453. During the reign of Arcadius ambitious politicians wielded an unlimited power, and oppressed the people to satisfy their rapacity. Arcadius was followed by his seven-year-old son, Theodosius II. (408–450), for whom a prefect ruled with wisdom and strength. In 415 he took his sister Pulcheria as co-regent, who from that time took charge of the entire administration. Peace and prosperity reigned during Theodosius's rule, and were only interrupted by a short war with Persia in 422, which led to the acquisition of a part of Armenia. But peace with Attila, king of the Huns, could only be purchased by large tracts of land on the Danube and large sums of money. Upon the death of Theodosius he was succeeded by his sister Pulcheria. She married the senator Marcianus, who reigned until 457. Under Justinian (527–565), who became famous by his legislation and the victories of his generals, Belisarius and Narses, the Byzantine empire gained great influence and power among the other nations, while in the interior the dissensions of the parties were quelled effectually. Under the nephew and successor of Justinian (Justinus II., 565–578) the empire suffered from invasions of the Lombards and Persians. In 718, Leo III. ascended the throne, and continued to sustain himself in spite of the contest concerning the worship of images, which continued for over a century, and the attacks of the Arabs. He died in 741. He conquered Phrygia from the Arabs, but lost the last remnant of territory in Italy. Basilius I. Macedo, the founder of the Macedonian dynasty, ascended the throne in 867. He introduced reforms in all branches of the administration, and revised the laws of Justinian. He was succeeded by his son, Leo VI., who called upon the Turks to aid him against the Saracens, and thus opened the way for the Turks. After the extinction of the Macedonian dynasty, in 1057, Isaac Comnenus was raised to the throne by the unanimous vote of the army. He introduced many reforms, and entered a monastery in 1059. Among his successors, Alexius I., who began to rule in 1081, was the most important. He increased the area of the empire considerably. The dynasty of the Comnenian emperors continued to rule until 1204. In 1204, Constantinople was taken by the French and Venetians (called the Latins), who then became masters of the whole empire. They divided it into four parts, giving the first, with the capital, to Baldwin, count of Flanders, who was made emperor, and whom the other participants in the expedition recognized as their sovereign. The Venetians received as their share the countries bordering on the Adriatic and Ægean Seas, a part of the Morea, together with several islands; Bonifacius, count of Montferrat, Macedonia and part of Greece; dukedoms, countships, principalities, etc. were established at various places; while a number of Greek princes maintained their independence. Under Theodorus Lascaris, who had been elected emperor at Constantinople, an empire was formed at Nicæa (Nice), and in Trebizond Alexius Comnenus ruled with absolute power. One of his successors, John Comnenus, became emperor of Trebizond. Neither Baldwin nor his successors could do anything to avert the impending ruin. Baldwin was taken prisoner by the Bulgarians, and died in 1206. His brother Henry ruled bravely and wisely till 1216, when the empire became a prey to utter anarchy.

The dynasty of the Palæologi began with Michael VIII. Palæologus, who, by the help of the Genoese, captured Constantinople in 1261. Michael, the first of the Palæologi, was an able prince, but offended both clergy and people by an attempt to unite the Greek and Latin churches. Andronicus III., a great-grandson of Michael, became emperor in 1328. During his reign the Turks took Nicæa and Nicomedia and devastated the European coasts. In the reign of his son, Johannes V., the Turks began to gain ground in Europe, and in 1362 Sultan Amurath had made Adrianople his capital. Under the following rulers the empire rapidly declined, giving way more and more to the advancing forces of Turks, until on May 29, 1453, with the capture of Constantinople by Mohammed II. and the death of Constantine XI., the Byzantine empire came to an end, and the Turkish rule was, after centuries of fierce warfare, firmly established in Europe. A. J. Schem.

Byzantine Historians are those Greek writers who have treated of the history of the Byzantine empire. They are divided into three classes: 1. Those whose works refer exclusively to Byzantine history; 2. Those who professedly occupy themselves with universal history, but at the same time treat Byzantine history at disproportionate length; 3. Those who write on Byzantine customs, antiquities, architecture, etc. The most interesting and instructive among them are those who confine their attention to a limited number of years, and to the events which transpired under their own observation or in which they took part. The Byzantine historians flourished from about 300 A. D. to 1453, the date of the capture of their city by the Turks. Among the most eminent of these very numerous writers we may reckon Procopius (about 500–565 A. D.), an excellent historian; Acropolita (1220–83), whose chronicle is but short; Cinnamus (twelfth century), an able but strongly prejudiced writer; Georgius Pachymeres (1242–1310), one of the best of the later Byzantines; Anna Comnena (1083–1148), a romantic and untrustworthy writer; Nicephorus Bryennius (died 1137), the husband of the last named, and one of the most accomplished historians of his age; the emperor John (V.) Cantacuzenus (about 1300–55), a very partial historian; Nicephorus the patriarch (758–828), one of the best of all; Nicetas (twelfth and thirteenth centuries), whose writings are highly valued; and Nicholas Chalcocondyles (who was alive late in the fifteenth century), one of the latest, treating of the history both of his own people and of the Turks. Of some of these, and of others, there are many writings yet unpublished, so that this field of historical research contains much fresh, if perhaps unproductive, soil. As a class, the Byzantine writers are turgid and bombastic, full of prejudice and conceit, and the proper estimation of their value requires much labor and discrimination. The principal Byzantine histories were collected and published at Paris in 36 vols., with Latin translations, under the editorship of P. Philippe Labbé, a Jesuit, and his successors (1648–1711). This magnificent collection was reprinted, with additions, at Venice (1727–33). In 1828, Niebuhr, assisted by Bekker, the two Dindorfs, Schopen, Meinecke, and Lachmann, began a new "Corpus Scriptorum Historiæ Byzantinæ," the forty-ninth volume of which appeared in 1878.

Byzantine Recension is a Greek text of the New Testament, which was used in Constantinople after it became a metropolitan see in the Eastern Church. It is cited by several Greek Fathers, and was used as the basis of the old Slavic version. It corresponded quite nearly with the present "received text" and with many existing MSS.

Byzan'tium [Gr. Βυζάντιον], an ancient Greek city, situated on the Thracian Bosporus and on the site of the modern Constantinople. It is said to have been founded by a colony of Megarians in 667 B. C. It increased rapidly, and soon became an important commercial city. Few cities could boast so magnificent a position. Commanding, as it did, the two shores of both Europe and Asia, at the same time secure and advantageously situated for commerce, it had at its command the choicest gifts of nature and the most charming scenery. Byzantium was very anciently the site of extensive tunny-fisheries, the fishes visiting the port periodically in immense numbers, as they do at the present day. The fish were salted and exported. The name "Golden Horn," still applied to a part of the channel of Constantinople, was probably derived from the great revenue flowing from this fishery. The Byzantines also levied a considerable toll on vessels passing from sea to sea. The levying of these tolls once involved them in war with the Rhodians. They also derived much profit from their rich corn-fields, not far from the city. On the S. it was bathed by the Propontis (Sea of Mármora), and on the N. by the waters of the Golden Horn. Having been captured by a general of Darius Hystaspis, it was liberated by Pausanias about 478 B. C. A few years later Byzantium became an ally or tributary of Athens, against which it revolted in 440 B. C. It was besieged and taken by Alcibiades in 408. Philip of Macedon besieged it in 340 B. C., but Demosthenes persuaded the Athenians to send a fleet which compelled him to raise the siege. This repulse of Philip was one of the proudest feats of the great orator, who often recurs to it in his speech "On the Crown." Byzantium was for ages especially exposed to the attacks of barbarians, but the long wars did not beget much valor in the people. From their great commercial prosperity they early became corrupted, and they were proverbially indolent, cowardly, and luxurious. Byzantium was probably either a kingdom or the seat of a tyrannus; afterwards it became an aristocracy, and later a crude democracy.

The Byzantians suffered much from the predatory incursions of the Gauls, and being unable to resist them in battle, agreed about 279 B. C. to pay them an annual tribute. This city supported Pescennius Niger in the civil war against Septimius Severus, who captured it in 196 A. D., after a brave resistance of three years' duration. He then reduced it almost to ruin, but afterwards relented and partially restored it. The name of *Augusta Antonina* was given to it in his time. The Greek Christians ascribe the foundation of the Byzantine Church to the labors of Saint Andrew the apostle, but this statement is unsupported by trustworthy evidence. It is, however, certain that soon after 200 A. D. there were numerous Christians in the city. In 330 A. D. Constantine the Great selected this place as the capital of his empire, and founded a new city, to which he gave the name of New Rome. This city of Constantine was much more extensive than Byzantium, which occupied in all probability only the most eastern of the seven hills on which the modern capital is built. (See Constantinople.)
Revised by C. W. Greene.

Bzo'vius, or **Bzowski** (Abraham), a Roman Catholic historian, born at Proczovic, Poland, in 1597. He was a zealous Dominican prior, and was called to Rome by Pius V., where he wrote nine volumes of a continuation of the "Annals of Baronius," an "Ecclesiastical History" (3 vols. folio, 1817), and other historical works, besides numerous sermons and biographies of several popes. Died Jan. 31, 1637.

C.

C, the third letter of most European alphabets, is in English either a palatal mute, with the sound of *k*, a sound which it has before *a*, *o*, *u*, and the consonants (except *h*), unless marked with the cedilla, thus, *ç*, as in *façade* and other words, mostly from the French and Portuguese. When marked with the cedilla, or when occurring before *e*, *i*, or *y*, it has the sibilant sound of *s*. *Ch* has (1) the Spanish sound, as in the word *church*; (2) the French sound (equivalent to *sh*, the German *sch*), as in *chaise;* and (3) the hard sound, equivalent to *k*, as in *chord*. The German guttural *ch* is never used in English. C in music is the first note of the natural diatonic scale. C in Latin stood for 100, and also for the prænomen Caius. In chemistry it is the symbol of carbon; and *c. c.* is an abbreviation for "cubic centimètre."

Caaba. See Kaaba.

Caa'ing Whale [Scottish for "driving whale"], the *Globiocephalus deductor*, a large porpoise which abounds in large herds on the coasts of Great Britain, North America, Iceland, etc. It takes its name from the fact that when one of the herd is stranded, the rest all follow it, sometimes as many as 100 at once rushing to their own destruction in this manner. They are the source of rich booty to fishermen. Other species of the genus inhabit the Mediterranean, the Pacific, etc. It is one of the "bottle-head" whales of North America, and is most frequently caught in Scotland.

Cabal', a secret council formed under the reign of Charles II. (1667), consisted of the following members: Sir Thomas, afterwards Lord Clifford, Lord Arlington, the duke of Buckingham, Lord Ashley, afterwards earl of Shaftesbury, and the earl of Lauderdale. The Cabal was dissolved in 1674. The prevailing opinion, that the word was formed from the initials of the names of its members, is perhaps erroneous, as it had been used before to denote a secret cabinet, and is said to be derived from the Hebrew (see Cabbala), but this accidental association of the initial letters may have suggested this particular application of the name.

Cabanel (Alexandre), a French historical painter, born at Montpellier Sept. 28, 1823, obtained a first medal at the Paris exhibition of 1855. Among his masterpieces we may name "The Florentine Poet" and "The Lost Paradise," "John the Baptist" (1874), "Venus" (1875).

Cabanis (Pierre Jean George), an eminent French philosopher and physician, born near Saintes (Corrèze) June 5, 1757. He was a friend and political partisan of Mirabeau, whom he attended in his last illness. He was admitted into the Institute in 1796, and became professor of medicine in Paris in 1797. In the early part of his life he was an atheist. His principal work is the "Relations between the Physical System and Mental Faculties of Man" ("Rapports du Physique et du Moral de l'Homme," 1802), in which he maintained that "the brain secretes thought as the liver secretes bile." But he afterwards changed his opinions in this respect, and adopted theistic views. Died May 5, 1808.

Cab'bage [Fr. *chou;* Ger. *Kohl*], a variety of the *Brassica oleracea*, a plant of the order Cruciferæ. Other varieties of this species are the broccoli, cauliflower, and kale. Cabbages are of many sorts, which are divided into common and Savoy cabbages, the latter being characterized by wrinkled leaves. They are also divided into early and late cabbages, which differ remarkably in their periods of growth. The cabbage requires a good soil and clean culture, and furnishes not only a cheap, palatable food for mankind, but is very useful as a forage plant. It may be remarked that although boiled cabbage occasionally acts as a poison on certain peculiar constitutions, uncooked cabbage in the form of a salad is generally very wholesome.

Cab'bage But'terfly, a name common to several species of butterfly, the larvæ of which devour the leaves of plants of the cabbage tribe, and are popularly known as cabbage worms. They belong mostly to the genus *Pieris*, are natives of Europe, but have been introduced into America. The excessive multiplication of these insects is generally prevented by small birds, which devour them and their caterpillars, and by insects of the ichneumon tribe, which lay their eggs in the caterpillars, that their own larvæ may feed on them.

Cabbage-Fly (*Anthomyia brassicæ*), a fly of the same family with the house-fly, flesh-fly, etc., of which the maggots often do injury to the roots of cabbages. It is of the same genus with the turnip-fly, onion-fly, etc. They are found in both continents, and are very destructive.

Cabbage-Palm, or **Cabbage Tree,** a name given to several species of palm, the great terminal bud of which is eaten like cabbage. The cabbage-palm of the West Indies is the *Areca oleracea*, which grows to the height of 130 feet or more. (See Areca.) The palmetto (*Chamærops palmetto*) is sometimes called cabbage-palm.

Cab'bala [Heb. קַבָּלָה, "that which is received," "tradition"] meant originally simply the verbal exposition of the truths contained in the writings of the Law, the Prophets, and the Talmud, which, though not generally known to the common people, but communicated only to the initiated, was orally transmitted from generation to generation along with the Scriptures, but came afterward to mean that ancient Jewish system of theosophy and religious philosophy which resulted from the crystallization of the tradition and its being put down into writing. Those, however, who have studied the system with the greatest care are not fully agreed among themselves as to its origin and character. The Cabbala attempts to explain the nature of God and of the universe. Some of the late writers of the school teach that God has neither will, intention, desire, nor action, but that ten *Sephiroth*, or intelligences, emanated from Him. The first *Sephirah* is called the *Inscrutable Height* (from which the second was derived, as the third from the second, and so on). The names of the other intelligences in order are wisdom, intellect, grace, power, beauty, firmness, splendor, foundation, and authority. As God became active in these *Sephiroth*, so these again become active in the universe. In this its fundamental idea the Cabbala shows its affinity to Neo-Platonism, and it is probable that it originated among the Alexandrian Jews, near the beginning of the Christian era, influenced by and again reacting upon Neo-Platonism. During the Middle Ages it was eagerly studied, but often from a magical rather than from a purely religious interest. The most famous Cabbalists are Moses ben-Nachman, who wrote "Faith and Hope;" Joseh of Castile, who wrote "The Gates of Light;" Moses of Cordova, who wrote "The Garden of Pomegranates;" Isaac Luria, who wrote the "Book of Metempsychosis;" Chajim Vital, who wrote "The Tree of Life;" and Chr. Knorr von Rosenroth, who collected most of these and other Cabbalistic writings in his "Kabbala denudata" (Sulzbach, 1677). (See Ginsburg: *The Kabbalah*, London, 1865.)

Cabbalists, the name given to those Jews who believe in the Cabbala, or traditional interpretation of the Pentateuch, said to have been received by Moses from God on Mount Sinai. (See preceding article.)

Cabell (James Lawrence), A. M., M. D., LL.D. See Appendix.

Cabell Court-house. See Barboursville.

Cabet (Étienne), a French socialist, born at Dijon Jan. 2, 1788. He was a radical democrat in politics and a leader of the Carbonari. In 1842 he published a romantic work called "Travels in Icaria," which was very popular among the workingmen of Paris. He planted in 1846 a colony on the communist system in Texas, from which he and his followers removed in 1849 to Nauvoo, Ill., after that town had been deserted by the Mormons. Died Nov. 9, 1856. His colony, which had never enjoyed any high degree of prosperity, was broken up in 1857.

Cabe'za del Buey, a town of Spain, in the province of Badajos, on the northern slope of the Sierra Pedregoso, 112 miles by rail E. S. E. of Badajos. It has manufactures of linen and woollen goods. Pop. 7451.

Cab'in [Fr. *cabane*], a small room or enclosure; a cottage, small house, or rudely-built temporary residence. Also an apartment in a ship or steamboat for the use of the officers and passengers. These apartments in steamboats are often called saloons. In ships of war the rooms of the admirals and captains are called state cabins, and are fitted up with much elegance, with a gallery or balcony projecting at the stern. All cabins of a ship of war are enclosed by panelling, so that the partitions are readily removed when it is necessary to clear the decks for action.

Cab'inet, a closet; a small room or retired apartment, a private room in which consultations are held; a piece of furniture, consisting of a chest or box with drawers and doors; a small room used as a repository for works of art, antiquities, medals, specimens of natural history, etc. The term cabinet is also applied to a collection of such objects. A cabinet picture is a painting suitable for a cabinet or small room. These are generally of small dimensions and finely finished.

Cabinet, in politics, a select council of an executive chief; a committee of ministers or the governing council of a country, so called from the cabinet or apartment in which the ruler assembles his privy council. In the U. S. the cabinet is composed of seven heads of departments—namely, secretary of state, secretary of the treasury, secretary of war, secretary of the navy, secretary of the interior, postmaster-general, and attorney-general. In England a variable number of ministers (usually about fifteen) are by official usage members of the cabinet, and are called cabinet ministers, but they have no recognized legal character. The names of the members who compose the cabinet are never officially announced; no record is kept of its resolutions or meetings, nor has its existence been recognized by any act of Parliament. The British cabinet always includes the first lord of the treasury (who is prime minister), the lord chancellor, the chancellor of the exchequer, the president of the council, and five secretaries of state.

Cabi'ri, or **Cabeiri** [Gr. Κάβειροι], ancient divinities worshipped in Samothrace, Phœnicia, Greece, and other countries. The myth of the Cabiri is obscure, and not well explained by ancient writers. Their worship was performed with much solemnity and mystery.

Ca'ble, a rope or a chain, employed on shipboard to suspend and retain the anchors, and for other purposes. The name is often applied to wire ropes, especially such as are used in suspension bridges, to submarine telegraph lines, etc. Rope cables are made of the best hemp, of manilla, or of coir. The circumference varies from about three inches to twenty-six. A number of yarns are twisted to form a *lissum;* three lissums, twisted in an opposite direction, form a *plain-laid* or *strand;* and three or four strands twisted in the direction of the yarns in a lissum form a *cable.* The strength of a cable eighteen inches in circumference is about sixty tons; the strength varies according to the cube of the diameter. On shipboard, cables receive the names of *chief* cables, *bower* cables, etc., according to the anchor to which they are attached. Hempen cables are now generally spun by the wonderfully ingenious machinery invented by the late Prof. Treadwell of Harvard College. Chain cables consist of links the length of each of which is about six diameters of the iron of which it is made, and the breadth about three and a half diameters. (See Rope-Making.)

Cable (George W.), b. at New Orleans, La., in 1845, grew up under very straitened circumstances; fought in the Confederate army until 1863; afterward held a position in a cotton-house, but gave it up in 1879 in order to devote himself exclusively to literary pursuits. His *Old Creole Days,* first published in *Scribner's Magazine,* created quite a sensation, and was followed by *The Grandissimes* (1880) and *Madame Delphine* (1881), which secured to their author a prominent place among American novelists. He has also written *The Creoles of Louisiana* (1884) and *Dr. Sevier* (1885).

Cabochiens, a number of journeymen butchers who took their name from their leader, Jean Caboche. They were partisans of John, duke of Burgundy, whose cause they maintained against the Armagnacs. Their outrages in Paris caused the citizens to rise against them in 1418.

Ca'bo Fri'o (*i. e.* "cool cape"), a city and seaport of Brazil, is on the Atlantic, near a cape of its own name, 75 miles N. E. of Rio Janeiro.

Cabomba'ceæ [from *Cabomba,* one of the genera], a small natural order of exogenous aquatic plants allied to the Nymphæaceæ. They are indigenous in North and South America and Australia, and are distinguished by their distinct carpels, abundant albumen in the seeds, and the absence of a torus.

Cabool', or **Cabul,** a fortified city of Afghanistan, on the Cabool River, here crossed by three bridges, is 80 miles N. N. E. of Ghuznee, and is elevated about 6400 feet above the level of the sea; lat. 34° 30′ N., lon. 69° 6′ E. The climate in winter is very severe. The citadel, called Bala Hissar, includes the palace of the khan, the government offices, royal gardens, and numerous dwellings. The streets are narrow; the houses are two or three stories high, and have flat roofs. The public buildings are not remarkable. Cabool is widely celebrated for the variety and excellent quality of its fruits, apples, pears, pomegranates, grapes, etc. It has an extensive trade as an entrepôt between India and Toorkistan. The people of Cabool are Mohammedans and a mixture of several races. Under the emperor Bâber, Cabool was the capital of the Mogul empire. It was taken by Tamerlane about 1400, and by Nâdir Shah in 1738. The British captured it in 1839, but in Jan., 1842, the Afghans revolted and massacred the British army. Pop. estimated at 60,000.

Caboose, or **Camboose** [Ger. *Kabuse*], a name of the kitchen or cook-room in a merchant-ship. In coasting-vessels the term is applied to a portable cast-iron cooking-stove on the deck.

Cabot (George), a statesman and Federalist, born at Salem, Mass., Dec. 3, 1752. He was elected to the Senate of the U. S. in 1790, and was president of the Hartford Convention in 1814. He was distinguished for sound judgment, and was well versed in political economy. Died April 18, 1823.

Cabot (John), a foreign merchant of Bristol who after the discovery of America by Columbus was placed in command of a fleet of five vessels, which sailed in the spring of 1497. They reached the coast of Newfoundland (according to Sebastian Cabot's map, found in the geographical cabinet of the National Library in Paris) on June 24, and were in England again in August. Nothing is heard of him after 1498, and he is supposed to have died about that time. The date of his birth is not known.

Cabot (Sebastian), an eminent navigator, a son of the preceding, was probably born in Bristol about 1476. He commanded a ship in his father's voyage, and in 1498 conducted another expedition, and penetrated into Hudson's Bay, trying to find a N. W. passage through which to reach India. Having entered the service of Ferdinand, king of Spain, in 1512, he commanded an expedition which examined the coasts of Brazil and La Plata in 1526. He returned to England in 1548, after which a pension was granted to him and the office of grand pilot was created for him by Edward VI. Died about 1556. (See Richard Biddle: "Memoir of Sebastian Cabot," 1831, and Bryant's "Popular History of the United States," 1876.)

Ca'bra (anc. *Ægabrum*), a town of Spain, in the province of Córdova, 30 miles S. S. E. of the city of Córdova. It has a college, a cathedral, a convent, and manufactures of linens, hats, soap, bricks, etc. The neighboring region is volcanic, and produces excellent wine. Pop. 13,763.

Cabral' (Pedro Alvarez), a Portuguese navigator noted as the discoverer of Brazil, was born about 1460. He commanded a fleet which Emmanuel of Portugal sent to the East Indies in 1500. Having been carried out of his course by a westward ocean current, he discovered Brazil in April, 1500. He afterwards pursued his voyage to Calicut, and made conquests in India, where he founded the first Portuguese factory. He returned to Lisbon, where he arrived in June, 1501. Died about 1526.

Cabre'ra (Ramon), a Spanish general and Carlist, noted for his cruelty, was born at Tortosa Aug. 31, 1810. In the civil war which began about 1834 he fought for Don Carlos against the Christinos, and became a leader of guerillas. He gained a victory at Buñol in Feb., 1837, and took Valencia, but he was driven out of Spain by Espartero in 1840, and retired to France. He returned in 1848 and renewed the contest, but he was defeated and went into exile in Jan., 1849. D. Aug. 29, 1876.

Caca'o, the fruit of the *Theobroma Cacao,* a tree of tropical America, of the order Byttneriaceæ. Chocolate is made of the roasted oily kernels of the cacao nut, which also yields cacao butter. This tree should not be confounded with the cocoanut tree nor with the coca of Peru.

Cacao Butter, a fixed oil, hard and solid at ordinary temperatures, which is yielded in large quantities by the fruit of *Theobroma Cacao.* It is extracted by heat and pressure. It contains a very large proportion of stearin, with some olein and palmitin. It is largely used in the preparation of cosmetics, and is especially useful in pharmacy in the preparation of suppositories. The mafurra tallow which is brought from Madagascar closely resembles the above in chemical and physical properties. Cacao butter is not to be confounded with cocoa butter, which is a kind of palm oil, used in the manufacture of soap.

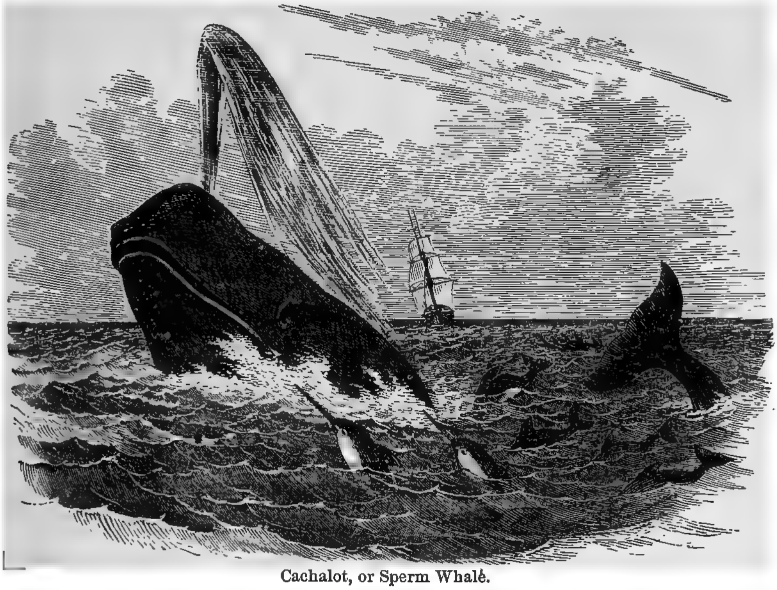
Cac'apon, or **Great Cacapon,** a river of West Virginia, rises near the S. extremity of Hardy county, flows nearly north-eastward through Hampshire and Morgan counties, and enters the Potomac. Length, about 140 miles.

Cacca'mo, a town of Sicily, in the province of Palermo, about 18 miles W. of the city of Palermo. P. 7233.

Cáceres, a province of Spain, bounded on the N. by Salamanca, on the E. by Avila, Toledo, and Ciudad Real, on the S. by Badajoz, and on the W. by Portugal. Area, 8014 square miles. It is intersected by the river Tagus. The surface is diversified by several ranges of mountains. Capital, Cáceres. Pop. 306,594.

Cáceres (anc. *Castra Cæcilia*), a town of Spain, capital of the above province, is situated on high ground 25 miles W. by N. from Trujillo. It contains an old castle, an episcopal palace, several convents and hospitals, a theatre, a Jesuits' college, and a bull-ring which is one of the largest in Spain. It has manufactures of linens, woollen goods, hats, soap, wine, etc. Interesting Roman and Moorish antiquities are found here. Pop. 14,816.

Cá'ceres, Nue'va (*i. e.* "New Cáceres"), a town of the Philippine Islands, in Luzon, on its S. E. coast, 184 miles S. or S. E. of Manila, a seat of a bishop. Pop. including suburbs, about 12,000.



Cachalot, or Sperm Whale.

Cachalot, kasha-lot, or **Sperm Whale** (*Catodon macrocephalus*), one of the largest of the Cetacea, is much sought after, not only on account of the oil, but also for the spermaceti and ambergris which it yields. Unlike the right-whale family, it affords no whalebone. The cachalot belongs to the family of Cetacea called Physeteridæ, of which there are three or four existing genera. The common cachalot has a very wide geographical range. It may be said to inhabit all seas, except those near the poles, although most abundant in the southern hemisphere. The cachalot sometimes attains the length of seventy or eighty feet. The head is enormous, forming about one-half of the entire bulk of the animal, and more than one-third of the length. The body tapers from the head to the tail. The color is dark gray, nearly black on the upper parts, but lighter beneath. Old males, or bull-whales, have a large gray spot on the front of the head. The muzzle is obtuse, as if suddenly cut off in front. In a protuberance on the front surface of the head is the blow-hole, which is single, and situated a little on the left side. The mouth is very large; and the throat, unlike that of the Greenland whale, is sufficiently wide to admit the body of a man. The upper jaw projects beyond the lower, and is destitute of teeth and whalebone, though rudimentary teeth exist within the gums; the lower jaw has from twenty to twenty-five teeth on each side, according to the age of the animal. The teeth are conical, projecting about two inches from the gum. The lower jaw is very narrow, the two branches being in contact throughout the greater part of its length. The cervical vertebræ, except the first, are consolidated into one. The dorsal fin is represented by a protuberance halfway between the neck and the tail; and these parts are seen above water in the ordinary swimming of the animal. The pectoral fins are small, and seem scarcely to aid in progression, which is accomplished by the large and powerful tail-fin, which is very broad, and is divided into two lobes, called flukes.

The head is in part occupied by a cartilaginous cavity in front of and above the skull, called by whalers *the case*, which is the chief receptacle for spermaceti. This substance being light, the animal in swimming raises its head above the surface of the water, which it also does even when at rest. The case frequently holds as much as ten large barrels of spermaceti. It is divided into compartments communicating with each other. The substance which it contains is a semi-fluid, but hardens on cooling; it consists of spermaceti and oil; the oil is separated by draining and squeezing. What purpose the spermaceti serves is not well known, except that of giving buoyancy to the fore part of the body; it is distinct from the brain, which is small. Cavities filled with spermaceti are distributed over the body and through the external fat or blubber. The blubber of the cachalot is not nearly equal in thickness to that of the Greenland whale, being only from eight to fourteen inches thick. It is removed from the body in great strips, and is heated in large pots, the skin of the whale serving for fuel. The *junk*, a thick elastic mass which lies immediately under the case, yields also considerable oil.

Squids and cuttle-fishes appear to be its chief food. Its herds are called *schools* or *pods* by whalers. Five hundred or more have been seen in a single herd. Large herds generally consist of females, with a few males; herds of young males also occur; solitary individuals are almost always old males. Terrible conflicts take place among the males, and it is not unusual to find the lower jaw dislocated or broken in consequence of these fights.

REVISED BY C. W. GREENE.

Cachao (formerly called **Donk-king;** now also **Bao-king,** or **Bacthian**) is one of the largest cities of the empire of Anam, and the capital of the province of Tonquin. It stands on the western bank of the river Tonquin, about 80 miles from the sea, in lat. 21° N. As most of its houses are one-story structures, built of mud or sunburned brick, its extension is immense; the royal palace alone has a circumference of several miles. Only the largest streets are paved. The city is of some commercial consequence, exporting gold, lackered ware of excellent quality, etc. In 1873 the French explorer François Garnier took possession of the city, but was shortly afterward assassinated by the natives. The port is now open to foreign vessels.

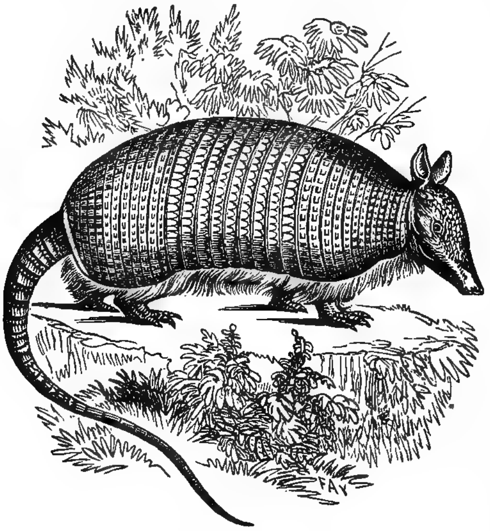
Cache, kåsh, a French word signifying a "hiding-place," is a name given in the Western U. S. to subterranean holes in which travellers and trappers hide provisions and other property, to preserve them from the depredations of the Indians and wild animals. They are made closely to resemble the surrounding earth.

Cache River of Arkansas rises near the N. E. extremity of the State. It flows in a S. S. W. direction, and enters the White River near Clarendon. Length, about 150 miles.

Cachet, Lettres de, lĕtr dẹh kå'shå', was a term applied in France under the old régime to letters or orders signed with the private seal of the king and used as instruments of despotic power. Before the seventeenth century they were not often employed, but in the reign of Louis XIV. they became very common. Many persons were arrested by such warrants and imprisoned without trial in the eighteenth century. It is stated that in the reign of Louis XV. lettres de cachet were sold by one of the mistresses of the king to any one who would pay money for them. About twenty-two of these warrants were issued against the famous Mirabeau. They were abolished in Jan., 1790.

Cachex'ia [from the Gr. *καχεξία*, a "bad habit" of body], in medical practice, a diseased or abnormal condition of the body. Cullen having given extensive circulation to the word as indicating a large group of chronic diseases, cachexia has come to be chiefly employed with reference to conditions in which the general nutrition of the body is at fault. Thus, cancerous cachexia indicates the state of ill-health associated with the growth of cancer in various parts of the body; gouty cachexia, the state of the general system in gout, as opposed to the mere local attack. All cachexias are associated with constitutional diseases, and most of them tend to become hereditary. The term is nearly synonymous with dyscrasia.

Cachica'ma, called also **Tatou-pe'ba,** the "nine-banded armadillo" (*Dasypus novem-cinctus*), an edentate mammal found from Texas to Paraguay. It is sixteen inches long, and has a long tail. Both body and tail are covered with plates, those of the tail in horny rings, and those of the body (in part) disposed in nine bands, so united as to admit of some motion. This animal can be readily tamed. Its food is principally ants, but it also is fond of vegetables and of carrion.



Cachicama.

Cach'olong, a beautiful mineral, sometimes called **Pearl Opal,** is a milk-white variety of opal, nearly allied to hydrophane. It is opaque and pearly, has a conchoidal fracture, and sometimes has a reddish tinge. The name is derived from the river Cach, in Bucharia, where it was first discovered.

Cac'odyle, or **Arsendimethyl,** is an extremely poisonous organic substance containing carbon, hydrogen, and arsenic (C_4H_6As). It has been proposed to employ the oxide of cacodyle as a deadly agent in war. This compound, known as *Cadet's fuming liquor,* has the property of taking fire spontaneously when exposed to the air, evolving abundant deadly fumes. Thus, a shell filled with it would, on bursting, cover the deck of a man-of-war with a liquid which would take fire of its own accord, and would likewise spread death by its fumes. The term *cacodyle* is from the Greek κακός, "bad," ὄζω, to "smell," and ὕλη, "matter" or "stuff." (See KAKODYLE.)

Cacou'na, a post-village and parish of Temiscouata co., province of Quebec (Canada), on the S. E. bank of the St. Lawrence, is the terminus of the Rivière du Loup division of the Grand Trunk Railway, and is a place of summer resort for salt-water bathing and for fishing and hunting. Pop. of village in 1881, 648; of parish, 1047.

Cacta'ceæ (named from *Cactus,* one of the genera), a natural order of exogenous plants remarkable for their gay and large flowers, and for the grotesque forms of some of the species, which are nearly all succulent. It comprises about 500 species, all natives of America, growing in hot climates and arid situations, to which they are well adapted by their thick skins, almost impervious to moisture. The so-called cactuses of the Old World are often Euphorbiaceæ; or, if they are really cactaceous, they are naturalized plants. The Cactaceæ for the most part are easily naturalized, and hence some species abound in Southern Europe and Asia. Most of them are leafless, and instead of leaves have clusters of hairs or prickles. Among their characteristic features are the numerous undistinguishable sepals and petals, the scattered stamens, the confluent styles, and the exalbuminous seeds. Their curious and vastly diversified forms constitute a remarkable feature in the vegetation of the warm regions of America. In some species, as the melon cactus or melon thistle, the stem swells into a globe. Other species have long creeping or trailing stems. This order comprises the night-blooming cereus, the *Opuntia* or prickly pear, which bears an edible fruit, and the nopal, on which the cochineal insect feeds. The stems of the Cactaceæ abound in a juice which affords a wholesome and valuable beverage to men and animals in the long dry season which prevails where they grow. Many species occur as epiphytes on forest trees. The Cactaceæ are extensively cultivated in greenhouses and hothouses in England and the U. S. Most of them are easily propagated by branches, which are allowed to dry a little before they are planted. Numerous species are natives of the U. S., especially in the extreme S. W.

Cactus. See CACTACEÆ.

Ca'cus, in classic mythology, an Italian robber and giant, said to be a son of Vulcan. He stole some oxen of Hercules, and dragged them by their tails into the cave which he usually inhabited, so that they could not be discovered by their tracks. Hercules, however, heard them bellow, and killed Cacus.

Cadahalso (JOSE DE), born at Cadiz 1741, killed at the siege of Gibraltar Feb. 27, 1782. He was educated in Paris, travelled in Italy, Germany, and England, and entered the army after his return. He made his *début* in literature with "Sancho Garcia," a tragedy (1771), which was followed the next year by "Eruditos á la Violeta," a satirical epic which attracted much attention. A volume of poems appeared in 1773, and after his death his "Moorish Letters," written on the model of "Lettres Persanes." An edition of his collected works was published in 3 vols. in Madrid, 1818.

Cadam'ba, or **Kudum'ba,** the wood of several species of *Nauclea,* a genus of East Indian trees of the order Cinchonaceæ. The *Nauclea Cadamba* is a noble tree which bears orange-colored fragrant flowers, and is highly prized for its shade. The wood, which is yellow, soft, and fine-grained, is useful for several purposes. The wood of *Nauclea cordifolia,* a large tree which grows in the mountains of Hindostan, is used for flooring-planks.

Ca'da Mos'to, da (LUIGI), a navigator, born at Venice in 1432. Having entered the service of Prince Henry of Portugal, he explored in 1455–56 the W. coast of Africa as far as the mouth of the Gambia. He wrote a narrative of his voyage (1507). Died in 1464.

Cadas'tral Sur'vey [Fr. *cadastre*], a term recently adopted by the English and other European nations, is used to denote a survey on a large scale. A cadastral as opposed to a topographical map may be defined as one on which the objects represented agree as to their relative positions and dimensions with the objects on the face of the country, while a topographical map, usually drawn on a small scale, exaggerates the dimensions of houses and the width of roads and streams, for the sake of distinctness. The usual scale of cadastral maps is nearly twenty-five inches to a mile.

Cad'dice-fly, or **Caddis-fly** (*Phryganeidæ*), a family of insects of the order Neuroptera, considered by Mr. Kirby a distinct order, Trichoptera. The caddice-flies differ in important particulars from the other neuropterous insects, and exhibit points of intimate resemblance to the Lepidoptera. These insects are most interesting, however, on account of their larvæ, of which the larger kinds are the caddice-worms or cad-bait of British anglers. The species of caddice-fly are numerous in the U. S., and they are more so in the north than in the south of Europe. The perfect insects have four wings, with branched nervures, of which the anterior pair are clothed with hairs; the posterior pair are folded in repose. The head is furnished with a pair of large eyes, and with three ocelli. The angler looks for cad-bait about the edges of streams and under stones, or on the stalks of aquatic plants. As a bait, the caddice is almost as deadly as the May-fly, and more so, in running streams, than the ordinary worm.

Cade (JACK), an Irishman who called himself MORTIMER, the leader of an insurrection which broke out in Kent in June, 1450. He marched with about 16,000 insurgents towards London, and encamped on Blackheath. Among their motives for rebellion was oppressive taxation. Having defeated a royal army which was sent against him, he entered London, in which he maintained strict order, but he caused Lord Say, a royal favorite, to be put to death. Many of his followers were induced to disperse by a promise of pardon. Cade fled, but was pursued and killed July 11, 1450.

Cade, Oil of [Fr. *huile de cade*], a thin tar distilled from the wood of *Juniperus oxycedrus,* is used in the medical treatment of diseases of the skin.

Ca'dence [from the Lat. *cado,* to "fall"], a fall, a decline, a state of sinking; a fall of the voice at the end of a sentence; a sound or tone. In horsemanship, an equal measure or proportion observed by a horse in all his motions.

CADENCE, in music, the conclusion of a song or of some parts in certain places of the piece, dividing it into so many numbers or periods. The cadence takes place when the parts fall on a note or chord naturally expected by the ear, just as a period completes the sense in a discourse. A cadence is either perfect or imperfect—the former, when it consists of two notes sung after each other, or by degrees conjoined in each of the two parts, the harmony of the fifth preceding that of the key-note; and it is called perfect, because it satisfies the ear. It is imperfect when the key-note with its harmony precedes that of the fifth without its added seventh. A cadence is said to be broken or interrupted when the bass rises a major or minor second, instead of falling a fifth.

Ca′dency [from the Lat. *cado*, to "fall" or "descend"], in heraldry, the marks by which the shields of the younger members of families are distinguished from those of the elder and from each other. No distinction is usually made between marks of cadency, differences, distinctions, or brisures, though the last term is used to include not only differences in general, but also the so-called abatements. There is convenience in the practice followed in Scotland, of appropriating the marks of cadency to distinguishing the sons from the father, and from each other during the father's lifetime, and of adopting other distinctions after the death of their father. Another mode of differencing the shields of brothers in early times was by changing the tinctures, but this is now regarded as too extensive a change. The differences used by the British royal family are found in some peerages. The label of the prince of Wales is plain, whilst those of the other princes and princesses are charged with crosses, fleurs-de-lis, hearts, or other figures for the sake of distinction. Labels, crescents, mullets, martlets, etc. are the usual marks of cadency, and the rules governing their use are complicated and fanciful.

Caden′za, in music, an ornamental succession of notes introduced at pleasure at the end of a phrase.

Cadet′ (fem. *cadette*), [a French word signifying "younger," "junior"]. Cadet as a noun means younger son, younger brother: a military officer who is junior to another is a cadet in respect to him. The term is also applied in France and other countries to a student of the art of war and military science. The students of the Military Academy at West Point, N. Y., are called cadets, as are those of the Naval Academy at Annapolis. There are also medical cadets, recognized as of a distinct rank in the U. S. "Army Regulations." (See MILITARY ACADEMY (U. S.), by PROF. GEORGE L. ANDREWS.)

Cadet, Naval, is the lowest grade of officer in the British navy. Cadets enter the naval service at twelve to fourteen years of age. Every captain on being appointed to a ship has a right to nominate a cadet, and every flag-officer can nominate two on receiving his flag. The others are nominated by the first lord of the admiralty, subject to the regulations for competitive examination. They first pass three months on a training-ship in port to learn the rudiments of seamanship, and are thence transferred to seagoing ships. After the cadet has served fifteen months at sea he is eligible for promotion to the rank of midshipman. (See NAVAL ACADEMY, by PROF. R. S. SMITH.)

Ca′di, an Arabic word signifying judge or jurist, is the title of an inferior judge among the Mohammedans. He must be chosen from the ranks of the priesthood, as the precepts of the Koran constitute the code of laws.

Cadillac, on R. R., city, cap. of Wexford co., Mich. (see map of Michigan, ref. 5–H, for location of county), 100 miles N. of Grand Rapids. Pop. in 1880, 2213; in 1884, 3907.

Cadiz, a province which forms the S. W. extremity of Spain, is bounded on the N. by Seville, on the E. by Málaga, on the S. by the Strait of Gibraltar, and on the W. by the Atlantic and Huelva. Area, 2809 square miles. Capital, Cadiz. Pop. 430,185.

Cadiz (anc. *Gades*), an important city and seaport of Spain, capital of the above province, is situated on the Atlantic Ocean and on the N. W. extremity of the isle of Leon, about 94 miles by rail S. by W. of Seville; lat. 36° 32′ N., lon. 6° 18′ W. Its site is a long narrow isthmus or tongue of land surrounded by water on three sides, having on the N. and N. E. an inlet called the Bay of Cadiz, which forms a good and capacious harbor. It is accessible from the mainland only by a tongue of land, which in some places is only 200 yards wide, and is strongly defended by several forts. The houses, built of white freestone, present a bright appearance from the sea. The streets are narrow, but well paved and regular. Among the principal edifices are two cathedrals, an old and a new, the lighthouse of San Sebastian, 172 feet high, and a hospital called Casa de Misericordia. The convent of the Capuchins possesses two excellent pictures by Murillo. The city contains two theatres, a medical school, a botanic garden, and an academy of fine arts. Cadiz is one of the first commercial cities of Spain, but is probably inferior to Barcelona in the value of its imports. The chief articles of export are sherry wine, olive oil, salt, metals, and fruits. Among the imports are tobacco, sugar, coffee, hides, indigo, cotton, dyewoods, fish, and coal. The commerce of this port is much less extensive than it was formerly. Cadiz is the southern terminus of a railway which connects it with Seville. The isle of Leon is separated from the mainland by a narrow channel, which is crossed by a bridge. Here are manufactures of mantillas, fans, glass, soap, cotton and silk stuffs, hats, etc. Cadiz, which is one of the most ancient towns of Europe, was founded by the Phœnicians, probably before the foundation of Rome. The Carthaginians became masters of it during the first Punic war, but the Romans obtained possession of it in 206 B. C., after which it became a city of great wealth and importance. It was taken and pillaged by the earl of Essex in 1596, and was blockaded in 1656 by Admiral Blake, who captured two rich galleons. It was besieged by the French from Feb., 1810, until Aug., 1812, when the victories of Wellington rescued it. Pop. 65,028.

Cadiz, capital of Trigg co., Ky. (see map of Kentucky, ref. 5–D, for location of county), on Little River, 230 miles W. S. W. of Frankfort. Pop. in 1870, 680; in 1880, 646.

Cadiz, on R. R., capital of Harrison co., O. (see map of Ohio, ref. 4–I, for location of county), is about 22 miles N. W. of Wheeling, and 120 miles E. N. E. of Columbus. A branch railroad, six miles long, connects it with the Pan Handle route from Pittsburg to Cincinnati. It is the commercial centre of a great wool-growing district. Pop. in 1870, 1435; in 1880, 1817.

Cad′mium, a white metal having a slight bluish cast, discovered in 1817 by Stromeyer, and also independently by Hermann, named from *cadmia fossilis*, a name given to an ore of zinc mentioned by Dioscorides and Pliny. The name is said by some to have come from that of Cadmus. Symbol, Cd; atomic weight, 112; sp. gr. after fusion, 8.6; hammered, 8.7, nearly. Cadmium is lustrous, takes a fine polish, and possesses a fibrous fracture. It tarnishes very slightly in the air, and only burns at a high heat. It is more tenacious than tin, though, like that metal, a bar of it gives a "cry" when bent. It melts below 260°, and volatilizes at about 360° C. It occurs in nature as the sulphide "greenockite" at Bishopstown, Renfrewshire, Scotland, and incidentally as a constituent of various zinc ores, as the carbonate, silicate, etc., as well as the sulphide in several localities. The zinc flowers in the flues of zinc-reducing furnaces contain even as much as 11 per cent. of cadmium. Commercial English zinc often contains cadmium. The metal is readily soluble in nitric acid, and but slightly so in other acids, except at a boiling temperature. It forms two oxides, CdO and Cd_2O, of which the former (the monoxide) is the basis of a series of salts. The suboxide is greenish. The monoxide varies in color from brownish to blackish yellow, according to the mode of preparation. It is infusible and not volatile. Its salts are mostly colorless, and when taken into the stomach act as emetics; their taste is disagreeably metallic. The cadmium chloride forms double salts with hydrochlorates of many of the alkaloids. Cadmium is prepared by collecting the first products of distillation from the zinc ores containing it, and subjecting them, when mixed with charcoal, to two successive distillations in iron retorts at a low red heat. Instead of the last distillation, solution in acid and purification in the wet way is resorted to. The demand for cadmium is, however, so small that the working up of the furnace products containing considerable amounts of that metal has been discontinued in some places in Silesia. It is necessary, however, to remove it from the zinc, as it renders that metal brittle when 3 per cent. or more is present. Cadmium finds its chief application in the arts in the form of the sulphide, which has an intense yellow color, and is used for coloring soaps, and in paints, etc. It is known as cadmium yellow and jaune brillant. The iodide and bromide of cadmium are used in photography. The metal is used for forming a fusible with lead, tin, and bismuth for filling teeth. This element is recognized in the laboratory by being the only one which affords a yellow sulphide, insoluble in ammonium sulphide.

C. F. CHANDLER.

Cad′mus [Gr. Κάδμος], in classical mythology, was a son of Agenor, king of Sidon, and a brother of Europa. After Europa had been carried off by Jupiter, Cadmus was sent in quest of her. According to tradition, he founded the city of Thebes, originally called Cadmeia, in Bœotia, and invented sixteen letters of the Greek alphabet, or introduced them from Phœnicia into Greece. He was the first who worked the mines of Mount Pangæon.

Cadu′ceus, in classic mythology, the symbol and winged staff of Mercury (Hermes), to whom it was presented by Apollo. From this staff Mercury derived the surname of *Caducifer*. The term caduceus was also applied by the ancients to a staff or rod of laurel or olive which was carried by ambassadors and heralds as a symbol of peace. It had the figures of two serpents twisted around it. Among the moderns the caduceus is used as an emblem of commerce, over which Mercury was supposed to preside. Still more frequently it is the emblem of health and of the healing art.

Cadwal'ader (Gen. George), a native of Philadelphia, where he practised law, served as a brigadier-general in the Mexican war, and was brevetted major-general for services at Chapultepec. He was major-general of Pennsylvania troops 1861–62, and in 1862 became major-general of U. S. volunteers. D. Feb. 3, 1879.

Cadwalader, or **Cadwallader** (John), an American general, born in Philadelphia in 1743. He served as a brigadier-general at the battles of Princeton, Brandywine, and Monmouth (1778). Died Feb. 10, 1786.

Ca'dy (Albemarle), an American officer, born in 1807 in New Hampshire, graduated at West Point 1829, and Oct. 20, 1863, colonel Eighth U. S. Infantry. He served chiefly at frontier posts 1829–61; on engineer duty 1834–37; in Florida war 1838–42; in war with Mexico 1846–48, engaged at Vera Cruz, Cerro Gordo, Amazoque, San Antonio, Churubusco, and Molino del Rey (wounded and brevet major); on Sioux expedition 1855, engaged at Blue Waters, Dak.; and superintendent of general recruiting 1857–59. In the civil war was in command of the district of Oregon 1861–62; acting inspector-general of the department of the Pacific 1863, and in command of draft rendezvous at New Haven, Conn., 1864–65. Brevet brig.-gen. U. S. A. Mar. 13, 1865, for long and faithful services; and retired from active service May 18, 1864. Geo. W. Cullum.

Cady (Daniel). See Appendix.

Cæcil'idæ [from the Lat. *cæcus*, "blind"], a family of amphibians formerly placed among serpents on account of their form, although breathing by gills when young and undergoing a metamorphosis. The body is almost cylindrical, the head small, the eyes very small, and in some species imperfect or wanting; on which account the name was given. The skin is viscous and annularly wrinkled, appearing naked, although minute scales are found between its wrinkles. The vertebræ are articulated as in fishes and not as in serpents, and the skull is united to the first vertebra by two condyles. The ribs are short. The original genus has been subdivided, now forming a family, Cæciliadæ. The species are inhabitants of marshy or moist places, chiefly in Africa and South America.

Cæcil'ius Sta'tius, a Roman comic poet of high reputation, was a native of Milan and a friend of Ennius. He wrote nearly forty comedies, of which only small fragments are extant. Died in 168 B. C. He was regarded by ancient critics as a comic poet of the first rank.

Cæci'na Alie'nus (Aulus), or **A. Licinius Cæcina,** a Roman general who entered the service of Vitellius in 68 A. D., and obtained command of an army. In the year 69, Cæcina and Valens defeated the army of Otho at Bedriacum. He soon deserted Vitellius, and became an officer of Vespasian, but he formed a conspiracy against the latter, and was put to death in 79 A. D.

Cæ'cum [the neuter gender of the Lat. adjective *cæ'cus*, "blind"], literally, the "blind intestine," applied to a sac or branch of an intestine having only one opening. In man there is only one cæcum, not very large, at the extremity of the small intestine, where it terminates in the colon. In the herbivorous Mammalia it is comparatively large, and secretes an acid fluid; perhaps supplementing the gastric juice in completing digestion. The cæcum is wanting in bats and in the bear and weasel families. Birds have two cæca, generally long and capacious in those that are omnivorous or granivorous. Reptiles seldom have a cæcum. Fishes have the cæca attached to the intestine at its uppermost part. The number of these is extremely various; sometimes there are only two, and sometimes more than a hundred. The number is different even in nearly allied species. In some fishes, as the cod, the cæca divide into smaller branches. The intestinal canal of some of the infusoria is furnished throughout its length with cæca.

Cæd'mon, an ancient Anglo-Saxon poet, was originally a cowherd attached to the monastery of Whitby, in England. He afterwards became a monk, and composed, professedly under divine inspiration, poems on religious subjects, which are thought to have suggested to Milton his "Paradise Lost." Some of these are the oldest extant specimens of Anglo-Saxon metrical composition. Died about 680 A. D.

Cæ'lius Aurelia'nus, an eminent medical writer who belonged to the school of Methodici, was born at Sicca, in Africa. The period in which he lived is uncertain. His diction is rugged and obscure. He wrote two Latin works, "De Morbis Chronicis" ("On Chronic Diseases") and "De Morbis Acutis."

Caen [Lat. *Cadomus* or *Cadomum*], a city of France, capital of the department of Calvados, is situated on the river Orne, 10 miles from the sea, and 148 miles by rail W. N. W. from Paris; lat. 49° 11′ 12″ N., lon. 0° 21′ W. It was formerly the capital of Lower Normandy. It has wide, regular, and clean streets, several fine public squares, and many noble specimens of ancient Norman architecture. The houses are generally built of an excellent cream-colored freestone which is quarried in the vicinity, and is called Caen Stone (which see). Caen is connected with Paris by a railway, and with the sea by a navigable canal. Among its remarkable edifices are the cathedral of St. Étienne, founded by William the Conqueror; the church of La Trinité, or Abbaye-aux-Dames, founded by Queen Matilda in the eleventh century; and the church of St. Pierre, the tower or spire of which is much admired. The castle, commenced by William the Conqueror and finished by his son, Henry I., was partially destroyed in 1793. This city contains a large public library, a museum, a botanic garden, a custom-house, the hôtel of the prefecture, an academy of arts and sciences, a medical school, a normal school, and an asylum for deaf-mutes. It has manufactures of lace, crape, linens, cotton fabrics, porcelain, cutlery, flannel, hats, and gloves. Caen has long been celebrated for its manufacture of Angora and woollen gloves. This was an important place as early as 912, when it became subject to the Normans. It was the residence of William, duke of Normandy, before he conquered England. In 1346 it was taken and pillaged by Edward III. of England. The poet Malherbe and Auber the composer were born here. Pop. 41,508.

Caen Stone, a fine cream-colored or light yellow building-stone which is exported from Caen to England and the U. S. It is a fine-grained sandstone, and is easily worked. It was extensively used in England in the fifteenth and sixteenth centuries. The cathedrals of Winchester and Canterbury are built of this stone.

Caerle'on (anc. *Isca Silurum*), an old town of England, in Monmouthshire, on the river Usk, here crossed by a bridge, 2 miles N. E. of Newport. It is supposed to have been the capital of the Roman province *Britannia Secunda* (modern Wales), and, according to tradition, was a residence of King Arthur. Many Roman antiquities and relics have been found here, as baths, altars, statues, coins, inscriptions, and aqueducts. Here is also a ruined amphitheatre 222 feet in length by 192 feet in width, which indistinctly shows the tiers of seats. The remains of a Cistercian priory are still visible. Caerleon has been included in the diocese of Llandaff.

Cæsalpin'ia, a genus of trees of the order Leguminosæ, the type of the sub-order Cæsalpinieæ. This sub-order is characterized by irregular flowers which are not papilionaceous, and comprises numerous species, some of which have purgative properties, as senna (*Cassia*). Others bear edible fruits, as the tamarind and the carob. Among the products of the sub-order are Copaiba, Logwood, and Camwood (which see). They are mostly natives of warm climates. The genus *Cesalpinia* has pinnate or bi-pinnate leaves, and ten stamens in each flower. The red dyewood called sappan-wood is obtained from the *Cæsalpinia Sappan*. Other species yield the Brazil-wood of commerce. Among the species of the above sub-order that grow wild in the U. S. are the *Cercis Canadensis*, the *Gleditschia triancanthos* and *monosperma* (honey locust).

Cæ'sar, the cognomen of a patrician Roman family of the Julia gens, which was one of the most ancient in the state, and claimed a descent from Iulus, a son of Æneas. The first member of the family mentioned in history is Sextus Julius Cæsar, who was prætor in 208 B. C. After the family had become extinct (at the death of Nero), the succeeding emperors of Rome assumed the name of Cæsar as a title. It subsequently became the title of the heir-presumptive to the throne.

Cæ'sar (Julius), or, more fully, **Caius Julius Cæsar,** one of the most remarkable men that ever lived, was born on the 12th of July, 100 B. C. He belonged to the Julian tribe (gens Julia), which boasted its descent from Iulus (or Julus), the son of Æneas. In 83 Cæsar divorced Cossutia and married Cornelia, the daughter of Cinna. This act offended Sulla (then in the height of his power), who commanded Cæsar to divorce the latter. On his refusal to obey he was proscribed. He was under the necessity of concealing himself for a time, but on the intercession of mutual and influential friends the dictator reluctantly pardoned him. Sulla is reported to have said to some of his friends who interceded for him, that Cæsar would some day be the ruin of the aristocracy, adding, "In that young man there are many Mariuses." (Marius had proved himself the most formidable enemy that the aristocratic party had ever encountered.) Soon after, Cæsar went to Asia Minor, and served with distinction in the Roman army. Afterwards, while on his journey to Rhodes with a view to study oratory under Apollonius Molo, he was taken by pirates. While detained by them he often threatened (in jest, as they supposed) that he would put them to death when he got his liberty. The required ransom having at last been paid, he manned some vessels, pursued and took the pirates, and crucified them all.

Having returned to Rome, he became a candidate for popular honors. He was elected quæstor in 68 B. C. This same year his wife Cornelia died, and the next he married Pompeia, a relative of Pompey the Great and a granddaughter of Sulla. This was done to ingratiate himself with Pompey, who, since the death of Sulla, was all-powerful at Rome. He was made an ædile in 65 B. C., and sought to render himself popular by the exhibition of public games which are said to have surpassed in magnificence everything of the kind ever before seen at Rome. He was elected pontifex maximus in 63 B. C. In 63 occurred the conspiracy of Catiline, and many suspected Cæsar of being accessory to it. When Cicero asked the opinion of the senate respecting the punishment which ought to be inflicted on the conspirators, all the senators gave judgment in favor of their death, until it came to Cæsar's turn to speak. He maintained that it was contrary to justice and highly inexpedient to put men of their rank to death without a full trial. His argument had great weight with the senators. But Cato followed in a powerful speech, accusing Cæsar of complicity with the conspirators, and carried a large majority of the senate with him. The conspirators were condemned to death; Cæsar himself narrowly escaped.

In 62 B. C. he was made prætor, and was sent the next year as proprætor to Spain, where he greatly distinguished himself both as a magistrate and general, and was saluted as *imperator* by the army. In 60 he was elected consul, L. Calpurnius Bibulus being his colleague. One of his leading measures was to propose an agrarian law, by which a considerable tract of the public land was to be divided among the poorer citizens, particularly those who had a number of children. This measure was carried, in spite of the opposition of Bibulus. With a view to strengthen his interest with Pompey, Cæsar gave him in marriage his daughter Julia, though she had already been affianced to S. Cæpio. He formed in 60 B. C., with Pompey and Crassus, a secret alliance known in history as the first triumvirate. Supported by such powerful influence, Cæsar was enabled to carry through the senate whatever laws or measures he pleased. The government of Cisalpine and Transalpine Gaul having been decreed to him for five years, he left Rome in the spring (of 58 B. C.), and before the ensuing winter he had ended successfully two important wars in Transalpine Gaul—one with the Helvetii, a nation inhabiting what is now Switzerland; the other with Ariovistus, the king of a powerful German nation who had a few years before crossed the Rhine and established themselves in Gaul. In the next seven years he not only subdued the greater part of Gaul, but crossed over (55 B. C.) into Britain, defeated Cassivelaunus, one of the kings of that country, took hostages, and fixed the tribute the Britons were to pay to Rome.

Cæsar's daughter Julia, whom he had given in marriage to Pompey, had died in 54 B. C. The triumvir Crassus had been killed in the war with the Parthians. A coolness gradually arose between Cæsar and Pompey. The latter appears to have become jealous of the new favorite of fortune, since all his own exploits, splendid and unparalleled as they were at the time they were performed, had been eclipsed by the more recent and more glorious achievements of his great rival. Pompey had succeeded to the position of Sulla as the leader of the aristocracy, while Cæsar's policy had been from the first to cultivate the favor of the common people. The two parties became more and more hostile to each other. Some of the more violent of the patricians were determined to crush Cæsar at all hazards. It was at length proposed in the senate, in 50 B. C., by Marcellus, that Cæsar, the Gallic war having been brought to an end, should lay down his command and disband his army; but Curio, a tribune whom Cæsar had gained over to his interests, vetoed the decision of the senate; Cæsar, however, was deprived of two of his legions. But desirous, by the moderation of his conduct, to fasten upon his opponents the responsibility and odium of beginning the quarrel, he sent a proposition to the senate that he would agree to dismiss his army if Pompey would do the same. But the senate even refused to consider the proposal. It was afterwards decreed that Cæsar should disband his army by a certain day or be considered a public enemy. This was virtually a declaration of war, for no one could believe that Cæsar would thus tamely abandon the contest. On learning the decision of the senate, Cæsar assembled his army, and in an eloquent harangue inspired them with his own indignant spirit. Accompanied by only 5000 infantry and 300 cavalry (for his other troops were beyond the Alps), he advanced to the river Rubicon, which then marked the limit between Italy and Cisalpine Gaul. After revolving in his mind for some time his perilous enterprise, he at length exclaimed, "The die is cast!" He instantly crossed the river, and proceeded with rapid strides through Ariminum, Arretium, and Ancona towards Rome. Every town seemed ready to open its gates as he approached. In the general consternation, Pompey, with the two consuls and many of the senators, fled from the city towards Brundisium, closely pursued by Cæsar. He passed over into Greece, whither Cæsar, for want of ships, was unable to follow him. Cæsar soon after set out for Spain, where Afranius and Petreius, Pompey's lieutenants, had a formidable army under their command. Having compelled them to sue for and accept peace on his own terms, and captured Massilia (Marseilles), he returned to Rome, whence he proceeded to Brundisium. After some delay he evaded the vigilance of Pompey's fleet, and succeeded in transporting his army into Greece. In his first engagement with Pompey, near Dyrrhachium, Cæsar was worsted, and was obliged to retreat. He withdrew, pursued by Pompey, to Thessaly. At length the two armies met on the plains of Pharsalia. Cæsar had only 22,000 foot-soldiers and 1000 horse, while the army of Pompey amounted to 45,000 infantry and 7000 horse. The latter sustained a disastrous defeat; 15,000 men fell in battle, and upwards of 24,000 were taken prisoners. Pompey escaped to Egypt, where he was basely assassinated. (See Pompey.) The power of his enemies having been utterly broken in Greece, Cæsar followed Pompey to Egypt, where he was detained for a time, captivated by the charms of Cleopatra, whose pretensions to the throne of Egypt he supported against those of her brother Ptolemy. He next marched against Pharnaces, a son of Mithridates the Great, king of Pontus. Having defeated and destroyed the army of Pharnaces, he wrote to the senate his celebrated letter of three words only—*Veni, vidi, vici.* He next turned his arms against the Pompeians in Africa, who were under the command of Cato and Scipio, whose forces were defeated and almost exterminated at Thapsus, not far from Carthage (46 B. C.). Cæsar returned to Italy the undisputed master of the Roman world. But he had scarcely time to celebrate his recent triumphs when word was brought that the sons of Pompey, Cneius and Sextus, had collected a formidable army in Spain. Cæsar advanced to meet them with his usual celerity. After a severe and bloody battle he gained a complete victory. He said afterwards to his friends that he had often fought for victory, but then only for his life.

Having thus risen to power on the ruins of the republic, Cæsar appears sincerely to have sought to promote the true interests of his country. He procured the enactment of several salutary laws. One of the subjects which claimed his earnest attention was the regulation of the calendar. His improvements have been adopted, with some modifications, by all the European nations. (See Calendar.) He is said to have contemplated the preparation of a complete digest of the Roman laws, the draining of the Pontine Marshes, and other important public works, when death put an end to all his schemes. The senate had conferred upon him the title imperator (whence our "emperor"), for life; he was also made dictator and præfectus morum ("chief or ruler of manners or customs"), and pontifex maximus. To these dignities he wished to add that of king, that he might transmit his power to his successor. Having no legitimate children of his own, he had adopted his grand-nephew, Octavius, the son of Attia, who was a daughter of Cæsar's sister Julia. On a certain public festival, the Lupercalia (sometimes called in English the Lupercal), Antony, a zealous adherent of Cæsar, publicly offered him a regal crown, but he, perceiving that it displeased the people, refused it, but very reluctantly, according to some accounts. From the time of Tarquin the Proud the name of king had always been particularly odious to Romans of every class. Cæsar's evident desire to be a king stimulated the hostility of his enemies, who were encouraged to hope that the taking of his life would be approved even by many of the people. A conspiracy in which sixty persons were implicated was formed. Cæsar had many warnings, it is said, of his approaching fate, but as he scorned to live in constant terror of death, he disregarded all the admonitions of his friends, saying it was better to die at once than to suffer the anguish of death many times by constantly fearing it. It had been planned that when Cæsar came into the senate on the ides of March, Cimber, one of the conspirators, should present a petition to him, and that while the paper was being read the others should crowd around, as if very anxious that Cimber should obtain his request, and make an attack upon their victim all at once. At first Cæsar resisted with great spirit, but when he perceived the number of his enemies he resigned himself to his fate, and, wrapping his toga about him, fell at the foot of Pompey's statue, the base of which was bathed in Cæsar's blood. One account states that he resolutely defended himself until he saw the dagger of M. Brutus among those of the other conspirators, when, exclaiming "Thou too, Brutus!" he yielded without any further struggle. He was assassinated 44 B. C., in the fifty-sixth year of his age. In person, Cæsar was tall and of a commanding presence. His constitution was naturally delicate, but by exercise and exposure he became so hardy that none of his soldiers could better bear the fatigues and privations incident to a military life. He was sometimes, though rarely, subject to attacks of epilepsy.

As a general, Cæsar was probably superior in genius to every other commander of whom history makes mention, excepting, perhaps, Hannibal alone. (See HANNIBAL.) In the fertility of his resources, indeed, he appears to have surpassed all other generals that ever lived. It has been said that Napoleon taught his enemies how to conquer him, but Cæsar's enemies never learned how to conquer him, because he had not a mere system of tactics, but a new stratagem for every new emergency. But he was not only a great general, but a pre-eminent statesman, and the greatest orator of his age except Cicero. Cæsar was also distinguished as a historian; he wrote the first seven books of the commentaries treating of the Gallic war, and three books relating to the civil war. His style is remarkable for ease, clearness, and simplicity.

Referring to those remarkable men in history who have compelled "nations unaccustomed to control" to bow obedient to their will, Macaulay observes: "In this class three men stand pre-eminent—Cæsar, Cromwell, and Bonaparte; the highest place in this remarkable triumvirate belongs undoubtedly to Cæsar. He united the talents of Bonaparte to those of Cromwell, and he possessed also what neither Cromwell nor Bonaparte possessed—learning, taste, wit, eloquence, the sentiments and manners of an accomplished gentleman." WILLIAM JACOBS.

Cæsare'a [Gr. Καισαρεία; anciently called *Turris Stratonis*], an ancient city and seaport of Palestine, now in ruins, was situated on the Mediterranean, about 37 miles N. of Jaffa, and 55 miles N. N. W. of Jerusalem. It was founded by Herod the Great (22 B. C.), who erected here several magnificent edifices, and protected its port by a semicircular mole, which is said to have been one of the most wonderful works of antiquity. Cæsarea was the scene of several events recorded in the book of Acts. (See Acts, chaps. x., xxiii., xxv.) It was taken by the crusaders in 1101. The site is now covered with shapeless ruins.

Cæsarean Operation. See HYSTEROTOMY.

Cæsare'a Philip'pi, or **Pa'neas,** an ancient town of Palestine, situated about 20 miles N. of the Sea of Galilee and 45 miles W. S. W. of Damascus. It is mentioned in Matthew xvi. 13. This site is now occupied by the village of Banias, in which some ancient ruins are visible. Inscriptions found here show that the god Pan once had a sanctuary in this place.

Cæ'sium (symbol Cs; atomic weight, 133), an alkali metal discovered with the spectroscope by Bunsen and Kirchhoff in 1860 in the water of some saline springs in Germany. The salt spring of Dürkheim contains 0.17 parts of the chloride in 1,000,000. The hot spring of Wheal Clifford was found to contain 0.12 grains of the chloride in a gallon. Cæsium is widely diffused in nature, though in exceedingly small quantities; it has been found with rubidium in lepidolite, petalite, and some felspars. The mineral *pollux* of Elba is reported to contain 34 per cent. of cæsium. In its chemical relations cæsium is closely analogous to potassium, though it is more electro-positive, being, indeed, the most electro-positive element known. A fused mass of cæsium chloride may be decomposed by the electric current, but the cæsium rises to the surface and burns with a reddish flame. Bunsen obtained it as an amalgam with mercury, but even in amalgam or alloy it absorbs oxygen with great rapidity. The platin-chloride is more insoluble than that of potassium, and this fact has formed the basis of its separation from that element. The spectrum of cæsium is characterized by two blue lines. C. F. CHANDLER.

Caffraria. See KAFFRARIA.

Caf'feine, an alkaloid existing in coffee, tea, Paraguay tea (*Ilex Paraguayensis*), and guarana (*Guarana officinalis*, or *Paullinia sorbilis*), called also **Theine** and **Guaranine.** Chemical formula, $C_8H_{10}N_4O_2$. It was discovered by Runge in 1820, and almost simultaneously by Pelletier, Caventou, and Robiquet. Oudry in 1827 extracted an alkaloid from tea which he supposed to be a distinct compound, and called it theine, but in 1838 Jobst proved caffeine and theine to be identical. Stenhouse extracted caffeine or theine from the leaves and twigs of Paraguay tea, while Martius extracted it from the dry pulp of the *Paullinia sorbilis* or guarana, and called it guaranine, but afterwards proved the alkaloid to be identical with caffeine. Van Corput first showed that the leaves of the coffee-plant, as well as the berries, contained caffeine. It probably also exists in other plants.

Caffeine occurs in the raw and also in the roasted coffee, the amount varying with the variety of coffee, the ripeness of the sample, the season of the harvest, etc. The mean amount of caffeine, as determined by Stenhouse in samples of various coffees, was 0.8 to 1 per cent. Domingo coffee contains the least and Martinique coffee the most caffeine. Tea contains somewhat more caffeine than coffee, 2.5 to 3.4 per cent. having been found in hyson tea, 2.2 to 4.1 in gunpowder tea, and 0.9 to 2.1 per cent. in various black teas. (*Stenhouse.*) Mean, about 2 per cent. The Paraguay tea used in several South American countries to prepare the drink known by the natives as "maté" contains 1.1 to 1.2 per cent. of caffeine. The guarana, which is a sort of chocolate, the seeds of the plant being roasted and ground to a paste with water, contains about 5 per cent. of caffeine. Guarana is used by the Brazilians to counteract dysentery, retention of urine, etc. Caffeine is supposed to exist in coffee-berries and tea-leaves, combined with tannic acid and potassa—*i. e.* as potassium caffeo-tannate.

Several methods of extraction have been practised, as precipitating the infusion of tea or coffee with basic lead acetate, freeing from excess of lead salt by hydrosulphuric acid, and then crystallizing out from the solution, precipitating by milk of lime, and extracting the caffeine from the precipitate by water or alcohol. Another process is based on the volatility of the alkaloid.

When pure, caffeine appears in white silky needles having no odor, containing 8.4 per cent. of water of crystallization, which it parts with at 150° C.; sparingly soluble in cold water, and much more so in hot, less soluble in alcohol, and still less so in ether. It acts as a weak base, dissolving in acids, from which it may be crystallized by evaporation. Boiled with fixed caustic alkalies, it decomposes, giving methylamine. Heating with basic hydrate alters it to a stronger base—caffeidine. Boiled with an excess of nitric acid and then evaporated at a gentle heat, it gives a red color, resembling that obtained from murexide, on the addition of ammonia, which is quite characteristic. C. F. CHANDLER.

Ca'gliari, one of the two provinces into which the island of Sardinia is divided, is bounded on the N. by the province of Sassari, and on the E., S., and W. by the Mediterranean Sea. Area, 5224 square miles. The ground is marshy and the climate unhealthy. The chief articles of export are grain, oil, almonds, sugar, molasses, and wine. Chief town, Cagliari. Pop. in 1881, 421,085.

Cagliari (anc. *Calaris* or *Caralis*), a city of Sardinia, the capital of the above province, is situated on a spacious bay on the S. coast; lat. 39° 13′ N., lon. 9° 7′ E. It has a large and secure harbor, which is defended by several forts, and is the emporium through which nearly all the foreign trade of the island passes. It contains a cathedral, about thirty churches, numerous convents, a public library, several hospitals, an arsenal, a mint, and a college. Here are manufactures of cotton fabrics, soap, gunpowder, leather, and furniture. Among the articles of export are grain, wine, oil, salt, saffron, and rags. Pop. in 1881, 38,596.

Cagliari (PAOLI), an eminent Italian painter of the Venetian school, often called PAUL VERONESE, was born at Verona 1530. He was a pupil of his uncle, Antonio Badile, and he worked successively in Venice, Rome, and other cities of Italy. He was an excellent colorist, and was distinguished by the richness and fertility of his imagination. Among his masterpieces are "The Marriage at Cana" (which is now in the Louvre), "The Calling of Saint Andrew to the Apostleship," "The Rape of Europa," and "The Presentation of the Family of Darius to Alexander." He was a contemporary of Titian. Died April 19, 1588.

Caglios'tro (ALEXANDER), COUNT, a famous Italian charlatan and impostor, whose proper name was GIUSEPPE BALSAMO, was born at Palermo June 2, 1743. He learned a little chemistry and medicine in a monastery, where he was assistant apothecary. Having assumed the title of count and become a Freemason, he travelled through many countries, professing to be a physician and alchemist, and raising money by quackery and other forms of imposture. In some of his adventures he was attended by his wife, and travelled in his own coach in an ostentatious style. About 1780 he visited Paris, where he made many dupes among the higher classes, and revived an old Egyptian Masonic order, of which he became grand kophta. He was patronized by Cardinal de Rohan, with whom he was implicated in the affair of the "diamond necklace," and was imprisoned in the Bastile in 1785. Having been liberated in 1786, he visited England, where he obtained little success. He afterwards went to Rome, where he was arrested in 1789 as a Freemason, and condemned to imprisonment for life. Died in 1795. (See Carlyle, "Miscellanies," vol. iv.)

Cagno'la (Luigi), Marquis, an eminent Italian architect, born in Milan June 9, 1762. He became president of the Institute of Milan. His greatest works are two triumphal arches of Milan—viz. the Porto del Ticino (once called Porta di Marengo) and the Arco della Pace or Porta del Sempione, commenced in 1807 and finished about 1837. The latter is built of white marble, and is seventy-eight feet high. Died Aug. 12, 1833.

Cagots [Fr.], a despised race of social outcasts (resembling in some respects the gypsies) who have wandered over parts of France for centuries, and were considered descendants of the Visigoths, whom Clovis nearly annihilated in battle in the fifth century. Before the great French Revolution they were bound by law to wear a peculiar dress, to live apart, to labor in none but menial occupations, and only to enter churches by a special door in each. The Revolution relieved them from all legal disabilities, but could not release them at once from social outlawry and general detestation. Vulgar prejudice still regarded them with abhorrence as foul and depraved, and they were still objects of aversion and loathing. Of late, however, they would seem to have sunk out of sight, being either absorbed into the lower class of the peasants or dwindled to a handful. (See Michel, "History of Outcast Races.")

Cahaw'ba, a river of Alabama, rises in the N. central part of the State, flows in a general S. S. W. direction, and enters the Alabama at Cahawba, in Dallas co. Length, estimated at 150 miles.

Cahill (Daniel William), D. D., born in Queen's co., Ireland, in 1802, studied at Carlow College and at Maynooth, where he was ordained; became professor of natural history in Carlow College; was a chemist, astronomer, and pulpit orator, author of several pamphlets, and former editor of "Dublin Telegraph." Died Oct. 27, 1864.

Caho'kia, St. Clair co., Ill. (see map of Illinois, ref. 9-D, for location of county), situated on R. R. and the Mississippi River, 10 miles N. W. of Belleville. It was settled by the French about 1683, and its present inhabitants are of French descent, and preserve many of their old ancestral customs. Coal is found in the neighborhood. The name is derived from a tribe of Indians long extinct. Pop. in 1880, 211.

Cahors (anc. *Divona*), a town of France, the capital of the department of Lot, is on the river Lot, 57 miles N. of Toulouse. The site is a rocky eminence enclosed on several sides by the river. It contains a large cathedral, a college, a theatre, a public library, and a normal school; and has manufactures of glass, paper, woollen goods, cotton yarn, etc. Here are remains of a magnificent Roman aqueduct. Pop. in 1881, 15,524.

Cailliaud (Frédéric), a French traveller, born at Nantes Mar. 17, 1787. He discovered in Mount Zabarah, in Egypt, the emerald-mines which were worked in ancient times. He published a "Journey to the Oasis of Thebes" (1821), and "Researches into the Arts and Trades and the Civil and Domestic Customs of the Ancient Egyptians, Nubians, and Ethiopians" (1831). Died May 1, 1869.

Caillié, or **Caillé** (René), a French traveller, born in Deux-Sèvres Sept. 19, 1799. He gained a prize of 10,000 francs which the Geographical Society of Paris offered to the first traveller who should visit Timbuctoo. He performed the journey from Sierra Leone to Timbuctoo in 1827-28, and published a narrative of his adventures (1830). Died May 25, 1838.

Cain, the eldest son of Adam and Eve, was a cultivator of the soil, but he slew his brother Abel in a fit of jealousy, caused by the rejection of his own sacrifice and the acceptance of his brother's, and was condemned to be a fugitive on the earth. He then retired to the land of Nod, and built there a city which was called Enoch, after the name of his eldest son.

Cain'ites, or **Cain'ians,** a Gnostic sect of the second century, who maintained that Cain was superior to Abel, since the latter was easily overcome by him. They also professed reverence for Judas and all the worst characters mentioned in the Bible.

Cainozo'ic, Kainozo'ic, or **Cænozo'ic** [from the Gr. *καινός*, "new," and *ζωός*, "living"], a geological term synonymous with tertiary, and applied by some writers to rocks which were formed after the mesozoic.

Caique, a small boat for conveying passengers, used principally on the Bosphorus near Constantinople.

Caird (John), D. D., a Scottish pulpit-orator and Presbyterian, was born at Greenock in 1823. He was ordained a minister in 1845, and became pastor at Errol, Perthshire, in 1849. He gained a wide reputation by a sermon on "Religion in Every Day Life," preached before Queen Victoria in 1855. He removed to Glasgow in 1858. In 1873 he was appointed principal of the University of Glasgow. He has also published a volume of "Sermons" (1858) and "An Introduction to the Philosophy of Religion" (1880).

Cairn, a Celtic word signifying a "heap or pile," is applied to artificial and conical heaps of unhewn stones which are frequently found in Europe on tops of hills. Many cairns are found near the circles of unhewn stone pillars which are sometimes called Druidical. In some cases the heaps of stones are girdled round by large unhewn stones set upright in the ground. It appears that the majority of them were raised as sepulchres and monuments for the dead. Human bones are often found buried under them, together with stone hammers, flint arrow-heads, flint axes, bronze weapons, etc. In Scotland and Ireland occur large cairns called "chambered cairns." The most remarkable of these is at New Grange, on the river Boyne, near Drogheda. It is 400 paces in circumference, about eighty feet high, and is supposed to contain about 180,000 tons of stones. It presents the appearance of a grassy hill partially wooded, but on examination the coating of earth is found to be superficial. An opening accidentally discovered is the external entrance of a gallery leading to a large cruciform chamber containing three granite basins or urns. The sides or walls of the chamber are formed of immense blocks of stone, some of which are covered with carved figures, supposed to be symbolical.

Cairngorm Stones, a name given by jewellers to brown or yellow quartz or rock-crystal found at Cairngorm, in Aberdeenshire, Scotland. The color is produced by a little oxide of iron or manganese. The yellow variety is often called topaz, but it is inferior to the true topaz in hardness and brilliancy.

Cairns (Hugh **McCalmont**), Lord, a distinguished orator and lawyer, born near Belfast, Ireland, in 1819. He was returned to Parliament for Belfast in 1852, and was appointed attorney-general by Lord Derby in 1866. He was lord chancellor of England from Feb., 1868, until December of that year, and was leader of the Conservative party in the House of Lords in 1869; again lord chancellor from 1874 till 1880. Died Apr. 2, 1885.

Caï'ro [called by the Arabs *Al Masr* or *Musr;* also *Al Kahireh* (or *Qahera*), *i. e.* "the victorious"], a famous city, the capital of modern Egypt, is situated in a sandy plain on the right (E.) bank of the Nile, 5 miles S. of the commencement of the Delta; lat. 30° 3′ N., lon. 31° 18′ E. Elevation, forty feet above the level of the sea. The climate is warm, dry, and healthy, with a mean annual temperature of about 72° F. The mean temperature of summer is 85°, and that of winter, 58°. Cairo is bounded on the E. by the ridge of Mokattam, and surrounded by stone walls with antique battlements. The old streets are narrow, crooked, and ill-paved. The houses, which are mostly built of brick, are substantial, have flat roofs, and two or three stories. The city is divided into quarters, occupied respectively by the Mussulmans, the Jews, the Christians, etc. These quarters are separated by gates, closed at night. Cairo is connected with Alexandria and Suez by R. R.

The most remarkable edifices of Cairo, which comprise many of the finest remains of Arabian architecture, are the mosques and minarets; the latter, which are very lofty, and built of alternate layers of red and white stone, are considered the most beautiful in the Levant. The city contains about 350 mosques, one of which, the great mosque of Sultan Tooloon, was built 879 A. D. It exhibits the oldest specimens of the pointed arch. The magnificent mosque of Sultan Hassan has two very high and graceful minarets. The majestic "Tombs of the Caliphs," which are in the environs without the walls, are beautiful specimens of Saracenic architecture. Here are handsome public gardens with groves of orange, citron, and palm trees. Among the remarkable objects in the vicinity of Cairo are the palace of the viceroy, the obelisk of Heliopolis, and the old and celebrated Nilometer, on the island of Rodah, which is a graduated column indicating the height of the inundations of the Nile. The Great Pyramid is about 10 miles S. W. of this city. Cairo has long been celebrated as a seat of Oriental learning and Mohammedan theology. It has a university or college which is attended by nearly 2000 students. Here are numerous iron-foundries, calico-printing works, and extensive manufactures of cotton and silk fabrics. The Arabs are the most numerous of the races which compose the population. Cairo, which is supposed to occupy the site of the ancient *Latopolis,* was founded by the

Arabs about 970 A. D., and was ruled by the Fatimite caliphs until 1171, when Saladin became master of Egypt. It was the capital of the sultans of Egypt until it was captured by the Turks in 1518. Between the W. side of the older city and the river Nile most of the ground has been laid out into building-lots, and much of it covered with regular rows of houses, forming the district of Ismaileeyah. New streets have been cut through the crowded districts of the city, and the Ezbekeeyah, its principal square, transformed into public gardens. The boulevard Mehemet Ali traverses the city nearly N. and S. Pop. in 1878, 349,883.

Cairo, kā′ro, R. R. centre, city, and river-port of Illinois, capital of Alexander county (see map of Illinois, ref. 12–E, for location of county), situated at the southern extremity of the State, upon the point formed by the junction of the Ohio and Mississippi rivers, 175 miles below St. Louis. It is a market for the supply of a large portion of Southern Illinois, South-east Missouri, and Western Kentucky, and is an important dépôt for the products of Northern Illinois, Iowa, and Wisconsin seeking southern markets. Over 4000 steamboats land at its wharf annually. It has a considerable manufacturing industry, costly public-school buildings, and a fine custom-house. Pop. in 1870, 6267; in 1880, 9011.

Caisse, a French word, the primary meaning of which is a "chest," "box," "case," or "coffer." It has important applications in commerce, finance, etc. In mercantile business it signifies "cash" or "cash-box." In anatomy, caisse is the drum of the ear. In financial affairs the term is applied to a fund; also to the pay-office. "Caisse d'Épargne" signifies a savings fund or savings bank.

Caisson, a French word which in architecture signifies a coffer, a sunken panel in a flat or vaulted ceiling or in the soffit of a cornice. In civil engineering the term is applied to an enclosure or large vessel in which the foundations of the piers of a bridge are built and gradually lowered to the bottom of a stream. Caisson is also a name given to a tumbril or ammunition-cart used in the artillery service. In maritime affairs it is applied to an apparatus for lifting a vessel out of the water for repairs or inspection. It is usually a hollow structure which contains an air-chamber, and is sunk by letting water into it. After it has been placed under the vessel the water is pumped out, and the caisson rises with the vessel. (See FOUNDATIONS.)

Caith′ness, the northernmost county of Scotland, is bounded on the W. by the county of Sutherland and by the ocean on the other three sides. Area, 712 square miles. The sea-coast is bold and rocky, with many inlets or bays. The surface is nearly level, except a mountain-range formed of granite and gneiss, which extends along the western border, and rises to the height of 2300 feet. A large part of the county is moorland, destitute of trees. The staple products of the soil are oats, potatoes, and turnips. Many of the inhabitants are employed in the herring, cod, and salmon fisheries, and over 150,000 barrels of cured fish are annually exported from this county. Chief towns, Wick and Thurso. In the Middle Ages the kings of Norway ruled over this part of Scotland. Pop. in 1881, 38,845.

Caithness, EARLS OF, and Barons Berriedale (1455, in Scotland), Barons Barrogill (1866, in the United Kingdom), and baronets (1629, in Scotland).—JAMES SINCLAIR, the fourteenth earl, was born Dec. 16, 1821, and succeeded his father in 1855. D. Mar. 28, 1881.

Caithness Flagstones are dark-colored bituminous schists, slightly micaceous and calcareous, found in Caithness, Scotland. Their great toughness and durability render them valuable for pavements, cisterns and other purposes. They belong to the old red sandstone formation.

Ca′ius [the Latinized form of *Kaye, Key,* or *Cay*], (JOHN), M. D., a learned English physician, born at Norwich Oct. 6, 1510. He practised medicine at Cambridge and in London, and was appointed physician successively to Edward VI., Queen Mary, and Elizabeth. In 1557 he founded Caius College, Cambridge. He wrote, besides other works, a "Treatise on the Sweating Sickness" (1552). Died July 29, 1572.

Caiva′no, a town of Italy, in the province of Naples, 8 miles N. of Naples, was fortified in the Middle Ages. It has remains of its old walls and towers. Pop. 9441.

Caj′etan [It. *Cajetano* or *Caietano;* Lat. *Caëtanus*], the surname of THOMAS DE VIO, an Italian prelate, born at Gaeta (Caieta) Feb. 20, 1470. He became the general of the Dominican order in 1508, and a cardinal in 1517, soon after which Leo X. sent him as legate to Germany in order to induce Luther to recant. In 1519 he became bishop of Gaeta. He was one of the first who maintained without reserve the infallibility of the pope. Died Aug. 9, 1534.

Caj′uput, or **Cajeput** (*Melaleuca Cajeputi*), a tree of the order Myrtaceæ, sub-order Leptospermeæ, from the leaves of which the pungent, aromatic volatile oil of cajuput is obtained by distillation. The cajuput is common on the Moluccas and in the southern part of Borneo. It is rather a small tree, with a crooked trunk, thick spongy bark, white wood (whence the name cajuput, properly *kayuputi,* signifying white wood), and terminal spikes of white flowers. The greater number of the species of this genus are natives of Australia, some of them very beautiful ornaments of hothouses. Much of the oil of cajuput of commerce is prepared in the island of Banda, and at Amboyna and Bouro. Several other species yield this oil. Two sackfuls of leaves yield scarcely three drachms of the oil, which is green, transparent, limpid, with a strong odor, agreeable only when much diffused. It is sometimes used as a stimulating aromatic in medicine, and is considered very efficacious in rheumatism.

Cal′abar Bean, the seed of the *Physostigma venenosum,* a twining, half-shrubby leguminous plant, a native of Western Africa. It belongs to the sub-order Papilionaceæ, and is nearly allied to the kidney bean. The bean is used as an ordeal among the Africans. It is very poisonous; fifteen of the beans have produced death in an hour. It is used by surgeons, in small amounts, to cause contraction of the pupil of the eye, the opposite of the effect of belladonna. It is also sometimes given in tetanus and some other diseases. It is a powerful depressant to the nervous action.

Cal′abash Tree (*Crescentia Cujete*), a tree of the order Bignoniaceæ, is a native of the tropical parts of America. It bears a large fruit, sometimes one foot in diameter, the hard shell of which is used as a substitute for bottles and other vessels. These shells are so hard that water may be boiled in them. They are sometimes polished, carved with figures, and converted into ornamental vessels. The wood of this tree is tough and flexible, and a suitable material for coaches. The term calabash is also applied to the fruit of the gourd, which is used for holding water.

Calabo′zo, a town of Venezuela, in the province of Guarico, on the Guarico River, 106 miles S. S. W. of Caracas. It has considerable trade with the interior. The valley in which it is situated is subject to great inundations. The city is the residence of many wealthy cattle-graziers (*hatos*), and has a fine church. Pop. 10,000.

Cala′bria, the ancient name of the south-eastern part of Italy, coinciding nearly with the modern province of Lecce. It was bounded on the N. E. by the Adriatic, on the S. W. by the Sinus Tarentinus (Gulf of Taranto), and on the N. W. by Apulia. Among its chief towns were Brundisium and Tarentum.

Calabria (anc. *Bruttium*), a region of Southern Italy, forming the southern part of the former kingdom of Naples, is a long peninsula enclosed by the sea on all sides except the N., and separated from Sicily by the Strait of Messina. Area, 6663 square miles. It is divided into three provinces, Cosenza, Reggio Calabria, and Catanzaro. It is traversed by the Apennines through its whole extent. These mountains, which are here nearly 4000 feet high, are partly covered with forests of pine, oak, and beech trees. Between the Apennines and the sea are fertile and beautiful valleys, which produce wheat, cotton, rice, sugar, oranges, figs, grapes, and olives. This region is subject to earthquakes. Calabria has considerable fisheries of the tunny, swordfish, anchovy, and mullet. Agriculture is in a rude and barbarous state. Chief towns, Cosenza, Reggio, and Catanzaro. Pop. in 1881, 1,257,907.

Calahor′ra (anc. *Calagurris*), a town of Spain, in the province of Logroño, on the river Ebro, 19 miles E. S. E. of Logroño. It has an old cathedral and some ancient remains. It is the seat of a bishop. Quintilian was born here. *Calagurris* was taken by Pompey or Afranius about 78 B. C., after a long and famous siege. The sufferings of the inhabitants were extreme: hence the Romans gave the name "Calagurritan famine" to any severe famine. Pop. 8134.

Calais [Lat. *Caletum,* from the ancient tribe *Caleti*], a fortified seaport-town of France, department of Pas-de-Calais, on the Strait of Dover, 122 miles by rail N. N. E. of Amiens, 19 miles N. E. of Boulogne, and 26 miles E. S. E. of Dover; lat. of the lighthouse, 50° 57′ 45″ N., lon. 1° 51′ 18″ E. The town and harbor are defended by a castle and several forts, and can be rendered inaccessible by land by flooding the adjacent ground, which is low and marshy. The harbor, which is formed by two moles, is nearly dry at ebb-tide. The town is regularly built, mostly of brick, and has wide, well-paved streets. It has a Gothic cathedral, a public library, and a theatre. A large portion of the English tourists who visit the Continent pass through

Calais, which has daily communication with Dover by steamboats. The number of persons who arrived here from England in 1865 is said to have been 133,562. Calais is the terminus of a railway which connects it with Amiens and Paris. Here are flourishing manufactures of bobbinet, hosiery, soap, leather, etc. In 1347 this town was taken after a long siege by Edward III. of England, who was then persuaded by his queen, Philippa, to spare the lives of six devoted citizens of Calais. It remained in the power of the English until 1558, when it was taken by the duke of Guise. It is connected with Great Britain by submarine telegraph. The terminus of the proposed tunnel beneath the English Channel is near the village of Sangatte, 6 miles W. of Calais. Pop. in 1881, 13,529.

Calais, kăl'is, a city, port, and cap. of Washington co., Me. (see map of Maine, ref. 7–G, for location of county), on R. R. and St. Croix River, at the head of navigation, 28 miles N. by W. from Eastport, and 264 miles N. E. of Portland. Bridges across the river connect it with St. Stephen's, in New Brunswick. Calais derives its prosperity from the lumber-trade and shipbuilding. It has a public library, an academy, an opera-house, a dry dock, marine railways, machine-shops, foundries, and several shipyards. It is the S. E. terminus of the St. Croix and Penobscot R. R. to Princeton. The river, which affords water-power, is part of the eastern boundary of the U. S. Pop. in 1870, 5944; in 1880, 6173.

Calaman'der Wood, a valuable cabinet-wood which resembles rosewood, but is far more beautiful and durable. It is produced by the *Diospyrus hirsuta*, a tree of the order Ebenaceæ, a native of Ceylon and Southern Hindostan, which belongs to the same genus as the ebony and persimmon tree. This wood is very dense, takes an exquisite polish, and exhibits great richness and variety of colors, among which is chocolate or fawn-color. It is said to be so hard that it cannot be worked with edge tools. The tree has become rare in consequence of the wasteful operations of the Dutch and English. Several similar species are found in the Indian Archipelago.

Calamary. See SQUID.

Calamat'ta (LUIGI), a French engraver of Italian birth and of great merit, born at Cività Vecchia in 1802. Died in 1869.

Calambu'co, a valuable timber tree which grows in the northern part of the island of Luzon. It is an excellent material for shipbuilding, and resembles the teak in appearance. It is very durable, and is never eaten by the white ant, which is so destructive in the Malay Archipelago. Calambuco-wood is also used in the manufacture of farming-implements and other articles. It is also a name of aloes-wood.

Calamia'nes, a group of islands in the Malay Archipelago, about midway between Mindoro and Palawan; lat. 12° N., lon. 120° E. Calamianes, the largest of the group, is about 35 miles long and 15 miles wide. It is fertile, and has a Spanish settlement.

Calamich'thys [Gr. κάλαμος, a "rush," and ἰχθύς, "fish"], a ganoid fish found in the rivers of Western Africa. It takes its name from its slender, cylindrical form. It is closely allied to the *Polypterus* of the Nile.

Cal'amine (*Lapis calaminaris*), an important and abundant ore of zinc, a native carbonate, containing, when pure, 52 per cent. of zinc. Crystals of this mineral are rare. It is opaque or translucent, has a vitreous lustre, and occurs in kidney-shaped, botryoidal, cellular, and other imitative forms. It is found in veins, beds, and large deposits termed *pockets* in metamorphic limestone and in the Devonian and carboniferous formations. Large quantities of it are exported from Spain. This ore is called Smithsonite by Dana and other mineralogists, who apply the term calamine to the silicate of zinc, the primary form of which is a rhomboid.

Cal'amint (*Calamintha*), a genus of plants of the order Labiatæ. The common calamint (*Calamintha officinalis*) is indigenous in England. It has serrated leaves, with an agreeable aromatic odor, and is used in domestic practice as a pectoral medicine. The U. S. have several species.

Cal'amis [Κάλαμις], an eminent Greek sculptor and embosser who worked at Athens about 450 B. C. He reproduced the forms of horses with success, and executed a bronze statue of Apollo, which Lucullus transported to Rome. Among his works was a marble statue of Apollo, which some persons identify with the Apollo Belvedere.

Cal'amite, an extinct genus (*Calamites*) of great plants, perhaps of the order Equisetaceæ, approaching in character (in the opinion of some observers) the dicotyledonous plants and the conifers. The remains of nearly sixty species have been observed, chiefly in carboniferous strata (none later than the Jurassic) in both continents. These plants must have contributed largely to the production of coal.

Cal'amus [Gr. κάλαμος], a Latin word signifying a "reed," a "stalk" (of a plant), was used by the ancient Romans to denote an arrow, a musical pipe, and a pen which was made of a reed. This reed is supposed to have been the *Arundo donax*. Calamus also denotes the golden tube through which, in some church services, the eucharistic wine is taken.

Calamus, a name of the sweet flag. (See ACORUS.)

Calamus, a genus of Palmaceæ, yields a great part of the canes and rattans of commerce, which are used in Europe and the U. S. for the seats of chairs and other purposes. Among the species of this genus are *Calamus Rotang* and *Calamus viminalis*, which are natives of the warm or tropical parts of Asia. The *Calamus rudentum* has been found 500 feet long (Humboldt). *Calamus Draco* yields the best dragon's blood. Several species are climbers.

Cal'amy (EDMUND), an English divine, born in London in Feb., 1600. He became an eloquent Presbyterian minister, and preached for many years in London. In the civil war he sympathized with the royalist party. He was one of the authors of a famous treatise called "Smectymnuus" (1641), intended as a reply to Bishop Hall's "Divine Right of Episcopacy." Died Oct. 29, 1666.

Cal'and (PIETER), an engineer of Holland, born in Zierikzee in 1826. His father, A. Caland, was an engineer-in-chief of the "Waterstaat" of Holland, and author of a work on dyke-construction, embracing the methods of Dutch engineering as exhibited in the works of protection against the encroachments of the ocean and the inundations of rivers, etc. The son above named was educated at the Royal Military Academy at Breda, was appointed a sub-engineer of the "waterstaat" in 1845, and passing through successive grades became engineer-in-chief of the second class in 1867, then in 1873 promoted over the intermediate grade to be inspector (the highest grade, of which there are but two) of the "waterstaat."

He is author of a work (in French), "Étude sur l'Effet des Marées dans la partie maritime des fleuves;" also (in Dutch) of a work on the protection of the coast against the encroachments of the sea, and of numerous reports. Knight of the order of the Netherlands Lion, and vice-chairman of the Royal Institution of Engineers of Holland. As a member of a commission upon the "improvement of the water-communication from Rotterdam to the sea," and as the executive engineer of the work by which an existing mouth of the combined Rhine and Meuse has been closed and another made, and a channel navigable for ships of the greatest draught (600 passing per month) created where before naught but light-draught vessels (10 to 12 feet) could under favorable circumstances of wind and tide venture, M. Caland's highest claim to fame as an engineer will be founded on the great seaport of Rotterdam, through the works with which he is thus identified in giving an easy and direct water-communication with the sea, in place of the tedious and circuitous ones (see "Prof. Papers Corps of Engineers," No. 22) before available. For this important work M. Caland received from the Vienna Exposition the first prize—a certificate of honor.

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Calan'do, an Italian musical term, signifies diminishing gradually from forte to piano. It differs from *decrescendo* and *diminuendo*, as the tempo at the same time is slightly retarded, but not so much as in *ritardando*.

Cala'nus [Gr. Κάλανος], an ancient Hindoo philosopher, was one of those whom the Greeks called Gymnosophists. According to Plutarch, his proper name was SPHINES. He passed some time in the camp of Alexander the Great in India. Having become sick at Pasargadæ, he was at his own request burned alive.

Calas (JEAN), a French Protestant and victim of fanaticism, born in Languedoc in 1698, lived at Toulouse. He was condemned and executed Mar. 9, 1762, by eight judges of Toulouse on a false charge that he had murdered his own son. Voltaire exposed the iniquity of this outrage, and induced the king to give 30,000 livres to the family of Calas. (See COQUEREL, "Jean Calas et sa famille," Paris, 1869.)

Calascibet'ta, a town of Sicily, in Caltanisetta, about 60 miles S. E. of Palermo, is on an isolated hill which rises nearly 2500 feet above the sea. It is said to have been founded in 1080. Pop. 5255.

Cala'tabello'ta, a town of Sicily, province of Girgenti, 25 miles N. W. of the city of Girgenti. It is very near the site of the ancient *Tricala*, and is on the ancient river *Crimisus*. Here is a fine mediæval church. Pop. 5572.

Calatafi'mi, a town of Sicily, province of Trápani, is in a fertile valley 5 miles S. W. of Alcamo. Here in 1860 Garibaldi defeated the royalist troops. Pop. 9414.

Calatanazor′, a small town of Spain, in Old Castile, 10 miles S. W. of Soria. Here Al-Mansoor gained a great victory over the Christians in 1101.

Calatayud′, a town of Spain, province of Saragossa, on the river Jalon, 45 miles S. W. of Saragossa. It has an episcopal palace, a noble old castle, and several churches, convents, and hospitals; also manufactures of linen and woollen fabrics, paper, leather, etc. About 2 miles E. of this place is the site of the ancient *Bilbilis*, from the ruins of which Calatayud was mostly built. Pop. 11,512.

Calatra′va (José Maria), a Spanish statesman and eloquent lawyer, born at Mérida Feb. 26, 1781. He was a leader of the liberal party and a member of the Cortes. He passed many years in exile between 1814 and 1830. Died Jan. 24, 1846.

Calatrava La Viega, or **Old Calatrava**, a ruined city of Spain, on the Gaudiana River, about 12 miles N. E. of Ciudad Real, was a strongly fortified place in the Middle Ages, but only a single tower now remains. Its defence against the Moors in 1158 is famous on account of its having originated the order of the Knights of Calatrava.

Calatra′va, the Order of, was founded in 1158 by Sancho III. of Castile, and confirmed by Pope Alexander III. in 1164. After the death of Sancho the knights elected as grand-master Don Garcías de Redon. For a long period the war against the Moors was carried on almost entirely by the Knights of Calatrava. The influence exercised by the grand-master on public affairs at length excited the jealousy of the king, and in 1487 the grand-mastership was united to the crown.

Calave′ras, a small river in the N. central part of California, rises at the foot of the Sierra Nevada, in Calaveras county, flows nearly south-westward, and enters the San Joaquin River about 15 miles below Stockton.

Calbur′ga, or **Kulbur′ga**, a town of India, in the Nizâm's dominions, on an affluent of the Beemah, 110 miles W. of Hyderâbâd. It is now unimportant, but was formerly the capital of several Hindoo and Mohammedan sovereigns.

Calcar, or **Kalcker** (John de), born at Calcar, in the duchy of Clèves, in 1499, was a disciple of Titian at Venice, and perfected his style by studying Raffaelle. He imitated these masters very closely. Among his best works is a "Mater Dolorosa." Died in Naples in 1546.

Calca′reous [Fr. *calcaire*, from Lat. *calx*, gen. *calcis*, "lime"], containing much lime. The term "calcareous" is applied to rocks which are chiefly composed of lime—*i. e.* to limestone, marble, and chalk, which are carbonates of lime. They are sedimentary and stratified rocks, and consist chiefly of shells of marine animals, corals, and encrinites. The presence of lime in rocks can easily be detected by the application of nitric or hydrochloric acid, which produces an effervescence in any of the various forms of carbonate of lime. Calcareous soils are derived from the disintegration of limestone, chalk, etc., but they often contain a portion of clay, which increases their fertility. The term calcareous is applied to springs and to water which hold in solution carbonate or sulphate of lime. Such water is commonly called *hard*, and is not so good for washing as soft water.

Calcareous Spar, or **Calc Spar**, a common name of crystallized carbonate of lime, composed, when pure, of 44 per cent. of carbonic acid and 56 of lime. It is one of the most abundant of all minerals, and is found in all geological formations and in every part of the world. The primary form of its crystals is a rhomb or rhombohedron. Its secondary forms are more numerous than those of any other mineral, and are said to amount to 700 or more. In a pure state this mineral is colorless and transparent, but it often contains impurities which render it red, green, brown, yellow, etc. It is found abundantly in almost all parts of the world. Andreasberg, in the Hartz, and the Derbyshire lead-mines are noted for fine large crystals. Some very fine crystals are from the Rossie lead-mine of New York. The purest and most limpid variety of this crystal is called Iceland spar, which is found in Iceland, and exhibits double refraction in a remarkable degree.

Calcasieu, kal′ka-shu, a river of Louisiana, rises in the western part of the State, flows in a general S. S. W. direction through Calcasieu parish, and enters the Gulf of Mexico. At its mouth stands an iron lighthouse 53 feet high; lat. 29° 45′ N., lon. 93° 17′ E. Length, estimated at 200 miles, including Calcasieu Lake, which is an expansion of the river. The lake is about 18 miles long and 5 wide, and the foot of it is nearly 5 miles from the Gulf of Mexico.

Calceola′ria [from Lat. *calceolus*, a "little shoe," a "slipper"], a genus of plants of the order Scrophulariaceæ, comprises numerous species, natives of South America. They mostly grow on that part of the Andes which is more than 9500 feet above the level of the sea, and are herbaceous plants or shrubs with beautiful flowers. The corolla is 2-lipped, and the lower lip is inflated, so as to form a bag which has some resemblance to a slipper. They are so abundant in some parts of Chili and Peru as to give a peculiar aspect to the scenery. They are cultivated by florists in Europe and the U. S., and are easily propagated by cuttings. Some of the species are used for dyeing in South America.

Çal′chas [Κάλχας], a celebrated Greek soothsayer who was present at the siege of Troy. He was consulted by the Grecian chiefs in the most important affairs during that siege.

Cal′cite [from *calx*, "lime"], a general term under which are comprised all the varieties of carbonate of lime.

Cal′cium (symbol Ca), the metal present in lime, discovered in 1808 by Sir Humphry Davy. Its atomic weight or equivalent is 20. Combined with oxygen it forms lime or oxide of calcium, which consists of 20 parts of calcium + 8 of oxygen. It is a yellowish-white malleable metal, having a specific gravity of 1.578. It does not occur naturally in a separate state, but may be obtained by passing a powerful current of voltaic electricity through fused chloride of calcium, when the metal separates in minute globules. When brought into contact with water, it rapidly decomposes the water and is converted into lime. At a red heat it melts and burns with a dazzling white light and with scintillations.

Cal′culating Machine, a machine for performing arithmetical operations, or for computing logarithmic or other mathematical tables in which the successive results are to be obtained by substituting, in an invariable formula, the consecutive numbers of a simple series, uniformly increasing. The two kinds of work here mentioned are essentially different, and require different machinery. For simple arithmetic the most successful machine yet constructed is that of M. Thomas of Colmar in France. For tabular numbers, the computations are made by the "method of differences;" and the machines are called "difference-engines." Such are those of Babbage (which was never finished) and of the Messrs. Scheutz of Stockholm, of which there is an example at the Dudley Observatory, Albany, and another in the office of the registrar-general, London. (See Mechanical Calculation.)

Cal′culus [Lat. a "little stone" or "pebble"]. The term is derived from the ancient use of pebbles as *counters* or for making computations, and it, in general, denotes some particular method of performing mathematical investigations. Those, *e. g.*, of arithmetic, algebra, logarithms, etc., have received the name of *calculus*, as the *Arithmetical*, the *Algebraic*, the *Exponential*, the *Trignometrical* (which latter, according to De Morgan, "contains that of *undulating magnitude;*" or of *Circular Functions*); but the term applies, in modern usage, more appropriately to mathematical methods of peculiar power involving unusual refinements of reasoning, or reference to relations of magnitude, which may be styled "transcendental." Among such are the "Antecedental Calculus" of Mr. Glenie,* the "Calculus of Derivations" of M. Arbogast, the "Calculus of Probabilities" (see this head), and the more modern creation of Sir Wm. Rowan Hamilton, "Quaternions." But, pre-eminently, by the word calculus is denoted the Differential Calculus, including under this head the complementary branches of "Differential and Integral," of the Leibnitz system of symbolization, or the "Fluxions" and "Inverse Method of Fluxions" of the Newtonian. The calculi of Leibnitz and Newton are essentially the same, though the logical basis on which Newton places his method is generally considered more satisfactory than that of Leibnitz. The method of Leibnitz was first to make its appearance before the public in 1684; but Newton's method of drawing tangents (wherein the method of fluxions was sufficiently explained) was communicated in a letter to a Mr. Collins in 1682. Upon the allegation that Leibnitz had seen this letter was based the charge (sustained by the Royal Society of London) that Leibnitz had plagiarized therefrom. This charge is now considered unfounded, and the glory is conceded to him of having been a contemporaneous discoverer of a calculus that has been styled "one of the greatest, most subtle, and sublime discoveries of this or, perhaps, of any age: opening a new world to us, and extending our knowledge, as it were, to infinity; and carrying us beyond the bounds that seemed to have been prescribed to the human mind; at least infinitely beyond those to which ancient geometry was confined."

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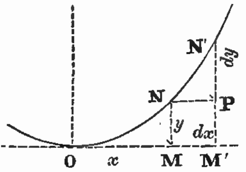
* Jas. Glenie, F. R. S. of London and Edinburgh, invented this calculus in 1774; it was published in 1794. According to the writer in Ree's Encyclopædia, "both the differential and fluxional calculi may be derived from the doctrine of proportions (therein expounded) in a manner altogether unexceptionable."

The Continental mathematicians usually defined the calculus as the arithmetic or analysis of *infinitely*, or rather indefinitely *small* quantities. ("*Analyse des Infiniment Petits.*") Sir Isaac Newton and the English authors styled these infinitely small quantities *moments*—*i. e.* the *momentary* increments of variable quantities; *e. g.* of a line considered as generated by the movement (*flux*) of a point, or of a surface by the "flux" of a line. Although it may have been impracticable to expound the rationale of the calculus, or of fluxions, without allusion to "infinitely small" or "indefinitely small" or "vanishing" quantities; nevertheless, all the mystification attending these subjects and nearly all the contests about the logical basis have had their *raison d' être* in the use of these words. There can be nothing "small," nothing "great," except *relatively*. "The expression *infinitely little magnitude*," says Mr. Glenie, author of the "Antecedental Calculus," "implies a contradiction, since what *has* magnitude cannot be infinitely little." And furthermore, it may be said that the relations of *magnitude* (which form the subjects of all mathematical reasonings) can be of but *one kind:* we must either discard the infinitely little, or treat it quantitatively (if we assign it magnitude), as we treat other quantities. No elaborate discussion of the differential method can be attempted here, but most briefly I think it can be defined as the method by which, from the *law of growth*, the "full stature," that is, the complete expression for the value of a function, is obtained; or *vice versâ*. A quantity or magnitude is said, in mathematics, to be a *function* of another quantity when it depends for its value upon the value of that other quantity. Thus, the particular ordinate, y, of a parabola, at any point of which the abscissa is x, depends for its actual value or magnitude, upon the arbitrary value we may give to x, and (referred to its axis of ordinates and vertex) the expression for y in terms of x is $py=x^2$, or $y=\frac{1}{p}x^2$. The ordinate, y, is here a *function* of the arbitrarily assumed magnitude x (hence called, as well as y, which varies with it, a *variable*) and of the parameter, p, which, remaining the same for the same parabola, is called a *constant*. As distinguished from y (the *function*), x is an *independent* variable.



If ONN′ be a branch of the parabola, let $x=$ OM, then y is represented by MN. If we add the magnitude MM′, which we will call dx (alluding thereby to the *difference* between the original and the new abscissa), to OM (or x), the ordinate corresponding, M′N′, will *differ* from MN by the magnitude PN′, which we will call dy. Thus, to an arbitrary increment dx of x, corresponds an increment dy of y; and the value of this last increment depends—1st, upon the nature of the function, or the algebraic relation between y and x; and 2d, upon the arbitrary value of dx.

In the equation $y=\frac{1}{p}x^2$ we substitute $y+dy$ for y and $x+dx$ for x, develop and subtract y and its value from the two members respectively, then divide by dx, we have $\frac{dy}{dx}=\frac{1}{p}(2x+dx)$; which gives the *ratio* of the increment dy of the function y to that of the variable x; and this ratio depends upon the value we may assign to dx, which, so far, may have been any lineal magnitude whatever. In fact, from the curvature of the line ONN′ to which the ordinates are drawn, it is clear that the ratio of dy to dx must vary with the greater or less distance of M′ from M. Let us suppose that the point M′ is moved towards M until MM′ or dx becomes *indefinitely small* (compared with OM or with our unit of linear dimension or with some dimension to which we attribute ordinary magnitude, such as that of the *parameter*), "smaller than any assignable quantity," "infinitely small," or *zero;* that is, "vanishes." So must also dy; but the value of the *ratio*, $\frac{dy}{dx}$, *does not vanish*, but becomes (as its algebraic expression shows) $=2\frac{1}{p}x$; that is, it has a finite determinable value which depends upon the *form of the function alone*. Had y been given as a multiple of some other power, say $=px^n$, we should have found the limiting value of $\frac{dy}{dx}$ to be npx^{n-1}, etc. etc. By this it is seen that the *ratio* of two mutually dependent variable quantities does not necessarily vanish, nor even *necessarily* become *small*, as the quantities themselves diminish; but that it approaches more and more nearly a determinate limit, just as in algebra and geometry the expression $\frac{0}{0}$ takes (generally) a finite and determinable value. Although it is, in general, with this *limit*, called the *differential coefficient*, that we have to deal, yet the symbols dy, dx, etc. (styled *differential* of y, etc.) are often met with separately and treated as *real*, though indefinitely small, quantities.* It is also to be remarked that in the exemplar expressions $\frac{dy}{dx}=2\frac{1}{p}x$, $\frac{dy}{dx}=nx^{n-1}$ etc., $\frac{dy}{dx}$ is *itself* a function of the variable x, and would yield (by the repetition of the same process) $2\frac{1}{p}$ and $n(n-1)x^{n-2}$, as *their* differential coefficients; styled *second* differential coefficients of the original function, and expressed, by reference to its symbol y, as $\frac{d^2y}{dx^2}$, implying a *second* differentiation of y, as a function of x. The process may be continued (to a third and fourth, etc.) so long as the resulting expression continues to be a function of the variable.

Geometrically, the idea of *limit* may be illustrated by supposing, in the figure, a secant to be drawn through the given point N of the curve, cutting it again in some other point N′. The nearer this second point is made to approach the first, the more nearly will the secant approach to coincidence with the tangent drawn at N. Thus, "the tangent to a curve is the right line which limits the position of all the secants which can be drawn through the point of contact, though, strictly speaking, it be no secant; so, also, a *ratio* may limit the variable ratio of increments, though it cannot be said to be the ratio of any real increments." In fact, the limit of the ratio $\frac{dy}{dx}$ is the trigonometrical tangent of the angle which the tangent line at N makes with the axis of abscissas. Newton's "method of drawing tangents" of 1682, in which the method of fluxions is said to be "sufficiently explained," is founded on this relation of tangents to this limit-ratio of increments. This ratio, now known as the "Differential Coefficient," is really the expression for what I have styled the *law of growth* of the function as depending upon the growth or increase (or decrease) of the variable. To determine the differential coefficients, knowing the integral expression for the function, and to deduce by aid of them unknown properties of the functions themselves, is the object of the "Differential Calculus." On the other hand, given this law of growth, the integral expression for the function is determined by the methods of the "Integral Calculus." The peculiar power of the calculus as an instrument of mathematical investigation depends upon this, that the more difficult problems of pure Mathematics, and far the greater proportion of those of Mechanics or Physico-Mathematics (in which the action of *forces* is concerned), can only be stated in terms involving not merely relations between integral quantities known and sought, but between their simultaneous and mutually dependent *increments*—*i. e.* the data involve *besides*, perhaps, the quantities themselves, their *law of growth*, in the form of their differential coefficients; and, *hence*, can only be solved by the processes of the Calculus.

Thus, in mechanics, the velocity generated by a constant or uniformly accelerating force is proportional to the time it acts, whether finite or indefinitely small, or $v=gt$ or $\frac{dv}{dt}=g$ (if the force be gravity). Also the distance traversed is proportional to the velocity; and this, though the velocity constantly increases, is the *law of growth*, as a function of the time; hence, $\frac{dy}{dt}=v=gt$, and hence (by integration) y (the distance fallen in the time t) $=\frac{1}{2}gt^2$, the well-known expression for the height of fall in terms of the time. The expression can be arrived at without the use or even the knowledge of the formal methods of the calculus, but it will be found that its fundamental principles are involved in such solutions.

These fundamental principles are in much more common use than is supposed. When we assign, for example, a specified velocity to a cannon-ball at a given instant of time or at a certain point of its trajectory, we speak of a thing which has no permanent—indeed, I might almost say no *real*—existence; for there is no portion of that trajectory, *however minute*, which the ball really traverses at the supposed rate. It *would* travel, *e. g.*, 1000 feet per second, if at the given instant its variable velocity were made invariable; and *this* is what we mean. The resulting direction would be the *tangent* to the actual trajectory; the invariable velocity, the *differential coefficient* of the space traversed as a function of the time. The practical measurement of the velocity involves the same conceptions. We place two screens along the path of the ball, and by skilfully-devised instrumental agencies, measure the minute *time* of transit. The quotient of the distance apart of the screens, divided by the time, gives us the required velocity. If this distance were "infinitely small," the quotient would be the true "differential coefficient." The *nearer* we place the screens (and we place them as near as the practical difficulties of measuring the time will permit), the more nearly do we approximate to that coefficient. Even with a very measurable (*finite*) distance, we obtain results of error less than we can assign any expression for.

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* In the modern improved system these illogical symbols are wholly discarded (*e. g.* Prof. Peirce's "Analytic Mechanics"), and the real element of the calculus—the differential coefficient—is symbolized by the letter D, with the independent variable sub-fixed; followed by the symbol of the function; *e. g.* $D_x y$, instead of $\frac{dy}{dx}$.

If, instead of placing screens very close together, they were many hundred feet apart, the distance divided by the time of transit would still give us the *mean* velocity between the screens, but evidently not (accurately) the velocity at any one point; for the variation or differential of velocity from one screen to the other is considerable, compared with its *total* value. Hence, by diminishing *indefinitely* the distance, this variation becomes less and less appreciable, and the ratio of the indefinitely diminished *space* and *time* becomes the *ultimate* ratio—the *differential coefficient*—which (in this particular case) is the velocity sought. We have then, in this practical operation, an illustration of peculiar notions and fundamental principles of the calculus: *indefinitely small—vanishing*, or *infinitesimal*, quantities; *ultimate ratios*, *limits*, or (what is equivalent) *differential coefficients.*

Besides the direct solution of problems, the calculus has been the most effective and indispensable of agents in widening the sphere of mathematical investigation, and in enhancing the power of its instruments. Scarce one of the modern methods of analysis but depend on it for their development. The Calculus of Variations, originating with Lagrange, is but an extension of the methods of the calculus to the discovering of functions, in cases in which, instead of the law of growth, some condition (such as that of producing a maximum or minimum under certain conditions) which the function when found must fulfil, is given. The Calculus of Operations is but an extension of algebra to the *symbols of operation* of the calculus: algebra itself being really a calculus of operations, since it deals only with symbols with a view to reduce the operations they indicate to their simplest expression. Modern "Higher Algebra" might with propriety be so styled. (See Determinants, Invariants.)

The mathematical method (another development of the Differential Calculus), commonly referred to by English writers as that of Laplace's Coefficients, is, generalized and enlarged, now termed "Spherical Harmonic Analysis," and is a *calculus* of great power for a large class of physical problems involving arbitrary data over a spherical surface. Hence its applicability to the calculation of the "tides" and other problems connected with the "figure" and "attraction" of the earth; also to certain problems relating to the distribution of electricity and magnetism, etc.

Sir William Rowan Hamilton's "Calculus of Quaternions," by many believed to be an invention of importance vieing with that of the calculus itself, has indeed a rationale, or logical basis, radically distinct from and independent of the calculus; yet for its full development it has recourse to the methods and principles of the Calculus.

Mr. Cauchy has shown that for the explanation of certain properties of functions, even for *real* values of the independent variable, it is indispensable to generalize the investigation by including the case of *imaginary* values for that variable (*i. e.* values involving the well-known expression of *impossibilty*, $\sqrt{-1}$). All geometricians are aware of the service which the consideration of imaginary quantities has rendered to Algebra. The theory of equations is dependent upon it, and it seems destined to render yet greater service to the theory of "functions." It would be impossible to attempt any explanation of the method or *Calculus* of Imaginaries, an outline of which may be found in Book I. of "Théorie des Fonctions Doublement Périodiques," Briot and Bouquet, Paris, 1859. Resulting from it is the *Residuary Calculus*, or Residuation by which (see the "Integral Calculus," of Prof. B. Peirce) developments are obtained for functions where Taylor's theorem fails in consequence of its first term becoming infinite.

In an antecedent paragraph we found the expression for the algebraic relation between the finite increments (or "differences") of the co-ordinates of the parabola when one of these is "any lineal magnitude whatever." The "Calculus of Finite Differences," invaluable in the practical application of analytic formulæ to numerical calculations, for the summation of infinite series, and for Interpolation, results from such relations between finite increments or "differences," and is defined by Lacroix to have for its object "the determination of the values of increments, by deducing them not merely from the analytic expression of the functions, but also from their numerical (or particular) values, when that expression fails or is too complicated." Except a general similarity in notation and terms employed, it has little in common with the Differential Calculus; the fundamental element of which latter—the Differential Coefficient—having no place in it.

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Calculus, or **Stone,** in medicine, a concretion formed within the body from the deposition of matters which normally remain in solution. The most important calculi are those formed in the kidneys or bladder (urinary calculus), and those formed in the gall-bladder or biliary ducts (biliary calculus, or gall-stone). Both of these give rise to intense pain, and may even threaten life. Calculi of less importance may form in the salivary ducts and elsewhere.

Biliary calculus may generally be assumed to exist when excessive pain suddenly arises in the right side beneath the ribs, and when in a few hours jaundice comes on. But absolute proof that these symptoms depend on calculus is often wanting. The pain is more severe while it lasts than almost any other form of suffering. It may be relieved by large doses of opium or by the inhalation of ether, but such a remedy requires to be cautiously given. Gall-stones impacted in the ducts sometimes have proved fatal, but much more frequently they find their way, sooner or later, into the intestines. They are, in the human subject, almost invariably composed of cholesterine, with coloring-matter and mucus arranged in layers. The Oriental bezoar-stone is a biliary calculus from an antelope. It consists chiefly of crystalline lithofellic acid.

Urinary calculus is a disease most common in advanced life and in the male sex. It is frequent in gouty persons, or among those who pursue sedentary occupations and live freely. Among sailors it is rare. Certain local conditions promote it, especially an excess of mineral matter in drinking-water. It is common in England, Ireland, Russia, France, Northern Italy, and Egypt. In the U. S. it is most frequent in Kentucky, Tennessee, West Virginia, Ohio, and Indiana. In its early stages the disease not unfrequently presents itself in the form of gravel, shown by the passage of numerous small gritty concretions, observed in the urine as a deposit like sand. When such deposits are present at the time of passing the urine, and not merely after it has cooled, there is reason to apprehend the formation of calculus. If in these circumstances there are pains of a dull character in the loins, with occasional twinges, no time should be lost in seeking medical advice. Calculus in the bladder is at first attended with little pain, as compared with that caused by the stone in its passage downward from the kidney; but unless removed the calculus is sure to enlarge, and it then becomes the cause of most intense distress. Perhaps the most trustworthy evidence of stone in the bladder, apart from the use of the sound, is smarting and burning pain experienced after the bladder has been emptied, with occasional temporary stoppages of the urine.

The chief varieties of urinary calculus are—1. Uric acid, urates of ammonia, soda, lime, etc. (brick-dust sediment, red sand); 2. Phosphates of ammonia and magnesia, lime, etc. (the lime phosphate, mixed with ammonio-magnesian phosphate, constitutes the "fusible calculus," one of the commonest kinds); 3. Oxalate of lime (mulberry calculus); 4. Carbonate of lime (chiefly in domestic animals); 5. Cystine; 6. Xanthic oxide (very rare); 7. Very rarely indeed do leucine, tyrosine, and other disease-products form calculous concretions. 8. Calculi of fibrine, etc. are also reported. 9. Calculi are frequently composed of numerous layers, having perfectly distinct chemical composition. When calculus has once formed in the urinary organs no cure exists except the removal of it from the body (see Lithotomy and Lithotrity), but in the earlier stages much may be done to check the malady by careful regulation of the diet and mode of living, with the use of solvents adapted to the particular form of deposit found.

Urinary calculi have been often observed in horses, cattle, and pigs, and are very frequent in the common rat.

Revised by Willard Parker.

Calcut'ta [Sanscrit, *Kalikâta*, "dwelling of Kali," an Indian deity], the capital of British India, situated in the province of Bengal, on the E. bank of the Hoogly, an arm of the Ganges, about 75 miles from the sea; lat. 22° 34′ N., lon. 88° 20′ E. The city extends along the river about 6 miles, and has an average breadth of 1½ miles. The river, here a mile wide, is constantly full of shipping. In the southern part of the city, called Chowringhee, are the residences of the Europeans, which in a great part are finely built in Grecian style, and many of them surrounded by groves of fruit trees. A quarter of a mile to the S. W. is Fort William, built at a cost of £2,000,000, the largest fortress in the British dominions, octagonal in form, requiring a garrison of 10,000 men and mounting 619 guns. Its usual garrison consists of one English and two native regiments. Between the fort and the city is the Maidân or glacis, a handsome park, and the Esplanade, on which is the Government House, a magnificent building surmounted by a dome, and in a line with it a row of handsome dwellings. The principal buildings of Calcutta are, besides the Government House, the mint, the town-hall, the cathedral, the Hindoo college, and the hospital. Beyond Chowringhee is the native or "Black Town," mostly consisting of mud or bamboo cabins and narrow, dirty streets here and there adorned with an idol of painted wood or plaster. On the other side of the river are situated the botanic garden, opposite Fort William, and the suburb Howrah, with the terminus of the East India Railway, opposite the Black Town. The river is crossed on a floating bridge constructed on pontoons, forming a permanent connection between the city and the railway terminus, and affording a continuous roadway for passengers and vehicles. It was finished in 1874, and cost £220,000.

Down to 1686, Calcutta was nothing but a miserable Hindoo village, but in that year the English merchants of Hoogli, having been compelled by the Mughul chiefs to abandon their factories, moved 26 miles farther down the river and settled at the village of Sutânati, which now forms a part of Calcutta. In 1690 the Bengal servants of the East India Company took up their headquarters at Sutânati; in 1696, Fort William was built; and in 1700 the three villages of Sutânati, Calcutta, and Gobindpur were bought by the company and formed into one settlement. But half a century later on, in 1756, the fort was captured and the city was sacked by the nawab of Bengal. Most of the English residents escaped by vessels to the mouth of the Hoogli, but those who remained (146 persons) were soon compelled to surrender and were locked up in the guard-room, the "Black Hole," a chamber hardly 20 feet square, from which only 23 persons came out alive the next morning. In Jan., 1757, an English expedition from Madras under the command of Clive again took possession of the city, and a new and much stronger fort (the present Fort William) was built. From that time the history of Calcutta has been one of uninterrupted progress and prosperity. It is now one of the greatest commercial centres of Asia and the seat of the supreme administrative, judicial, and military authorities of the British-Indian government.

The site of the city was admirably chosen so far as it affords excellent anchorage, the port extending for ten miles along the bank of the river and having easy water-communication with the whole basin of the Ganges and the Brahmaputra. Its disadvantages arose from its deltaic location, the insalubrity of the ground, and the possible silting up of the river. The drainage was found very difficult, as in many cases the surface of the ground is considerably below the level of the water. The works, however, though not yet completed, have proved very effective, the underground sewers discharging their contents by means of a gigantic pumping apparatus, operated at an annual cost of £3000; and Calcutta is now not only the healthiest city of India, but compares well in this respect with the great cities of Europe and America. The mean temperature of the place is 79° F., the highest recorded during the last twenty years being 106°, the lowest 52°. The average rainfall is 66 inches. The cyclones are frequent, and often dangerous. The annual death-rate is 25.82 per thousand. Though the Hoogli River has long ceased to be the main channel of the Ganges, it is still navigable for vessels of the largest tonnage, and immense exertions are made to prevent its silting up, which, of course, would be the death of the city. An idea of the growth of the commerce of Calcutta during the last half century may be formed by comparing the value of its exports in 1820 (£10,454,910) with that of its exports in 1870 (£49,316,738). Its chief articles of export are opium, raw cotton, jute, grain, hides, etc.; of import, cotton fabrics, hardware, etc. Pop. in 1881 (with suburbs), 683,458.

Cal'das, or **Calde'tas,** a Spanish term applied to warm springs, and forming part of the name of many places in Spain. Among these the most noted is Caldas de Mombuy, 18 miles N. of Barcelonia. Here are thermal baths and some antiquities.

Calderon' de la Bar'ca (Pedro), the most eminent Spanish dramatic author, born in Madrid Jan. 17, 1600, was educated at the University of Salamanca. He began to write dramas about the age of thirteen, and having entered the army in 1625, served several campaigns in Italy and Flanders. After he had gained distinction as an author, he was patronized by Philip IV., who invited him to his court in 1636, and created him a knight of Santiago. He was a very prolific author, and produced about 500 dramas. In 1651 he entered the Church, and became chaplain in the royal chapel at Madrid 1663. Among his greatest works are a tragedy entitled "The Constant Prince" ("El Príncipe Constante"), "Love is no Joke," "Life is a Dream," and "The Physician of his Own Honor." In the latter part of his life he wrote many religious poems called "Autos Sacramentales." His imagination was brilliant, and not restrained by conventional rules. He is ranked among the greatest Spanish poets by native critics, and his dramas are popular in Germany. His works display great fertility of invention, and abound in beautiful passages, but are deficient in fidelity to nature. Died May 25, 1681. (See Trench, "The Life and Genius of Calderon," 1836; Ticknor, "History of Spanish Literature.")

Cal'derwood (David), a Scottish Presbyterian minister and historian, born in 1575. He was banished for his opposition to episcopacy in 1619, and then retired to Holland, where he published a controversial work called "The Altar of Damascus" (1623). He returned to Scotland in 1636, and wrote a "History of the Kirk of Scotland." Died in 1651.

Calderwood (Henry), LL.D., born in Peebles, Scotland, May 10, 1830, studied in Edinburgh University 1847–52, and in United Presbyterian Theological Hall 1852–56, and was minister in Greyfriars church, Glasgow, 1856–68; was examiner in mental philosophy to the University of Glasgow 1861–64, and conducted the class of moral philosophy in Glasgow University in 1866; in 1868 was appointed to the chair of moral philosophy in Edinburgh University; has published "The Philosophy of the Infinite" (1854), "Handbook of Moral Philosophy" (1872), "On Teaching" (1874), "Relations of Mind and Brain" (1879), "Science and Religion," the Morse Lecture in Union Theological Seminary (1881). R. D. Hitchcock.

Cal'dicot (Thomas Ford), D. D., born at Buckby, England, in 1803, removed to Canada in 1824, held Baptist pastorates in Hamilton, Lockport, and Brooklyn, N. Y., Boston, Mass., and Toronto, Canada, where he died July 9, 1869. As a scholar, writer, and orator he was alike distinguished.

Caldwell, Kan. See Appendix.

Caldwell (Lake George P. O.), on R. R., capital of Warren co., N. Y. (see map of New York, ref. 3–J, for location of county), is situated near the head of Lake George, 62 miles from Albany. It has several hotels, and is a place of summer resort. Steamers ply upon the lake. Fort William Henry and Fort George were situated within the limits of this township. Pop. of township in 1870, 1041; in 1880, 1223, including 319 in village.

Caldwell, on R. R., capital of Noble co., O. (see map of Ohio, ref. 6–H, for location of county), 35 miles N. of Marietta, is situated in the centre of the Duck Creek oil-region. The vicinity yields coal and iron. Pop. in 1870, 318; in 1880, 602.

Caldwell, on R. R., cap. of Burleson co., Tex. (see map of Texas, ref. 4–I, for location of county), 85 miles E. by N. of Austin; has a male and female academy. Pop. in 1880, 301.

Caldwell (Charles), M. D., an American physician, born in Caswell co., N. C., May 14, 1772. He was for many years professor of medicine in Transylvania University in Kentucky. He wrote, besides other works, a "Life of General Greene" (1819). His last work was a report on Mesmerism. Died July 9, 1853.

Caldwell (Charles H. B.), U. S. N., born June 11, 1828, in Mass., entered the navy as a midshipman Feb. 27, 1838, became a passed midshipman in 1844, a lieut. in 1852, a commander in 1862, a capt. in 1867, and afterward commodore. In 1858, while attached to the sloop-of-war Vandalia, Caldwell had charge of an expedition against a tribe of cannibals inhabiting Wega, one of the Fejee Islands, which he conducted with ability, defeating the Wegans in a pitched battle and burning their town. While commanding the steamer Itasca he took part in the bombardment of Forts Jackson and St. Philip April 24, 1862, but was unable to pass the forts with the rest of the fleet, "owing to a 42-pound shot entering the boiler, the steam from which filled the fire and engine-room, driving every one up from below, and almost suffocating those on the quarter-deck." He participated in the action with the Grand Gulf batteries, Mississippi River, June 9, 1862, and in command of the iron-clad Essex took part in all the operations at Port Hudson during the spring and summer of 1863. Died at Boston, Mass., Nov. 30, 1877. FOXHALL A. PARKER.

Caldwell (JAMES), a patriot, born in Charlotte co., Va., in April, 1734. He graduated at Princeton in 1759, became pastor of a Presbyterian church at Elizabethtown, N. J., and efficiently promoted the popular cause during the Revolution. He served in the army as chaplain and also as a soldier. He was murdered by a sentinel June 6, 1780.

Caldwell (JOSEPH), D. D., born in Leamington, N. J., April 21, 1773, graduated at Princeton in 1791, became in 1796 principal professor in the University of North Carolina, and its first president in 1804. Died Jan. 24, 1835.

Caldwell (MERRITT), A. M., a distinguished author and educator in the Methodist Episcopal Church, was born at Hebron, Me., Nov. 29, 1806, graduated at Bowdoin College in 1828, became principal of the Maine Wesleyan Academy at Readfield in 1828, was elected professor of mathematics and vice-president of Dickinson College, Pa., in 1834, professor of metaphysics and English literature at Dickinson in 1837, visited England, and assisted in founding the Evangelical Alliance at the "World's Convention," London, 1846. Died June 6, 1848. He was a distinguished and able advocate of total abstinence, a gifted and industrious writer, and was author of a "Manual of Elocution" (1846), "Philosophy of Christian Perfection" (1847), "Christianity Tested by Eminent Men" (1852), "The Doctrine of the English Verb" (1857), and numerous reviews. He was a man of great talents and excellence of character.—His brother, ZENAS CALDWELL (born Mar. 31, 1800; died Dec. 26, 1826), was a brilliant and able instructor, whose early death was widely lamented. A volume of his writings has been published.

Cald'well (SAMUEL L.), D. D., born Nov. 13, 1820, in Newburyport, Mass., graduated at Waterville College (now Colby University), Me., 1839; teacher Hampton Falls Academy, New Hampshire, and Newburyport 1839–42; graduated at Newton Theological Institution 1845; pastor Bangor, Me., 1846–58, First Baptist church, Providence, R. I., 1858–73; professor of church history Newton Theological Institution 1873–78; president of Vassar College, New York, 1878–85.

Cal'edon, EARLS OF (1801), Viscount Alexander (1797), Baron Caledon (1789), all of the Irish peerage.—JAMES ALEXANDER, fourth earl, was born July 11, 1846, and succeeded his father in 1855.

Caledo'nia, [Welsh *celydd,* "a woody shelter"], the name given by the Romans, in the first century, to that part of the island of Britain which lay to the north of the Firths of Forth and Clyde. It included, of course, only the Highlands of Modern Scotland. Very obscure is the ethnology of the people, and various hypotheses have been applied to the fact, though it seems most probable that the Caledonians belonged to the British branch of the Celtic family. Pliny is the first author who mentions Caledonia. Tacitus describes the natives as having red or sandy hair, as living in tents without cities, as addicted to predatory warfare and fighting in chariots. The Romans made several unsuccessful efforts to subdue these barbarians, who not only repulsed the invaders, but harassed the Roman colonies in Britain by frequent inroads. The first Roman general who penetrated into Caledonia was Agricola, the lieutenant of Domitian and the father-in-law of Tacitus. He defeated the Caledonians under Galgacus at Mount Graupius, a place of uncertain location, in 84 A. D. Galgacus is said to have lost 10,000 men in the battle. Nevertheless, in the following year Agricola was recalled to Rome, and soon after the Caledonians again began to harass the Roman colonies. To defend themselves against these inroads, the Romans built in 139 A. D. the Wall of Antonine from the Frith of Forth to that of the Clyde, 31 miles across, a substantial work which cannot have been without due effect in a war with barbarians. In 208 the emperor Severus entered Caledonia with a great armament and fully determined to subdue the country. He also succeeded in reaching the northern extremity of the island—which, however, most probably meant nothing more than the coast of Aberdeenshire—but by disease, fatigue, and the perpetual guerrilla-warfare waged against him he is said to have lost about 50,000 men, and was compelled to retreat southward. A league was then formed between the Caledonians and their southern neighbors, the Moata; but while preparing himself for a new campaign against the league, the emperor died at York in 210. A century later on the Picts are heard of for the first time, and in 367 Valentinian I. sent his lieutenants into Britain to defend the Britons against the Caledonians and the Picts. He succeeded, and once more laid the country between the Wall of Antoninus and that of Hadrian under Roman rule. (See SCOTLAND.)

Caledonia, capital of Traill co., Dak. (see map of Dakota, ref. 2–J, for location of county), is situated in the E. border of the county, on Goose River, near its junction with the Red River of the North, which separates the county from Minnesota. Pop. not given in census of 1880.

Caledonia, on R. R., capital of Houston co., Minn. (see map of Minnesota, ref. 11–H, for location of county), is 14 miles W. of the Mississippi River and 20 miles S. W. of La Crosse. It has one academy, plough and wagon manufactories. Pop. of township in 1870, 470; in 1880, 894; in 1885, 923; of village, 980.

Caledo'nian Canal', The, in Scotland, connecting the Atlantic Ocean with the North Sea near Inverness, was built by Telford, and opened in 1823. It is 61½ miles in length, and is formed by cuts 120 feet broad at the surface, 50 feet at the bottom, and 17 feet deep, connecting the Lochs Ness, Oich, Lochy, and Eil. The combined length of the artificial portions is 23 miles. This canal saves vessels the stormy passage by the Hebrides, which takes nine or ten days longer. Ships of 600 tons can pass through. The highest part is Loch Oich, 94 feet above the sea-level.

Caledo'nia Springs, in Caledonia township, Prescott co., province of Ontario (Canada), are 40 miles from Montreal and 9 miles S. W. of L'Orignal. They are resorted to especially for the cure of cutaneous, scrofulous, and rheumatic diseases. There are four principal springs, all strongly alkaline, one with considerable iodine and bromine in its waters.

Cal'endar [Lat. *calendarium,* the "money-lender's account-book," because interest was payable on the calends; hence, a register of times and seasons—an almanac], a term applied to any systematic and comprehensive method of dividing, distributing, and reckoning time, or to a book or table exhibiting such a method. There are two natural divisions of time, or regularly recurring periods, which all calendars must recognize—the day and the year. The month seems to have been suggested by the period of the moon's revolution (29½ days nearly), to which in some calendars (as the Jewish and the Greek) it has been made closely conformable. The week is, approximately, one quarter of a lunation. It is found in the Oriental and Egyptian calendars, and in that of the Israelites, from whom we have received it, but it was not known to the Greeks or the Romans. The Greeks instead employed *decades* of ten days each, and the Romans periods of *eight* days, the last of which was called *nundinæ* (*novem,* "nine;" *dies,* "day"), or ninth day; the count including both the nundine at the beginning and that at the end of the period. In the ancient calendars the nundine periods were distinguished by setting opposite the successive days the first eight letters of the alphabet (A to H inclusive), repeating these letters throughout the year. From this usage was derived that of the Christian calendar of marking the days by the first seven letters (A to G), similarly repeated. The manner of denoting days of the month was peculiar. The first day was always called *kalendæ,* "calends;" the fifth or seventh, *nonæ,* "nones;" and the thirteenth or fifteenth, *idus,* "ides." The nones were the seventh, and the ides the fifteenth in March, May, July, and October, the first, third, fifth, and eighth months of the Roman year (easily remembered by associating them with the notes of the common chord in music); in the remaining months they fell on the fifth and thirteenth. Any other day was denoted by its distance counted backward from one of these points of reference, the reference-day itself counting one. Thus, the 31st day of March is *Pridie* Kal. Apr., or II. Kal. Apr.; the 30th day of March is III. Kal. Apr.; the 6th of July is Pridie Non. Jul.; the 5th, III. Non. Jul., etc. It is difficult to understand how so cumbrous a system as this could have maintained itself for centuries among a cultivated people.

In the regulation of the year we find the calendars of different peoples materially differing. The Egyptian year had 12 months of 30 days each, and counted five unallotted days at the end. It was too short by nearly a quarter of a day; and hence the beginning of the year went backward through the seasons once in 1460 natural years or 1461 Egyptian years. This was known as the SOTHIC PERIOD (which see). Because of this incessant movement the Egyptian year is called *vague* or wandering. The Greek year consisted of 12 lunar months of 30 and 29 days alternately. This made the length of the year 354 days, or 11¼ days too small. To compensate for the deficiency, an intercalary month of 30 or 29 days was introduced every alternate year, which made the average length seven days too great; for which reason the intercalary month was omitted once in about eight years. The earliest Roman year, attributed to Romulus, had only ten months, of which the first, third, fifth, and eighth (those in which, as above mentioned, the nones fell on the seventh and the ides on the fifteenth) had 31 days, and the rest 30 each This year of only 304 days was shorter than the natural year by about one-sixth. Each Romulian year therefore began two months earlier in the season than the last, and the sixth came to an end at the same time with the fifth natural year. This circumstance, according to Niebuhr, determined the period of the lustrum. (See LUSTRUM.)

The months of the original Roman year were named Martius, Aprilis, Maius, Junius, Quintilis, Sextilis, September, October, November, December. Numa Pompilius, second king of Rome, added, according to Solinus, Januarius to the beginning and Februarius to the end of the year. This year was a lunar year of 354 days, but it was made a day longer, or 355, because there was supposed to be luck in odd numbers. To prevent displacement, an intercalary month of 22 and 23 days, alternately, was introduced every second year. This made the year to consist in effect of 366¼ days. About the year 450 B. C. the decemviri regulated the calendar once more, and placed February between January and March, both at the end of the year. The months were now—whether so settled by Numa or the decemvirs is uncertain—Martius, 31 days; Aprilis, 29; Maius, 31; Junius, 29; Quintilis, 31; Sextilis, 29; September, 29; October, 31; November, 29; December, 29; Januarius, 29; Februarius, 28. The intercalary month was inserted between the 23d and 24th days (as we count them) of February, or, in the Roman manner of speaking, before the sixth calends of March. The reason for so placing it was, that the seventh calends of March, or the 23d day of February, was the last day of a round year of 360 days, and was celebrated as the festival of Terminus, the god of limits, under the name Terminalia. The Romans, like the Egyptians, seem to have regarded the remaining five days as hardly belonging to the year, but as being a sort of interval between two years. The odd day added to the 354 for luck was not, however, intercalated in this place, but was introduced wherever it might be necessary to prevent the *nundinæ* from falling on the calends of January or the nones of any month—such a coincidence being deemed inauspicious. The year on this system being, as we have seen, a day too long, added twenty-four days too much in twenty-four years. It was provided, therefore, that during the last eight years of this period these twenty-four days should be deducted in making the intercalations. The pontiffs, however, who had the control of the intercalation, used their power capriciously for personal ends—sometimes to lengthen or shorten the term of a magistrate, sometimes to benefit or injure the farmer of the public revenues. As a natural consequence, the calendar fell into extreme confusion; so that in the time of Julius Cæsar the civil differed from the astronomical equinox by nearly three months. This powerful ruler resolved on a thorough reform. Under the advice of the astronomer Sosigenes he abolished the lunar year. He readjusted the months to their proper seasons by making the year 708 A. U. C. 445 days long, extending from October 13, inclusive (according to our present count), to the 31st day of the second ensuing December. This year is known in chronology as the year of confusion. He reconstructed the months, giving 31 days each to the first, third, fifth, seventh, ninth, and eleventh, and 30 days each to the rest, except February, which had 29 only, but every fourth year received an intercalary day, making 30. The intercalation took place, for a reason already given above, immediately after the feast of Terminalia, and was made by repeating the *sexto Kalendas Martias;* whence the year in which it occurred came to be called bissextile. Finally, the beginning of the year was transferred from the first of March to the first of January. To flatter the vanity of Octavius after he had secured the supreme power and had received the title of Augustus, a day was taken from February by a sycophantic senate and given to August, which had been named from him, for the frivolous purpose of giving to his month no less dignity in point of numbers than July, which had received its name from the first Cæsar. The lengths of the later months were then altered to prevent three long months from occurring consecutively.

The Julian year consisted of 365¼ days, and consequently differed in excess by 11 minutes 13.95 seconds from the true solar year, which consists of 365 days 5 hours 48 minutes 46.05 seconds. In consequence of this difference the equinox, in the course of a few centuries, fell back sensibly towards the beginning of the year. In the time of Julius Cæsar it corresponded to the 25th of March; in the sixteenth century it had retrograded to the 11th. The correction of this error was one of the purposes sought by the reformation of the calendar effected by Pope Gregory XIII. in 1582. By suppressing ten days in the calendar, Gregory restored the equinox to the 21st of March, the day on which it fell at the time of the Council of Nice in 325. This council determined that the Eastern churches should celebrate Easter at the same time as the Western—*i. e.* on the Sunday following the Paschal full moon, and not on the fourteenth day of the Paschal moon. The Gregorian rule of intercalation may be expressed as follows: Every year of which the number is divisible by 4 without a remainder is a leap year, excepting the centesimal years, which are only leap years when divisible by 4 after suppressing the two zeros. Thus, 1600 was a leap year; 1700 and 1800 were common years; 1900 will be a common year, 2000 a leap year, and so on. The length of the mean year thus fixed is 365.2425 days, or 365 days 5 hours 49 minutes 12 seconds, which exceeds the true solar year by 25.95 seconds, an error which amounts only to one day in 3325 years. The intercalations might be so made as to make the calendar year correspond even more closely than it does now with the solar year, but no other method could be as convenient as the Gregorian.

The new calendar was received immediately or shortly after its promulgation by all Roman Catholic countries. The Protestant states of Germany and the kingdom of Denmark adhered to the Julian calendar till 1700; and in England the alteration was successfully opposed by popular prejudices till 1752. In that year the Julian calendar, or *old style*, as it was called, was abolished by act of Parliament, and the date used in all public transactions rendered coincident with that followed in other European countries, by enacting that the day following the 2d of Sept., 1752, should be called the 14th of that month. When the alteration was made by Gregory it was only necessary to drop ten days; the year 1700 having intervened, which was a common year in the Gregorian, but a leap year in the Julian calendar, it was now necessary to drop eleven days. The old style is still adhered to in Russia and the countries following the communion of the Greek Church; the difference of date in the present century amounts to twelve days. For fuller information on this subject, see DELAMBRE, "Astronomie Théorique et Pratique," tom. iii., chap. xxxviii.; IDELER, "Lehrbuch der Chronologie;" and ANTHON, "Greek and Roman Antiquities."

Ecclesiastical Calendar.—The adaptation of the civil to the solar year is attended with no difficulty, but the church calendar for regulating the movable feasts imposes conditions less easily satisfied. The festival of Easter commemorates the resurrection of our Lord, which momentous event having occurred near the time of the Jewish Passover, was naturally associated in the minds of the early disciples with that anniversary, and its annual returns were made dependent upon the same calendar regulations. The Passover was observed on the fourteenth day of the moon—that is, near the full moon. The question what day is most proper for the observance of Easter became early a subject of warm controversy. In order to put an end to an unseemly contention, the Council of Nice ordered that Easter should be celebrated on the Sunday which immediately follows the full moon that happens upon or next after the vernal equinox. In order to determine Easter according to this rule for any year, it is necessary to reconcile three periods—namely, the week, the lunar month, and the solar year. To find the day of the week on which any given day of the year falls, it is necessary to know on what day of the week the year began. In the Julian calendar this was easily found by means of a short period or cycle of twenty-eight years, after which the year begins with the same day of the week. In the Gregorian calendar this order is interrupted by the omission of the intercalation three times out of four in the last year of the century. But to render calculation unnecessary, a table is given in the prayer-books, showing the correspondence of the days of the year and the week for the current century. The connection of the lunar month with the solar year is an ancient problem, for the resolution of which the Greeks invented cycles or periods, which remained in use with some modifications till the time of the Gregorian reformation. See, on this subject, DELAMBRE, "Histoire de l'Astronomie Moderne," tom. i., liv. i.; also DE MORGAN, "Companion to the British Almanac," 1845; also, BARNARD, "How to Find the Church Festivals," New York, 1872.

A new reform of the calendar was introduced in France during the Revolution by a decree of the National Convention passed Nov. 24, 1793. This took for its epoch the midnight next preceding the autumnal equinox of 1792, from which point of time the successive years were numbered I., II., etc. "of the French republic, one and indivisible." The year was divided into twelve months, each of thirty days, leaving, in ordinary years, five days necessary to complete the year, and in leap-year six. These days were placed at the end of the last month, and under the name *jours complémentaires* were celebrated as festivals. As during these celebrations the ordinary occupations of life were suspended and the population were expected to give themselves up without restraint to pleasure in every form, they obtained the name of *sansculottides*. Each period of four years terminating in a leap-year was called a *Franciade*. The leap-year was also called an Olympic year. The names of the *jours complêmentaires* were the following, with the dates as they occur in a leap-year: Primidi (dedicated to Virtue), Sept. 16; Duodi (dedicated to Genius), Sept. 17; Tridi (dedicated to Labor), Sept. 18; Quartidi (dedicated to Opinion), Sept. 19; Quintidi (dedicated to Rewards), Sept. 20; Sextidi, á Jour de la Revolution, Sept. 21. On this last day every Frenchman was required to renew the national oath, "*to live free or die.*" In order that the corrections found necessary by the mathematicians of Pope Gregory might be embodied also in the new calendar, it was further provided that the Franciade terminating the century should have no Olympic or leap-year except in the fourth century and in all subsequent centuries whose numbers are divisible by four, which latter were to retain the Olympic year until the fortieth century, which was to end without an Olympic year.

The months received names derived from their prevailing meteorological characteristics, or from the products of the earth maturing in them, the several seasons being distinguished by the peculiar terminations of the names, as follows:

AUTUMN.	Vendemiaire,	22 Sept.—21 Oct.,	inclusive,	Vintage month.
	Brumaire,	22 Oct.—20 Nov.,	"	Foggy month.
	Frimaire,	21 Nov.—20 Dec.,	"	Sleety month.
WINTER.	Nivose,	21 Dec.—19 Jan.,	"	Snowy month.
	Pluviose,	20 Jan.—18 Feb.,	"	Rainy month.
	Ventose,	19 Feb.—20 Mar.,	"	Windy month.
SPRING.	Germinal,	21 Mar.—19 Apr.,	"	Budding month.
	Floreal,	20 Apr.—19 May,	"	Flowery month.
	Prairial,	20 May—18 June,	"	Pasture month.
SUMMER.	Messidor,	19 June—18 July,	"	Harvest month.
	Thermidor,	19 July—17 Aug.,	"	Hot month.
	Fructidor,	18 Aug. -16 Sept.	"	Fruit month.

The week was abolished. Instead of this, the month was divided into three *decades* of ten days each. The names of the days of the decade were Primidi, Duodi, Tridi, Quartidi, Quintidi, Sextidi, Septidi, Octidi, Nonidi, Decadi. The decadi thus fell on the tenth, twentieth, and thirtieth days of the month, which were called Decadi I., Decadi II., Decadi III. For distinction, the intermediate days were described—rather awkwardly—as "before Decadi I.," "after Decadi I.;" "before Decadi II.," "after Decadi II.," etc.

This calendar first went into operation Nov. 26, 1793, and was discontinued Dec. 31, 1805, when, in the second year of the empire, the Gregorian calendar was resumed.

F. A. P. BARNARD.

Cal′endering [a corruption of the word *cylindering*], the process of finishing by pressure the surface of linen, cotton goods, or paper, by passing the material between cylinders pressed together with force; the domestic processes of starching and ironing afford simple illustrations of the object and result of calendering. The mangle effects the same object as the flat-iron, and is a near approach in construction to the calendering-engine. The calenders were originally of wood. Hollow iron and copper cylinders are used where heat as well as pressure is required, the cylinders being heated by steam passed through the interior or by red-hot heaters; but it is desirable that one of the cylinders shall be of material combining considerable hardness with a degree of elasticity; for this purpose solid paper cylinders are used.

Before the final calendering the fabric is flatly smoothed by passing over warm cylinders. Cotton goods are starched with flour, thickened with plaster of Paris, porcelain clay, etc., to give an appearance of stoutness, which of course vanishes when the article is washed. The fabric is then simply passed between plain cylinders, which produces the desired effect by flattening the threads. When, by means of a cylinder with a pattern raised upon it, the amount of this flattening is unequal on different parts of the cloth, the effect known as *watering* is the result. *Glazing* is produced by the rollers being made to move with different velocities, so that one side of the fabric is rubbed as well as pressed by the roller whose surface moves with the greater rapidity. A copper roller is used for glazing, so hot that if the machine stops it burns the goods. For glazing on a small scale a polished flint is rubbed over the fabric, which is laid upon a smooth wooden table.

Cal′ends [Lat. *calendæ*, from *calo* (Gr. *καλέω*), "I call"], the first day of each Roman month, because, according to Macrobius, before Cn. Flavius the scribe, against the will of the patricians, made the *fasti* (propitious days—days when courts were open) known to all the people (about 300 years B. C.), it was the duty of one of the minor priests, on the first appearance of each new moon, to summon the plebeians to a place in the Capitol near the Curia Calabria, and there to announce the number of days before the nones (always five or seven, *including the day of calling and the day of the nones itself*), by so many times repeating the word *calo*. If the part of this statement which makes the beginning of each month dependent on direct observation of the moon is correct, it is impossible that the months of the early Roman calendar should have had the fixed and rather arbitrary lengths usually assigned to them. As to this question historians differ, some asserting that the Roman months were strictly lunar down to A. U. C. 448; others, as Censorinus, that their lengths were fixed by Numa, the second king. (See CALENDAR, by F. A. P. BARNARD.)

F. A. P. BARNARD.

Cal′enture [Sp. *calentura*, a "fever," a "heat"], a species of temporary delirium occurring on board ship in hot climates, and probably due to the effect of exposure to the direct rays of the sun. The descriptions of the disease seem rather fanciful and contradictory, and the term is nearly obsolete. It is said that persons having a calenture fancied the sea was a green field, and leaped overboard.

Calfa (GUY AMBROISE), prince of Lusignan, a celebrated Armenian scholar and writer, also known under the name of **Iusuf Bey,** a grandson of that Prince Amaury of Lusignan who, under the name of Iusuf Bey, accompanied the French expedition to Egypt in 1799. He was born in Constantinople March 2, 1830, and educated by the Mekhibarists in Venice. In 1848 he was sent to Paris as professor at the Collége Moorat, but in 1854, a disagreement having arisen between the Mekhibarist leaders, he resigned his position and founded an independent national school at Grenelle, of which he was director for three years. Compelled by his delicate health to retire into private life, he developed a great activity as a writer, published a "Dictionnaire Arménien-Français," (1860) and "Français-Arménien," (1866); translated various French works into Armenian, as, for instance, "Paul et Virginie," "Telemaque," etc.; and wrote a "Universal History," a "Sacred History," "Lecture pour tous," (1867), "Guides de la Conversation" for several languages, etc.

Calhoun, on R. R., capital of Gordon co., Ga. (see map of Georgia, ref. 2–F, for location of county). 78 miles N. W. of Atlanta. Pop. in 1870, 427; in 1880, 510.

Calhoun, capital of McLean co., Ky. (see map of Kentucky, ref. 4–E, for location of county), is on Green River, about 40 miles S. S. E. of Evansville, Ind. Pop. in 1880, 484.

Calhoun (JAMES M.), a nephew of J. C. Calhoun, was born in South Carolina, but removed to Alabama, where in 1831 he was elected a member of the House. He served for several years, then retired for fifteen years, but served once more in the Senate from 1857 to 1861.

Calhoun (JOHN CALDWELL), LL.D., an eminent American statesman, born in Abbeville district, S. C., Mar. 18, 1782. He graduated at Yale College in 1804, studied law, and was sent to Congress in 1811. He began his political career as a Democrat and a leader of the war-party. He supported the tariff of 1816 and the U. S. Bank. In Oct., 1817, he became secretary of war in the cabinet of President Monroe. He approved the Missouri Compromise of 1820, and was elected Vice-President of the U. S. in 1824, in which canvass he was supported by the friends of Jackson and those of Adams. Having joined the Jackson party, he was again elected Vice-President in 1828, when General Jackson was chosen President. About this time he became an advocate of free trade and of the doctrine of the sovereignty of the States. He was the author of the "South Carolina Exposition," which affirmed that any State can nullify unconstitutional laws of Congress. Calhoun and Van Buren having become aspirants for the office of President of the U. S., Gen. Jackson, by promoting the nomination of the latter, incurred the enmity of Calhoun. He resigned the office of Vice-President in 1832, and was then elected a Senator of the U. S. for South Carolina. A convention held in South Carolina near the end of 1832 adopted what was known as the Nullification ordinance. Its object was to test the constitutionality of the protective tariff policy through the instrumentality of the State instead of the Federal courts, and to prevent the collection of duties on imposts in that State under the act of Congress of 1832, levied, as was alleged, with a direct view rather to the protection of American manufactures than the collection of revenue, until the protective principle, so-called, should be so tested and decided by the State courts. This was in pursuance of Mr. Calhoun's peculiar doctrines, known as nullification. He held that under the Federal system the judiciary of each State had the reserved sovereign right to decide in the last resort upon the extent of the powers delegated under the Constitution by the States respectively. This ordinance was to go into effect on the 12th of Feb., 1833. The determined attitude of Gen. Jackson against these nullification doctrines caused general and serious alarm lest a conflict of forces should ensue between the Federal and State authorities. It was in this condition of affairs that Mr. Clay, as a mediator, came forward with his famous "tariff compromise" of 1833, which was founded upon the avowed principle of an abandonment of the protective policy after 1843. To this measure Mr. Calhoun gave his cordial support, and in this way the anticipated perils of the crisis were averted.

As a debater, Mr. Calhoun occupied the foremost rank among the American Senators, and was scarcely equalled by any of his contemporaries, except Mr. Clay and Mr. Webster. These three were known as "the Great Trio." The debate between Mr. Calhoun and Mr. Webster on the nature of the Federal government and the doctrine of nullification, so-called, in Feb., 1833, was one of the most noted for ability and eloquence in the annals of this country. Mr. Calhoun retired from the Senate in Mar., 1843, and was appointed secretary of state by Mr. Tyler in Mar., 1844. It was under his auspices that the "Tyler treaty," as it was called, for the annexation of Texas, was negotiated in the same year. He was re-elected to the Senate in 1845, and opposed the Mexican war in 1846. He continued in the Senate until his death, which occurred 31st of Mar., 1850. His mind was eminently metaphysical, and his private character was without reproach. Among his writings are two posthumous works—one, a "Disquisition on Government," and the other, "A Discourse on the Constitution and Government of the U. S." These are both held in high estimation by his admirers and men of his school of politics. ALEX. H. STEPHENS.

Calhoun (WILLIAM BARRON), LL.D., born at Boston, Mass., Dec. 29, 1795, graduated at Yale in 1814, became a prominent lawyer of Springfield, Mass., was member of the Massachusetts house of representatives (1825–35), and speaker (1834–35), member of Congress (1835–43), president of the Massachusetts senate (1846–47), State secretary 1848–51, mayor of Springfield (1859), and again member of Mass. legislature (1861), besides holding other important offices. Died Nov. 8, 1865.

Ca'li, a town of the United States of Colombia, 70 miles N. by E. of Popayan, is on a western declivity of the Andes. It has two fine churches and an active trade. Pop. about 5000.

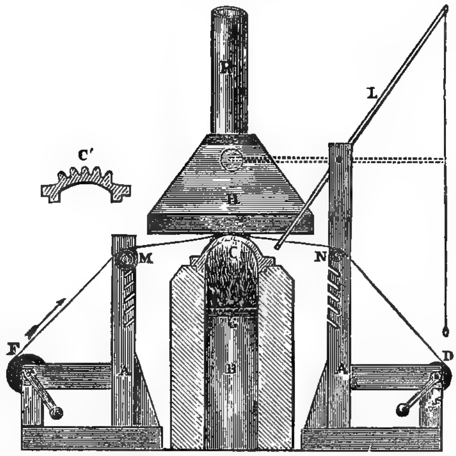
Cal'ibre, or **Caliber,** a French word which is also much used in English, signifies the diameter of the bore of a gun or any firearm. It is usually measured and decribed in inches or parts of inches. The cannon in which solid shot is used are often denoted by the weight of each shot, as a twenty-four pounder, but mortars which throw shells or hollow shot are usually designated by such terms as a thirteen-inch mortar, etc.

Cal'ico, a kind of cotton cloth, said to be so named from Calicut, a city of India, where it was first manufactured. It was imported into England by the East India Company in 1631.

Calico-Printing is the art of producing patterns on cotton cloth, either by printing in colors, or in mordants which become colors when subsequently dyed. Cloth made from cotton and wool, when similarly printed, is known as mousseline de laine. Calico-printing originated in India in very ancient times. Pliny describes the art as practised by the Egyptians. For a long time chintz counterpanes were imported into England from India. The art spread westward to Asia Minor and the Levant. It was imported into Holland by the Dutch East India Company, and spread into Germany. At the close of the seventeenth century Augsburg in Bavaria was noted for its printed linens and cottons. Calico-printing was introduced into England during the seventeenth century, but the development of the art was for a long time seriously retarded by the opposition of the silk and woollen weavers. At their instigation the importation of chintz from Calicut was prohibited, and a heavy revenue tax was placed upon English calicoes. Finally, in 1720 a law was enacted prohibiting the wearing of any printed calicoes whatever, either of foreign or domestic origin. This law was repealed in 1736, but a duty of 6*d.* per yard was still levied. In 1831 all duties were repealed. England is now the largest producer of calicoes; the U. S. stand second. The finest calicoes are made in Alsace, at Mühlhausen. Calico-printing involves a variety of operations, some of which are peculiar to certain styles, while others are common to all.

Singeing.—The first operation is the removal from the surface of the cloth of the fibrous nap or down, which, if not removed, would seriously interfere with the uniform application of the colors. The removal of the nap is effected either by passing the cloth rapidly over a red-hot plate (Fig. 1) or between lines of gas-jets. A shearing-machine is also in use for this purpose.

FIG. 1.



Hot-plate Singeing.—G is the grate; C is the semi-cylindrical red-hot plate of iron or copper; F and D are rolls on which the cloth is wound; M and N are brushes for raising the nap; L is a lever for raising the cloth from the plate, slots being made in the hood H to permit its being raised to the position indicated by the dotted line. C′ is a ridged plate used in some establishments.

Bleaching is then effected by boiling the cloth with lime, souring with sulphuric acid, boiling with soda-ash and rosin, boiling with soda-ash alone, treating with bleaching-powder, souring again, and finally washing thoroughly with water. (See BLEACHING.)

Calendering is resorted to in order to make the cloth smooth and even. It is effected by passing it between very heavy rolls.

Fixing the colors upon the cloth is effected (1) by the aid of mordants, substances which have an affinity for both fibre and color, as madder, logwood, Brazil-wood, etc., fixed by alumina or oxide of iron; Persian berries, fixed by chloride of tin; aniline colors, fixed by gluten, etc. Sumach and cutch, which produce drabs and blacks with oxide of iron by the action of the tannic acid they contain, belong to this class. It is impossible to make a distinction between the action of true mordants and of agents which simply produce insoluble colors in the tissue of the cloth, as the two classes pass into each other by insensible gradations. These insoluble colors are produced by double or simple decomposition, by the successive treatment of the cloth with the necessary reagents. Thus, Prussian blue is fixed on the cloth either by first applying an iron salt and then treating it with ferrocyanide of potassium, or it is produced by the decomposition of ferrocyanide of potassium alone, under the influence of certain acids. Chrome yellow is produced by the successive application of a lead salt and bichromate of potassa. Indigo is fixed by applying it in solution as colorless reduced indigo, and developing it as insoluble blue pigment by oxidation in the air. Brown oxide of manganese is formed by applying sulphate of manganese, withdrawing the sulphuric acid by an alkali, and oxidizing to a brown oxide by hypochlorite of lime. Aniline black is produced by the oxidation of an aniline salt in the cloth. (2) Colors are fixed by agents which, being first mixed with the color, are applied to the cloth and then rendered insoluble, when they hold the color upon the fibres mechanically, as ultramarine blue, Guignet green, chrome yellow, madder lake, and aniline colors, fixed by albumen coagulated by heat.

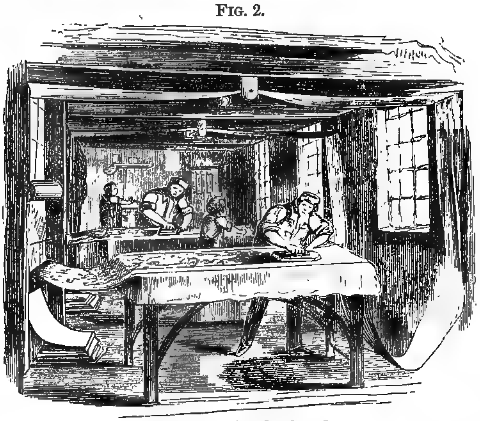
Patterns are produced (1) by printing the mordant in figures, and subsequently producing the colors in the dye-liquors: *madder styles.* (2) By printing one component of the color, and then passing the cloth through a solution of the other component, or of the agent necessary to develop the color: *padding, bronzing, indigo, pencil blue,* and *China blue styles.* (3) By printing the color together with the mordant or fixing agent, and rendering it insoluble or developing it by air or steam. This is called topical or surface printing: *steam colors, spirit colors, aniline black, aniline colors by albumen, pigment printing, metallic printing.* (4) By printing resist or reserve pastes, which protect certain portions of the cloth, and prevent the fixing of the color in the subsequent dyeing operations: *resist styles.* (5) By discharging the color from portions of the cloth previously dyed: *discharge styles.*

The *colors* most frequently employed in calico-printing are (1) the dyestuffs proper—madder in the various forms of powdered root, garancine, extract, alizarine, etc.; logwood, Brazil-wood, sandal, cam, and bar wood, and fustic; quercitron bark, indigo, Persian berries, cochineal and aniline colors; (2) the astringents which contain tannic acid, catechu, sumach, nutgalls, etc.; (3) the pigments chrome yellow and orange, Prussian blue, Guignet green, ultramarine, Scheele's green, oxide of iron, oxide of manganese. (For details see each under its own name, also DYEING and DYESTUFFS.)

The *mordants* most frequently used are salts of alumina, iron, and tin, caseine, albumen, and gluten.

Thickenings.—In preparing the colors and mordants for printing it is necessary to thicken them to prevent spreading and running. The agents generally used for this purpose are wheat flour, starch, dextrine, gum-arabic, senegal, and tragacanth, and glue.

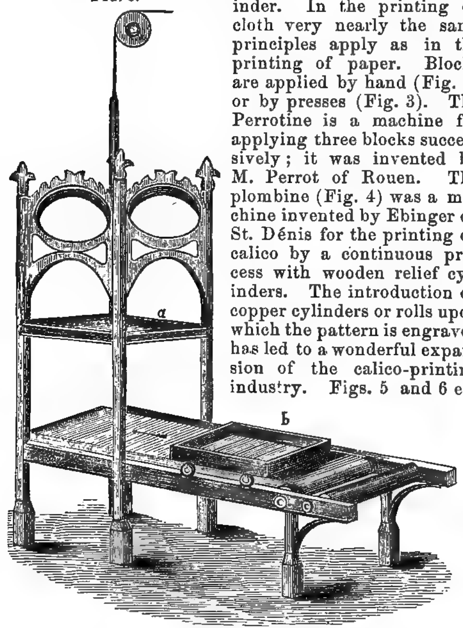
FIG. 2.



Block-printing by hand.

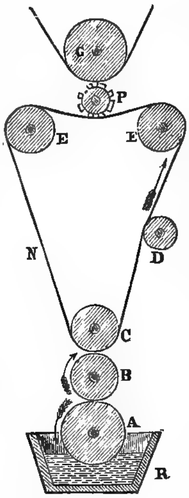
Printing Apparatus.—The mordants and colors are applied to the cloth either by wooden blocks or cylinders with raised patterns, or by copper plates or cylinders with sunken patterns; the copper cylinders being most generally used for common calicoes. Each color or tint requires a separate block, plate, or cylinder. In the printing of cloth very nearly the same principles apply as in the printing of paper. Blocks are applied by hand (Fig. 2) or by presses (Fig. 3). The Perrotine is a machine for applying three blocks successively; it was invented by M. Perrot of Rouen. The plombine (Fig. 4) was a machine invented by Ebinger of St. Dénis for the printing of calico by a continuous process with wooden relief cylinders. The introduction of copper cylinders or rolls upon which the pattern is engraved has led to a wonderful expansion of the calico-printing industry. Figs. 5 and 6 exhibit the disposition of the more essential parts in printing with engraved cylinders. The cloth F passes over a huge drum B, against which the rolls A are pressed. Each roll is supplied with thickened mordant or color by a wooden cylinder C, which dips into a vessel E containing it. A blunt knife D, called the *color doctor*, scrapes off the superfluous mordant or color from the unengraved portion of the roll; another knife, called the *lint doctor*, cleanses the roll as it leaves the cloth. By enlarging the drum the capacity of the machine may be increased from one to twenty colors by adding to the number of rolls. Fig. 7 exhibits a ten-color machine; Fig. 8 an eighteen-color machine. The pieces of cloth, measuring each about forty yards, are stitched together, and the process becomes continuous, miles of calico being printed without stopping the machine. A similar machine is now employed in printing wall-paper. As each roll prints only a portion of the pattern, it is of course very important to regulate the tension of the cloth to secure the proper location of the parts of the figure. It is found that the cloth stretches in length, and consequently diminishes in width, in the machine; so each roll must be made to print a slightly narrower pattern than those which precede it. To prevent the running of the mordants or colors, the cloth passes directly from the machine to a heated drying-room.

FIG. 3.



Press for Block Printing.

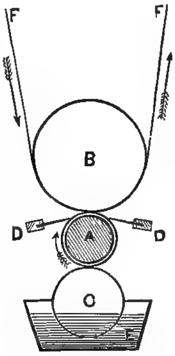
FIG. 4.



Plombine Printing.—R is the color-trough. The roll A applies the color to the roll B, which transfers it to the endless web N, by which it is applied to the relief cylinder P, which prints it upon the cloth as it passes over the drum G.

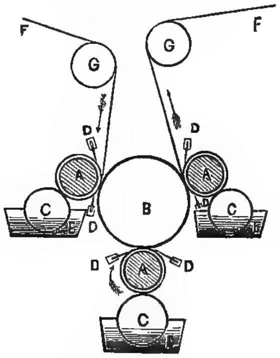
Madder Style.—This is the most important and extensively practised style of calico-printing, applicable not only to the coloring-matter from which it derives its name, but to nearly all organic coloring-matters which are soluble in water and capable of forming insoluble compounds with mordants. The thickened mordants are printed on the cloth, and the colors are produced by passing the cloth through the dye-beck, which contains the dyestuffs and water. For pinks the mordant employed is acetate of alumina;

FIG. 5.



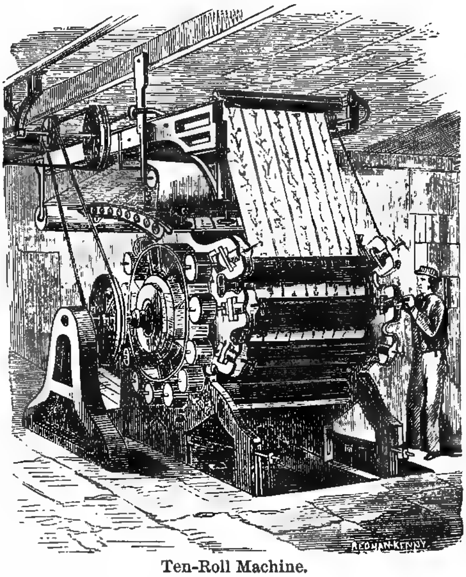
Single Roll.

FIG. 6.



Three Rolls.

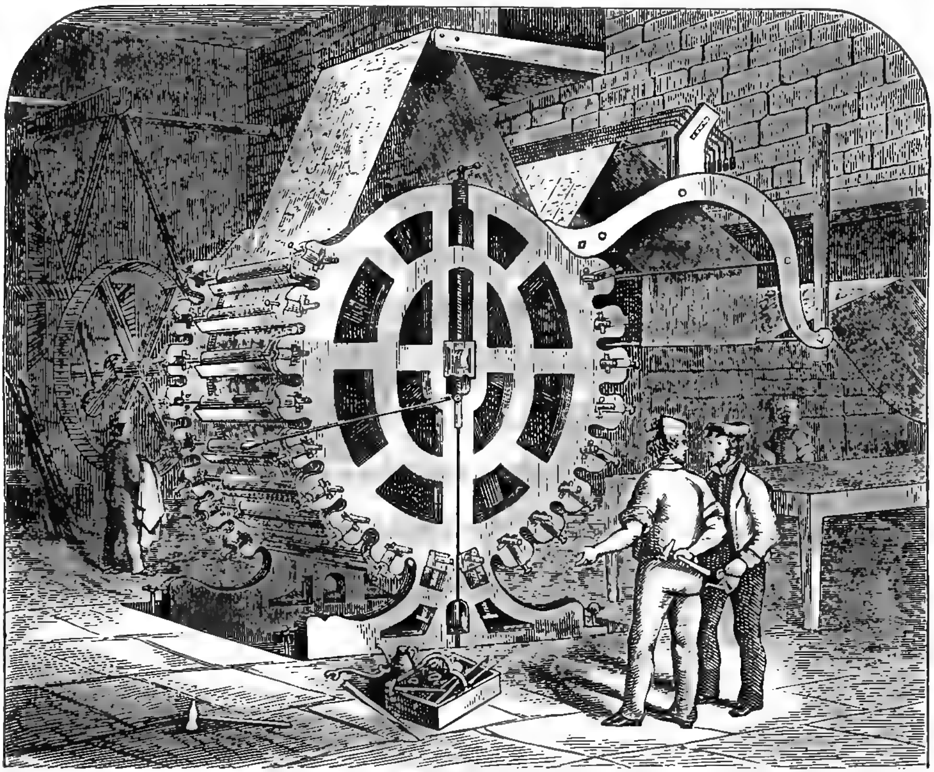
FIG. 7.



Ten-Roll Machine.

for reds, the same, more concentrated, with an addition of chloride of tin; for purple, acetate of iron; for chocolate, acetate of alumina, with a little acetate of iron; for brown, catechu, with a little nitrate of copper; for drab, catechu, with a little nitrate of copper and chloride of iron; for black, a strong solution of acetate of iron; for orange, acetate of lead, chloride of ammonium, and chloride of tin. After the mordants have been printed on the cloth, it is run into the drying-room, and then exposed to the process of *ageing*. This has for its object the setting or rendering insoluble of the mordants. It is effected by hanging the cloth in a room where it is exposed to air, warmth, and a certain degree of moisture. The alumina loses most of its acetic acid, and passes into the condition of an insoluble basic salt; the iron loses acetic acid and takes up oxygen, passing into the condition of an insoluble basic salt of the sesquioxide. The goods are next exposed to a cleansing process called *dunging*. Formerly, cow-dung was used for this purpose; it was mixed with water, and the goods were passed through the mixture and subjected to a kind of scouring. Phosphate of soda, arseniate of soda, and silicate of soda have now almost entirely displaced the dung. The effect of the treatment is to remove the excess of mordant, render what is left quite insoluble, and clear the unmordanted portions of the cloth. The next step is the dyeing, which is effected in the dye-beck. Water and the proper coloring-matters are introduced, and by means of steam the whole is heated to the proper temperature. The dyestuffs employed depend somewhat upon the tints to be produced. Madder alone is used for pinks; for reds, purples, chocolates, etc., a portion of the madder is replaced by Brazil-wood. For orange Persian berries are added, with quercitron and fustic; for blacks, logwood. In order to brighten the colors, to render them more permanent, and to clear the whites, the cloth is next subjected to the *clearing* process. This consists in exposing it to a bath containing bran and soap, and then to a very weak solution of bleaching-powder, hypochlorite of lime. If the colors employed include Persian-berry orange, the cloth is passed through a very weak bath of chloride of tin. The cloth is then washed, starched, and calendered, when it is ready for market. Calico dyed in madder styles is the most durable, resisting the action of light and soap better than any other style. *Garancine styles* are mordanted in the same manner, but are dyed with garancine—madder which has been treated with sulphuric acid. (See MADDER.) This is a more economical way of using madder. It is preferred for dark, heavy colors where the cloth is much covered. The soaping operation is omitted, and the colors are not as fast as those dyed with madder. Carbonate of lime, whiting, is added to the dye-beck, to neutralize the free acid in the garancine. Artificial alizarine madder red is now extensively manufactured from anthracene, a hydro-carbon obtained from coal-tar. It is employed as a substitute for the various preparations of the madder root, both in the dye-beck and in topical printing. (See ALIZARINE.) *Padded styles* are specially adapted to mineral colors. Sometimes padding is resorted to for the production of a ground of a uniform tint, the figures to be subsequently applied by topical printing. In this case the cloth is first passed through a mordant, then dried, and passed through the dye. To produce a pale blue ground the cloth is first passed through a weak iron solution, then dried, passed through chalk suspended in water to fix the iron, then through ferrocyanide of iron to produce Prussian blue. To produce a design in chrome yellow the cloth is printed with a thickened solution of acetate of lead, dried, passed through a carbonate-of-soda solution to fix the lead, and then through a solution of bichromate of potassa. A common padded style is iron buff, produced by passing through an iron solution and fixing by an alkaline bath. *Bronzes* were once a favorite style. They were prepared by padding with chloride of manganese, then through caustic soda, and finally through hypochlorite of lime. A uniform brown ground was thus produced. By printing figures with protochloride of tin mixed with pigments or decoctions, the brown color was discharged, and colored patterns on a brown ground were produced. *Topical printing* has displaced to a considerable degree the old madder styles. The colors and the mordant or fixing agent being applied to the cloth together, the operations of dunging and dyeing are rendered unnecessary, and a much greater variety of colors and shades can be employed; and as the colors do not come in contact with the whites, there is a great economy of materials. Woollen fabrics and de laines are always printed in this manner, as they are not well adapted for mordanting and dyeing in the madder style, owing to the affinity which wool possesses for most coloring-matters. *Steam colors* are produced by printing upon the cloth the madder and dyewood extracts, mixed with the mordants, to fix them and to produce the desired tints, and properly thickened. On exposing the dried and aged cloth to steam, an intimate union of the color, mordant, and fibre is effected. Such goods are very brilliant and permanent to light, but do not withstand hot soap solution, which alters the shades. For steam reds, prepara-

FIG. 8.



Eighteen-color Machine.

tions of madder, cochineal, and various dyewood extracts, especially Brazil-wood, are employed. Madder extract, nearly pure alizarine, prepared from madder root by various processes, is extensively used, not only for pinks and reds, but also for purples and chocolates. Artificial alizarine is now largely used in place of madder extract. For reds and pinks it is mixed, in the form of paste, with solutions of acetate of alumina and acetate of lime, and a thickening composed of wheat starch, acetic acid, gum tragacanth, and olive oil boiled to a paste with water. For purples, pyrolignate of iron is used in place of acetate of alumina. Cochineal is prepared for steam-printing by boiling the cochineal liquor with starch, and adding oxalic acid and protochloride of tin.

For steam yellows, either decoction of quercitron bark mixed with alum and gum senegal, or a decoction of Persian berries with alum, protochloride of tin, and gum senegal, is employed. Prussian blue is ground with chloride of tin and thickened for topical printing. To convert it into green the cloth, after rinsing, is passed through a solution of bichromate of potash. *Spirit colors* are extremely brilliant topical tints, obtained by the use of larger proportions of the spirits or metallic mordants. As they are applied very strong and acid, they cannot be steamed, but are simply dried in the air, aged, and rinsed with water. For a spirit purple a mixture of logwood liquor, thickened with starch, to which some perchloride of tin is added as a mordant, is employed. For chocolate, extract of Brazil-wood and extract of logwood, with the chlorides of tin and copper, properly thickened, is used. For red, peach-wood liquor, with starch, nitrate of copper, perchloride of tin, chloride of tin and ammonium, and oil. *Aniline black* is a topical style recently introduced, which has almost entirely displaced logwood and other blacks for certain kinds of patterns. It is produced by printing a thickened mixture of an aniline salt with a powerful oxidizing agent, such as chlorate of potassa, with chloride of ammonium, sulphate of copper, etc. The color is developed by steaming, and the goods are finally passed through a weak solution of carbonate of soda. When applied to large surfaces this black injures the strength of the fabric; its use is consequently restricted to light patterns showing a large proportion of white. It is also specially adapted for use with other topical styles. It is practically indelible. By substituting naphthylamine for the aniline salt the beautiful naphthylamine violet is produced.

Aniline Styles.—While the different aniline colors are more especially adapted to wool and silk dyeing and printing, they are nevertheless employed to some extent in calico-printing, either in the dye-beck or by topical application as steam colors. In the former case the cloth is printed with (1) albumen, caseine, gluten, or chloride of tin, followed by a nutgall decoction to produce insoluble tannates, and then passed through an acid solution of the aniline color; or the cloth is mordanted with either of the above-mentioned substances, the nutgall decoction printed on, and then passed through the acidulated color. Single tints are thus produced. For use as topical colors, to be fixed by steam, the aniline colors are mixed with albumen, gluten (either putrid or dissolved in soda-lye, weak acid or saccharate of lime), caseine in lye or weak acid, glue, tannate of glue, tannic acid, oleo-sulphuric acid, shell-lac in borax, arsenious acid in glycerine (method of Alfred Paraf), or with a solution of arsenite of alumina in acetate of alumina. The last process, devised by Perkin and Schultz, is more extensively employed than any other, except perhaps that with albumen. Of course in topical printing any desired number of aniline colors may be used at the same time. *Pigment printing* involves the application of the pigments used in painting to the surface of the cloth by means of some cementing agent. Caoutchouc dissolved in naphtha was first employed with excellent results, but the danger of fire attending the use of naphtha has caused the substitution of albumen, caseine, or gluten for the caoutchouc. The pigments generally used are ultramarine, chrome yellow and orange, Guignet green, and lampblack for drabs. *Metallic precipitates*, as tin precipitated by zinc, are sometimes printed on cloth.

Indigo Styles.—Indigo is in some respects a very peculiar dye; it is insoluble in its ordinary blue form, $C_{16}H_{10}N_2O_2$, but is changed by reducing agents, such as grape-sugar in soda-lye, or protoxide of iron, produced by the action of lime on copperas, to colorless, soluble, hydrogenized indigo, $C_{16}H_{12}N_2O_2$. By passing the cloth through such a solution, and exposing it to the air, the indigo is oxidized and becomes blue again, being fixed as an insoluble pigment in the fabric. By repeating the treatment any desired shade is obtained. By the use of reserve pastes or discharges, with topical printing, white or colored figures on a blue ground are produced. *Pencil blue* is a name given to a style of calicoes which were prepared by printing on by hand, with a piece of wood called a pencil, the colorless reduced indigo. On oxidizing it produced figures in fast blue. *The China blue or pottery style* (so called from its resemblance to old china) was once very popular, but, owing to its cost and the ease of imitating it with Prussian blue, is now almost obsolete. The blue indigo was printed on the cloth, forming blue figures on a white ground. To render the color fast, the indigo was worked into the cloth by treating it alternately with lime and copperas. *Resist styles* involve the use of a resist or reserve which protects the cloth in mordanting, dyeing, padding or covering, so that the mordant or color does not adhere. Some resists act mechanically, as clay, fat, oil, resin, wax, and sulphate of lead. Others act chemically, as citric, tartaric, or oxalic acid, or bisulphate of potassa, which are printed on cloth mordanted with alumina or iron to remove them and prevent the fixing of the color. Sulphate of zinc, sulphate and acetate of copper, and chloride of mercury are special resists used in indigo styles. *White resist*, for cylinder printing, consists of a mixture of acetate or sulphate of copper thickened with gum or dextrine. It is printed on the white cloth and allowed to dry. When the cloth is handled in the indigo vat containing the soluble colorless indigo, it is dyed a uniform blue, the insoluble indigo being precipitated as insoluble blue pigment in the fibres, except where the resist has been applied. Here the copper salt having been changed to oxide of copper by the alkali of the vat, the colorless indigo is oxidized by the oxide of copper (which becomes suboxide), and deposited on the surface. On subsequently passing the dyed goods through dilute sulphuric acid, the suboxide of copper is dissolved and the indigo detached, leaving white figures on a blue ground. Often the resist is mixed so as to contain a mordant for some other color; thus, the resist applied to cloth to be dyed in the indigo vat may contain an iron or alumina mordant; so that after the ground with the white figures is produced, the white becomes colored red, purple, or black in the dye-beck with madder, woods, or bark. This style is sometimes called *lapis*, from a remote resemblance to *lapis lazuli*.

Discharge Style.—After cloth has been uniformly dyed of one color, agents called discharges are sometimes employed to remove the color and produce a white pattern; or by adding to the discharge certain agents the original color is not only removed, but another color takes its place. By printing a mixture of tartaric acid with pipeclay and gum on a piece of cloth dyed red or purple with madder or wood, or blue with indigo, and passing it through weak hypochlorite of lime, the color will be discharged, leaving a white pattern. Were a salt of lead added to the mixture, it would be fixed by the hypochlorite of lime, and on subsequently passing the cloth through bichromate of potassa, would develop chrome yellow in place of the whites. A modification of this style is the well-known bandanna style for handkerchiefs. Several folds of cloth dyed Turkey red with madder are placed between perforated lead plates, and firmly squeezed together in a hydraulic press. A solution of chlorine is forced through the perforations, destroying the color. This is followed by water, and on removing the cloth from the press it is found to present white figures on a red ground. Indigo is oxidized to soluble isatine ($C_{16}H_{10}N_2O_4.H_{20}$), which is removed by washing, by the action of chromic acid (applied in the form of bichromate of potash), or by a mixture of potash and ferricyanide of potassium. Reducing agents are also employed as dischargers, especially the protochloride of tin, or *tin salt.* When this compound comes in contact with oxide of iron, a soluble protochloride of iron is formed, which is readily removed by washing, while at the same time the sesquioxide of tin (SuO,SuO_2) is fixed upon the cloth, and is ready to fix red or yellow dyes on the spots treated.

Combination Styles.—By combining two or more of the above styles the greatest variety of result may be obtained. Some of the finest French and English *cretonnes* exhibit the most elaborate designs and most pure and brilliant colors, and are really works of art. (For further details see URE'S "Dictionary;" MUSPRATT'S "Dictionary," especially the last German edition, from which the cuts used to illustrate this article were obtained; SCHÜTZENBERGER'S "Traité des Matières Colorantes," especially the German edition; O'NEILL'S "Dictionary of Dyeing and Calico-Printing," and KRIEG'S "Theorie und Practische Anwendung von Anilin in der Färberei und Druckerei;" the annual volumes of WAGNER'S "Jahresbericht ueber die Fortschritte der Chemischen Technologie." The following periodicals are especially devoted to dyeing and calico-printing: "Moniteur de la Teinture;" "Bulletin de la Société Industrielle de Mulhouse;" REIMANN'S "Färberzeitung;" "Die Musterzeitung für Färberei, Druckerei," etc. See also MOUSSELINE DE LAINE, SILK-PRINTING, and WOOL-PRINTING.) C. F CHANDLER.

Cal′icut, or **Kalikat,** a seaport-town of British India, presidency of Madras, on the Indian Ocean, 102 miles S. W. of Seringapatam, and about 570 miles S. S. E. of Bombay; lat. 11° 15′ N., lon. 75° 46′ E. It was the first place in India visited by Vasco da Gama, who arrived here in May, 1498. It was then a populous and important city, and it continued to be for nearly two centuries a flourishing emporium. Its prosperity has declined, partly because its harbor became filled with sand. Pop. about 24,000.

California, kal-e-for′ne-a, the largest of the Pacific States, extending from 32° 28′ to 42° N. lat., and from 114° 30′ to 124° 45′ W. lon. It is bounded N. by Oregon, E. by Nevada and Arizona, S. by Lower California, and W. by the Pacific. It has a coast-line of more than 700 miles, and an average breadth of 200 miles. Area, by the tenth census (1880), 158,360 square miles, or 101,350,400 acres, nearly equal to New England, N. Y., and Pa.

California Seal.

California, by census of 1880, ranked 24 among the States in population, 15 in value of agricultural products, and 12 in value of manufactures.

Topography: Mountains, Lakes, and Rivers.—The topography consists of two mountain-ranges more than one hundred miles apart, running from N. W. to S. E. through the whole length of the State, and with a broad valley, mostly fertile, lying between. These mountain-ranges are of varying width, sometimes consisting of three, two, or a single chain, and with spurs and outliers extending at some points nearly from one to the other. The name of the W. range is the Coast Range—not always appropriate—and its branches have many local names; the best known of these is the San Diablo range, 150 miles long by 50 broad; between this and the coast are lower ranges, as the Palo Scrito, Santa Lucia, San Rafael, and Santa Inez mountains. In Southern California this Coast Range spreads out in a confused mass of mountains extending across the State—the San Bernardino, San Jacinto, and other chains. The great E. range is the Sierra Nevada or Snowy Mountains, forming a boundary between California and Nevada for a part of the distance, but about the 38th parallel turning due S. and dividing into three parallel chains, and farther S. uniting with the Coast Range in masses of mountains and hills in a wild, rugged, and desert region. There are many lofty peaks in both ranges, though the highest are in the Sierra Nevada—Shasta, Spanish Peak, Mounts Dana, Lyell, Brewer, Tyndall, Whitney, Lassen's Butte, Pyramid Peak, and others. Some of these have been, and perhaps still are, volcanoes. What is known as the California Valley, perhaps 400 miles long and from 40 to 100 miles in width, lies between these mountain-ranges. There are also other large valleys, rich and fertile, as well as some which are waterless, barren, and deadly in their mephitic vapors. The most picturesque and remarkable of the valleys of California are the Yosemite (see Yosemite) and the Tuolumne Valley, which much resembles it. East of the Sierra is a series of lakes extending nearly the whole length of the State—Klamath, Goose, Honey, Owens, and others, some of them being alkaline, others salt, others dry most of the year, and Tahoe, one of the deepest, sweetest, purest, and most elevated lakes on the continent. In the S. E. and E. S. E. there are deep depressions (former lakes) like the Death Valley, 400 feet below the sea, and the bed of an ancient estuary, 600 feet below. In the California Valley are several important lakes, of which Clear, Tulare, and Kern are the largest. There is only one navigable river, the Salinas, which discharges its waters directly into the ocean, at the Bay of Monterey; other mountain-torrents of moderate length, not navigable, are numerous. Two important navigable rivers—the San Joaquin from the S. E. and the Sacramento from the N. E.—as well as several smaller navigable streams, flow into the San Pablo, Suisun, and San Francisco bays. Tulare Lake receives King, Kern, White, and Tule rivers. The harbors of California are San Francisco (the best on the Pacific coast), San Diego, San Pedro, San Luis Obispo, Monterey Bay, etc. There are numerous islands near the coast, some of them inhabited and cultivated. The arable lands of California, including the irrigable and swamp lands, are nearly 60,000,000 acres, and the pastoral and vinicultural about 30,000,000 more; not over one-fifteenth of the area is woodland.

Minerals.—Gold and silver have been found in paying quantities in eighteen or nineteen counties of the State, and probably exist in others—the gold pure, in scales, fine dust, nuggets, crystals, and in combination with copper, silver, lead, zinc, cinnabar, arsenic, iron, sulphur, tellurium, iridosmine, etc.; silver native, in combination with lead, copper, sulphur, iron, etc.; copper native and in many forms; quicksilver abundantly as cinnabar, and occasionally native; platinum and tin not in large quantity; lead and iron almost everywhere; arsenic, tellurium, graphite, borax, salt, soda in several forms; sulphur, gypsum, barytes, antimony, ochre, alabaster, fluor-spar, corundum, and cobalt; diamonds, tourmalines, zircon, garnets, chrysolites, etc.; coal of fair quality, petroleum, and bitumen. The gold-mining is of three kinds—common placer-mining, now nearly abandoned; hydraulic mining, which is placer-mining on a large scale; and mining in quartz veins or lodes. The silver is mined only in veins; copper may be found native, but is generally an ore and in veins or lodes.

Soil and Vegetation.—Most of the arable lands of California have a rich deep soil of wonderful fertility. Some of it requires to be quickened into activity by irrigation, but is then astonishingly productive. There are 48 genera and 105 species of forest trees already known in Cal., mostly not only indigenous, but peculiar to the Pacific slope. Forty species are evergreens, including the two sequoias or giant redwoods (see Sequoia), the sugar and fifteen other species of pine, six species of true fir, twelve of oak, white cedar, four species of cypress, manzanita, wild nutmeg, California laurel, chincapin, maples, etc. There are many valuable shrubs and small fruits, only one native grape, but all the European and eastern species and varieties flourish well, and California is becoming the vineyard of America. There are many nutritious grasses, but with few exceptions there is no sod, nor grass fit for hay. Alfalfa, wild oats, Hungarian grass, and millet are much used for feeding cattle. The flowers of California are abundant, fragrant, and beautiful.

Animals.—There are 115 species of mammals in California, 27 of which are carnivorous; they include the grizzly, black, and brown bear, raccoon, badger, 2 or 3 species of skunk, the wolverine, fisher, American sable or marten, mink, weasel, California otter and sea-otter, cougar, jaguar, 2 species of lynx, raccoon-fox or mountain-cat, gray wolf, coyote, 5 species of fox, 3 or 4 of sea-lion, 2 of seal, and the sea-elephant. There are 2 of moles, 2 of shrews, 16 species of bats, 50 species of rodents, some of them (the squirrels) specially destructive of grain; of ruminants, the elk, 3 species of deer, the American antelope, and big-horn; of cetacea, 11 species. There are 350 species of birds native to California, including a great variety of each family, order, and tribe. There are many reptiles, but no saurians, and only one poisonous serpent, the rattlesnake, of which, however, there are 5 species. The fish are of 240 species, of which 185 are edible; 60 mollusks and 8 crustaceans.

Climate.—Prof. E. W. Hilgard classifies the climate as follows: 1. Bay and coast climate; characteristics, small range of thermometer, extremes only 53° apart, means of summer and winter only 6° apart; no intense heat; frosts very rare; fogs from the sea in the afternoons of summer; rainfall averages 27.3 inches, of which about 25 are between Dec. and May. 2. Climate of the great interior valley; characteristics, average winter temperature lower than the coast, though minimum temperature about the same; frosts rare; summer heat very high—above 100° F. many days of the season; nights warm, but the dry air is less oppressive than a moist one; extreme annual range 76°; mean range, 23.6°; rainfall for year, 21.50 inches, of which 19.80 is between Dec. and May. 3. Climate of the slope of the Sierra Nevada; characteristics, considerable snowfall and much rain; cool summers, summer thunder-storms; winters often severe; mean winter temperature, 43.5°; mean summer temperature, 57.5°; mean range, 14°; rainfall, 57.24 inches. But, aside from these, there are many local climates. Even in Southern California, on the coast, the heat is not so great as in the interior valley, and the climate of Los Angeles, San Diego, and Santa Barbara is desirable for consumptive invalids. In the S. E., at Fort Yuma and in valleys adjacent, it is fearfully hot and dry.

The rainfall is only 2 or 3 inches a year, and there are from 100 to 115 days when the maximum temperature exceeds 100° F.

Agricultural Products.—Wine, grapes, and raisins occupy the front rank among these. With 60,000,000 grape-vines, most of them in full bearing and representing the choicest of European and American vines, and a climate admirably adapted to grape-culture, California can supply the whole American continent with grapes, raisins, and wine. As yet most of her wines are too strong, but they are improving. The grapes and raisins are unsurpassed anywhere. Wheat is a great crop, 29,017,707 bushels by 1880 census; barley, 12,463,561; Indian corn, 1,993,325; oats, 1,341,271; potatoes, 4,636,849; hay, 1,135,180 tons; a total value of agricultural crops, aside from fruit, of more than $100,000,000.

Farm Animals.—In 1880, 237,710 horses, 28,343 mules, 210,078 milch-cows, 454,229 oxen and other cattle, 4,152,349 sheep, and 603,550 swine.

Manufactures.—Mining and agricultural machinery, lumber for building purposes and ornamental woods, tanning and dressing of leather and leather manufactures, woollen goods of several classes, flouring-mills, the production of wine and brandy, carriages and wagons, iron manufactures and iron castings, manufactured tobacco and cigars, refined sugar, syrup, and candies (from Sandwich Islands sugar); grain-bags, gunpowder, dynamite, giant-powder, and chemicals for mining-purposes. There were in California, in 1880, 5885 manufacturing establishments; capital, $61,243,784; value of products, $116,218,973.

Mining Products.—The mines of California have not been as productive within the past few years as they were two decades ago, but they are now on the increase. The production of gold and silver in 1880 deposited in the mint, or forwarded by express companies was $18,276,166. Ten per cent. should be allowed for amounts otherwise forwarded, making the whole over $20,000,000. In 1881 the amount was about $20,000,000. The director of the mint reports that $703,736,520.80 of gold and silver had been deposited at the mints from California between 1848 and June 30, 1880. Of this, $702,058,970.35 was gold. Mr. T. F. Cronise, in his *Natural Wealth of California*, has demonstrated that this mint statement does not fully represent the product of the mines of California. He gives the amount produced each year from the most authentic data, and these, supplemented by the known products of the years since 1870, make the total product, in round numbers, $1,130,000,000. The lead parted from silver in 1879 amounted to about $1,000,000; quicksilver is produced to the extent of over $2,000,000; while the platinum, copper, lead (not charged with silver), iron, tin, borax, soda, salt, sulphur, coal (236,950 tons were mined in 1880), precious stones, building-stones, gypsum, etc., aggregate at least three times as much as the gold and silver.

Fisheries.—The census of 1880 reports the value of the products of the fisheries for that year as $1,860,714, and of the marine salt produced at $121,650.

Railways.—The number of miles of railway operated in 1880 was 2212; many miles have since been opened.

Finances.—The assessed valuation of the State in 1880 was $584,578,036, averaging $676.05 per capita; the State debt, net, was $3,306,614; local, net, $13,449,074; total, $16,755,688; the rate of taxation for all purposes was 5.5 mills on the dollar, and the amount of State and local tax in 1880, $12,628,005.

Commerce and Navigation.—The number of American and foreign vessels which entered and cleared at San Francisco and San Diego in 1880 was 633, and the tonnage 720,130 tons. The number of registered, enrolled, and licensed vessels of those ports the same year was 884, and their tonnage 202,114.30. The value of the imports from foreign countries into San Francisco in 1880 was $41,265,317; of domestic exports, $37,213,443; of foreign exports, $3,145,459; whole exports and imports, $81,624,219. The inter-State and internal commerce of the State by railways and steamers is still greater, though exact figures cannot be given. Lines of ocean-steamers ply to Alaska, Washington Territory, Oregon, and the Mexican coast, Panama, Honolulu, Chili, and Japan.

Banks.—There are 10 national banks in California, having a capital in 1881 of $3,180,073; deposits, $4,876,000 in 1880; there were also, in 1880, 111 State, savings, and private banks and trust companies, reporting $21,535,175 capital and $81,426,012 deposits.

Education.—In 1879 there were 216,404 children of school age, 156,769 enrolled, 144,806 attending; average attendance, 98,468. There were 1999 districts, 2743 schools—1000 of the first grade; 3453 teachers—1236 men, 2217 women; average monthly pay of men, $82.13; of women, $66.37; whole annual expenditure for common schools, $3,010,907; value of school property, $6,857,359; school fund, $2,011,800; children attending private schools, 15,432; not attending any school, 56,369. There are also 2 normal schools and 4 normal departments, 1 State university, with 9 literary, scientific, and professional colleges under its control; 12 other colleges, some of them having business or professional courses attached to them; 7 of these admit women as students, and there are many seminaries of high grade for women alone. There is also a school of engineering, 4 theological schools, and a scientific institution of high character, the San Francisco Academy of Sciences. There are 86 public libraries in California, numbering about 307,000 volumes. An observatory largely endowed by the late James Lick is now building. In 1880 there were 3446 public schools in California.

Churches.—All denominations are represented. The Methodists lead, with about 250 churches; the Roman Catholics come next, and then in order Presbyterians, Baptists, Congregationalists, Episcopalians, Disciples, Christian Connection, Lutherans, German Reformed, Evangelical Association, Friends, United Brethren in Christ, Jewish synagogues, Unitarians, Universalists, New Jerusalem Church, Second Adventists, Greek Church, Spiritualists, Mormons, Chinese temples, etc.

Population.—The first census of California was in 1850. Pop. 92,597; in 1870, 560,247, excluding tribal Indians; in 1880, exclusive of tribal Indians, 864,694 (white 767,181, colored 97,513, including 75,132 Chinese, 86 Japanese, and 16,277 Indians). There are about 7300 tribal Indians.

The principal towns are San Francisco, the largest city, pop. 233,959; Sacramento, capital, 21,420; Oakland, 34,555; San José, 12,567; Stockton, 10,282; Los Angeles, 11,183; Vallejo, 5987; Alameda, 5708; Marysville, 4321; Nevada, 4022; Santa Cruz, 3898; Napa, 3731; Santa Rosa, 3616; Santa Barbara, 3460; Petaluma, 3326. San Diego, San Rafael, Santa Clara, Eureka, Bodie, Red Bluff, and San Luis Obispo are thriving towns.

COUNTIES.	Ref.*	Pop. 1870.	Pop. 1880.	COUNTY TOWNS.	Pop. 1880.
Alameda	4–B	24,237	62,976	Oakland	34,555
Alpine	3–C	685	539	Markleeville	80
Amador	4–B	9,582	11,384	Jackson	1,040
Butte	3–B	11,403	18,721	Chico	3,300
Calaveras	4–B	8,895	9,094	San Andreas	597
Colusa	3–B	6,165	13,118	Colusa	1,779
Contra Costa	4–B	8,461	12,525	Martinez	
Del Norte	1–A	2,022	2,584	Crescent City	
El Dorado	3–C	10,309	10,683	Placerville	1,951
Fresno	5–C	6,336	9,478	Fresno City	1,112
Humboldt	2–A	6,140	15,512	Eureka	2,639
Inyo	5–D	1,956	2,928	Independence	
Kern	6–C	2,925	5,601	Bakersfield	801
Lake	3–A	2,969	6,596	Lakeport	562
Lassen	2–C	1,327	3,340	Susanville	943
Los Angeles	6–C	15,309	33,381	Los Angeles	11,183
Marin	4–A	6,903	11,324	San Rafael	2,276
Mariposa	4–C	4,572	4,339	Mariposa	342
Mendocino	3–A	7,545	12,800	Ukiah	933
Merced	4–B	2,807	5,656	Merced	1,446
Modoc	1–C	....	4,399	Alturas	148
Mono	4–C	430	7,499	Bridgeport	
Monterey	5–B	9,876	11,302	Salinas	1,854
Napa	3–B	7,163	13,235	Napa City	3,731
Nevada	3–B	19,134	20,823	Nevada City	4,022
Placer	3–B	11,357	14,232	Auburn	1,229
Plumas	3–B	4,489	6,180	Quincy	432
Sacramento	4–B	26,830	34,390	SacramentoCity	21,420
San Benito	5-B	....	5,584	Hollister	1,034
San Bernardino	6–D	3,988	7,786	San Bernardino	1,673
San Diego	7–D	4,951	8,618	San Diego	2,637
San Francisco	4–A	149,473	233,959	San Francisco	233,959
San Joaquin	4–B	21,050	24,349	Stockton	10,282
San Luis Obispo	5–B	4,772	9,142	San Luis Obispo	2,243
San Mateo	4–A	6,635	8,669	Redwood City	1,383
Santa Barbara	6–C	7,784	9,513	Santa Barbara	3,460
Santa Clara	4–B	26,246	35,039	San José	12,567
Santa Cruz	4–B	8,743	12,802	Santa Cruz	3,898
Shasta	2–B	4,173	9,492	Shasta	448
Sierra	3–C	5,619	6,623	Downieville	650
Siskiyou	1–B	6,848	8,610	Yreka	1,059
Solano	4–B	16,871	18,475	Fairfield	424
Sonoma	3–A	19,819	25,926	Santa Rosa	3,616
Stanislaus	4–B	6,499	8,751	Modesto	1,693
Sutter	3–B	5,030	5,159	Yuba City	
Tehama	2–B	3,587	9,301	Red Bluff	2,106
Trinity	2–A	3,213	4,999	Weaverville	
Tulare	5–C	4,533	11,281	Visalia	1,412
Tuolumne	4–C	8,150	7,848	Sonora	1,492
Ventura	6–C	....	5,073	S.Buenaventura	1,370
Yolo	3–B	9,899	11,772	Woodland	2,257
Yuba	3–B	10,851	11,284	Marysville	4,321
Total		560,247	864,694		

History.—Present State of California, discovered by J. R. Cabrillo, a Portuguese navigator in the Spanish service, in 1542; he named Cape Mendoza, now Cape Mendocino, and the Farallones Islands. In 1578, Sir Francis Drake discovered and landed at Drake's Bay and took possession

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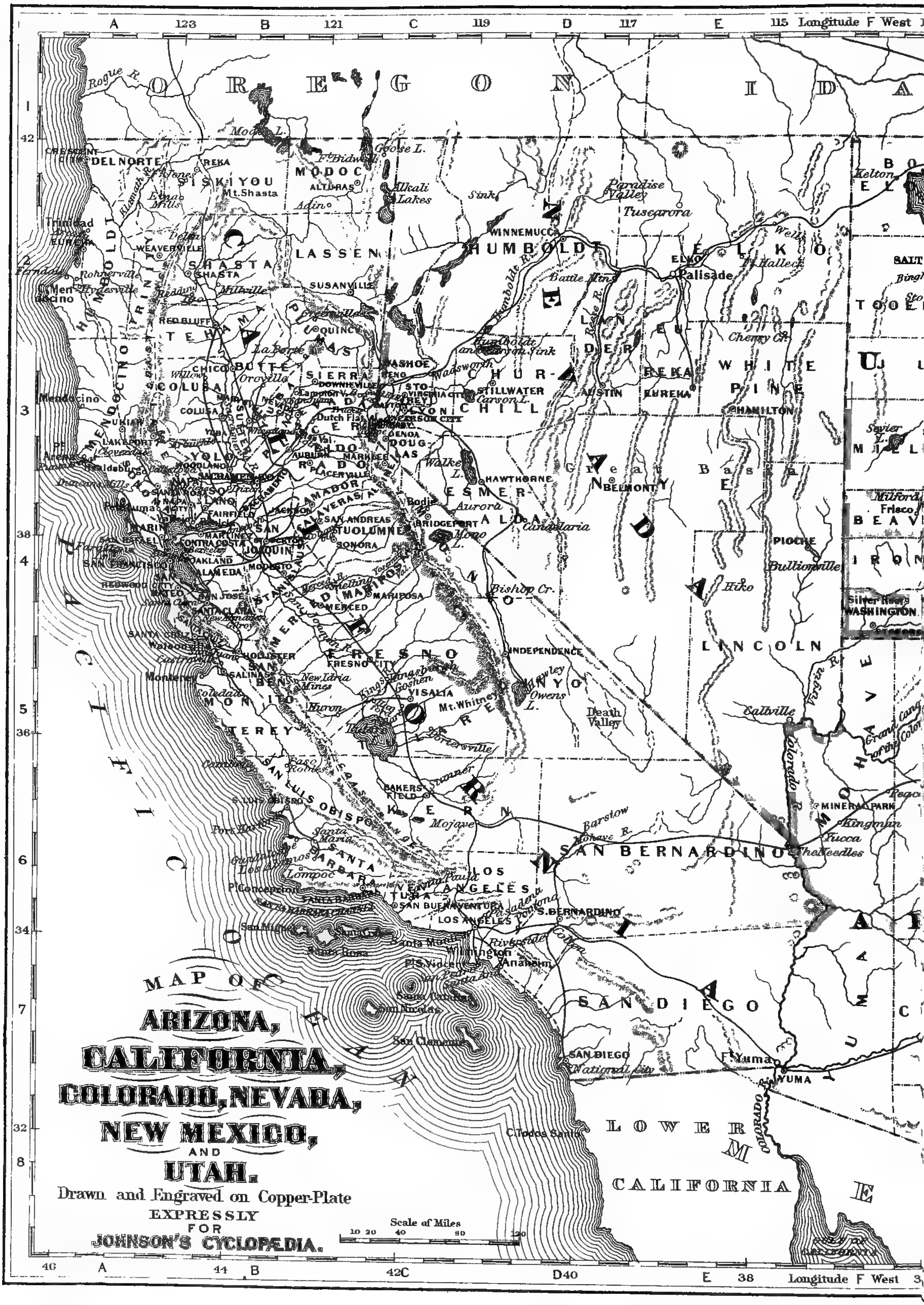
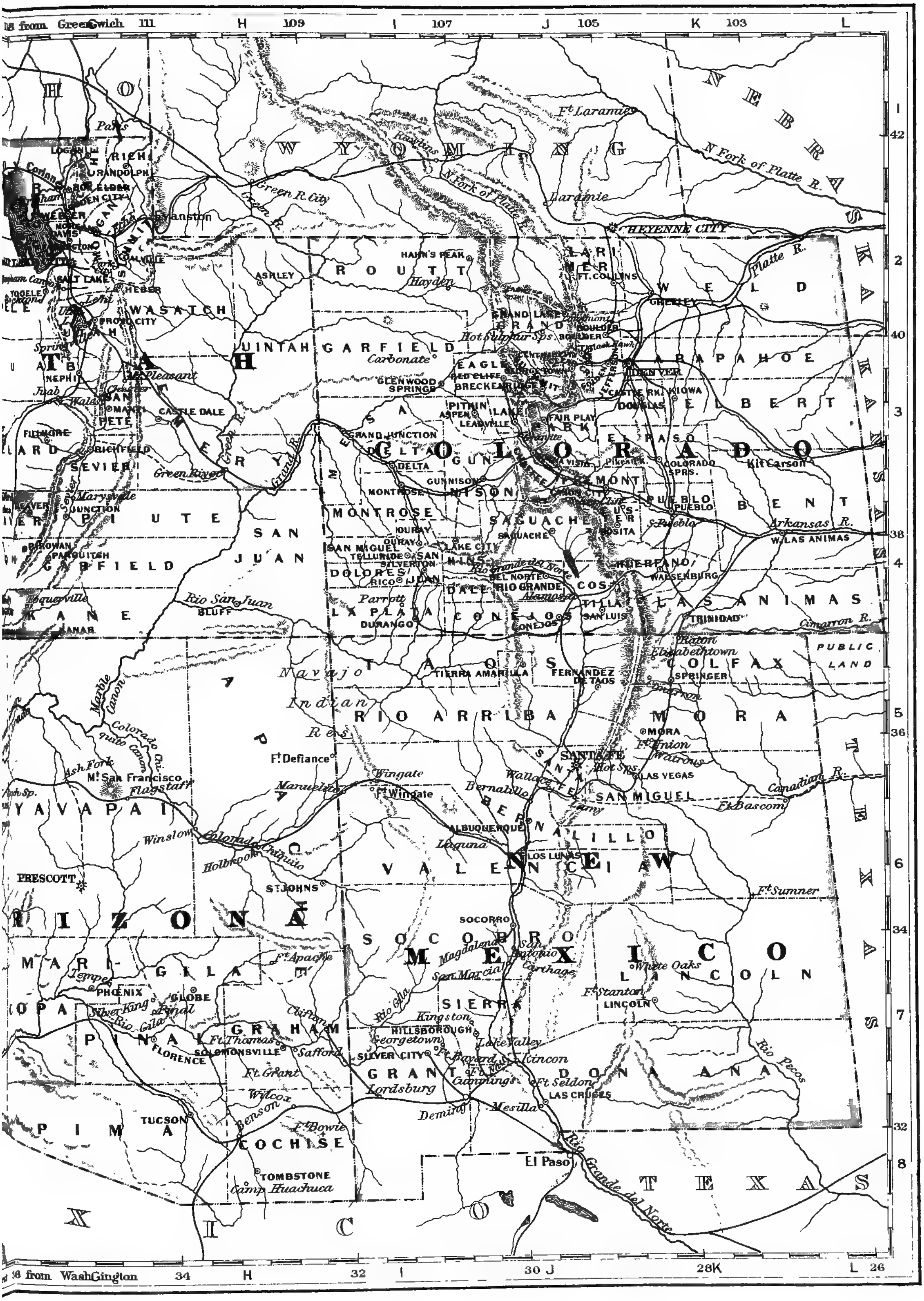
* Reference for location of counties. See map of California.



MAP OF
ARIZONA,
CALIFORNIA,
COLORADO, NEVADA,
NEW MEXICO,
AND
UTAH.
Drawn and Engraved on Copper-Plate
EXPRESSLY
FOR
JOHNSON'S CYCLOPÆDIA.



from Greenwich 111 H 109 I 107 J 105 K 103 L
W Y O M I N G
NEBRASKA
KANSAS
TEXAS
Ft Laramie
N Fork of Platte R.
Laramie
Rawlins
Green R. City
Evanston
CHEYENNE CITY
Platte R.
HAHN'S PEAK
ROUTT
Hayden
ASHLEY
LARIMER
FT. COLLINS
WELD
GREELEY
GRAND LAKE
GRAND
BOULDER
Hot Sulphur Sps.
UINTAH
GARFIELD
Carbonate
ARAPAHOE
DENVER
GLENWOOD SPRINGS
EAGLE
RED CLIFF
BRECKENRIDGE
SUMMIT
PITKIN
ASPEN
LAKE
LEADVILLE
FAIR PLAY
PARK
CASTLE RK.
KIOWA
DOUGLAS
ELBERT
MESA
GRAND JUNCTION
DELTA
COLORADO
GUNNISON
EL PASO
COLORADO SPRS.
Kit Carson
MONTROSE
FREMONT
CANON CITY
PUEBLO
BENT
SAGUACHE
CUSTER
ROSITA
Arkansas R.
W. LAS ANIMAS
OURAY
LAKE CITY
HINSDALE
SAN MIGUEL
TELLURIDE
SILVERTON
SAN JUAN
DOLORES
RICO
Rio Grande del Norte
DEL NORTE
RIO GRANDE
Alamosa
COSTILLA
SAN LUIS
HUERFANO
WALSENBURG
LAS ANIMAS
TRINIDAD
Cimarron R.
Parrott
LA PLATA
DURANGO
CONEJOS
Raton
Elizabethtown
PUBLIC LAND
COLFAX
SPRINGER
Cimarron
TAOS
TIERRA AMARILLA
FERNANDEZ DE TAOS
RIO ARRIBA
MORA
Ft Union
Watrous
LAS VEGAS
SANTA FE
Hot Sps.
Wallace
Lamy
SAN MIGUEL
Canadian R.
Ft Bascom
Bernalillo
BERNALILLO
ALBUQUERQUE
Laguna
LOS LUNAS
VALENCIA
NEW
MEXICO
Ft Sumner
Navajo Indian Res
Ft Defiance
APACHE
Wingate
Ft Wingate
Manuelito
SOCORRO
Magdalena
San Antonio
Carthage
San Marcial
White Oaks
LINCOLN
Ft Stanton
SIERRA
Kingston
HILLSBOROUGH
Lake Valley
Georgetown
SILVER CITY
Ft Bayard
Rincon
GRANT
Cummings
Ft Seldon
DONA ANA
Rio Pecos
Lordsburg
Deming
Mesilla
LAS CRUCES
El Paso
Rio Grande del Norte
TEXAS
MEXICO
UTAH
LOGAN
RICH
RANDOLPH
BOX ELDER
WEBER
DAVIS
SALT LAKE
TOOELE
HEBER
WASATCH
PROVO CITY
NEPHI
Juab
SAN PETE
Mt Pleasant
CASTLE DALE
EMERY
Green R.
Grand R.
Green River
FILLMORE
MILLARD
RICHFIELD
SEVIER
Marysville
JUNCTION
BEAVER
PIUTE
PAROWAN
PANGUITCH
GARFIELD
SAN JUAN
Rio San Juan
BLUFF
KANE
KANAB
Marble Canon
Colorado Chiquito Canon
Ash Fork
Mt San Francisco
Flagstaff
YAVAPAI
Winslow
Colorado Chiquito
Holbrook
PRESCOTT
ST JOHNS
ARIZONA
MARICOPA
GILA
Ft Apache
Tempe
PHOENIX
GLOBE
Silver King
Pinal
Rio Gila
Clifton
PINAL
GRAHAM
Ft Thomas
FLORENCE
SOLOMONSVILLE
Safford
Ft Grant
Wilcox
Benson
TUCSON
PIMA
Ft Bowie
COCHISE
TOMBSTONE
Camp Huachuca
42 40 38 36 34 32
1 2 3 4 5 6 7 8
from Washington 34 H 32 I 30 J 28K L 26

of the country, calling it New Albion. It was again explored by the Spaniard S. Viscayno in 1602, but no attempt made at settlement till 1769, when the Franciscan Fathers planted a mission at San Diego, and six others in the next seven years, the last—San Francisco—being established in 1776 as the Mission Dolores. Within fifty years they had founded twenty-one of these missions, had accumulated enormous wealth in live-stock, gold and silver, and buildings and lands, and had reduced more than 20,000 Indians to slavery, treating them with the utmost cruelty; the Indians of the interior were left to themselves. With the downfall of the Spanish power in Mexico these missions waned, and were finally abolished and confiscated in 1845. Then came a great rush of immigrants from all quarters. In 1847 Com. Stockton captured California and drove the Mexican forces out of the country. There was some conflict of authority between Com. Stockton and Gen. S. W. Kearney, but it was soon settled, and Col. R. B. Mason appointed governor. In Oct., 1849, a constitution was framed by a convention, and ratified by the people Nov. 13, 1849. After a long and angry debate and discussion, lasting from Dec. 22, 1849, to Sept. 1, 1850, the State was admitted to the Union. Gold was discovered in Feb., 1848, on the estate of Gen. Sutter in Coloma, and there was an instant rush thither, till, four years later, there were 250,000 men in the State, many of them energetic, daring, reckless persons capable of almost any crime. Gambling, intemperance, licentiousness, theft, and murder were rife. A vigilance committee of the best citizens was formed in 1851, and some of the worst villains tried and hanged. In 1855 the ruffians had regained their power, and seized upon the courts and offices. The vigilance committee was reorganized and broke up the gang of villains, hanging four, driving one to suicide, and banishing about twenty. Since that time the State has been quiet and prosperous, though threatened with disorder in 1879 and 1880 on account of the Chinese. It bore an excellent record in the late civil war in its contribution of men and means. The Union and Central Pacific R. Rs. were completed in 1869, and now the State is connected with the East by several lines, and others are in rapid progress.

GOVERNORS.

Spanish Rule.

Gaspar de Portala	1767–71	José J. de Arrillaga.	1792–94
Felipe de Barri	1771–74	Diego de Borica	1794–1800
Felipe de Neve	1774–82	José J. de Arrillaga	1800–14
Pedro Fajés	1782–90	José Arguello	1814–15
José Antonio Roman	1790–92	Pablo Vicente de Sola	1815–22

Mexican Rule.

Pablo Vicente de Sola	1822–23
Luis Arguello	1823–25
José Maria de Echeaudia	June 1825–Jan. 1831
Manuel Victorio	Jan. 1831–Jan. 1832
Pio Pico	Jan. 1832–Jan. 1833
José Figueroa	Jan. 1833–Aug. 1835
José Castro	Aug. 1835–Jan. 1836
Nicolas Gutierrez	Jan. 1836–Apr. 1836
Mariana Chico	Apr. 1836–Aug. 1836
Nicolas Gutierrez	Aug. 1836–Nov. 1836
Juan B. Alvarado	Nov. 1836–Dec. 1842
Manuel Micheltorena	Dec. 1842–Feb. 1845
Pio Pico	Feb. 1845–July 1846

American Military and Territorial Rule.

Com. John D. Sloat	July 7, 1846–Aug. 7. 1846
Com. Robert F. Stockton	Aug. 17, 1846–Jan. 1847
Col. John C. Fremont	Jan. 1847–Mar. 1, 1847
Gen. Stephen W. Kearney	Mar. 1, 1847–May 31, 1847
Col. Richard B. Mason	May 31, 1847–Apr. 13, 1849
Gen. Bennet Riley	Apr. 13, 1849–Dec. 1849

State Government.

Peter H. Burnett	Dec. 1849–51	Frederick F. Low	1863–68
John McDougall (act'g)	1851–52	Henry H. Haight	1868–72
John Bigler	1852–56	Newton Booth	1872–75
J. Neely Johnson	1856–58	William Irwin	1875–79
John B. Weller	1858–60	George C. Perkins	1879–83
Milton S. Latham	1860	George Stoneman	1883–87
John G. Downey	1860–62		
Leland Stanford	1862–63		

L. P. BROCKETT.

California, on R. R., capital of Moniteau co., Mo. (see map of Missouri, ref. 4–G, for location of county), 150 miles W. of St. Louis. It is the geographical centre of the State, has fine county buildings, graded schools, public library, and is surrounded by a rich agricultural district, abounding in lead and other minerals. Pop. in 1880, 1427.

California, Washington co., Pa. (see map of Pennsylvania, ref. 5–A, for location of county), on R. R. and Monongahela River, has a normal school, coal-mines, etc. Pop. in 1870, 659; in 1880, 1009.

California, Gulf of, or **Sea of Cortes** [Sp. *Mar Bermejo*], an arm of the Pacific Ocean, separates the peninsula of Lower California from Sinaloa and Sonora. It is about 700 miles long, and 40 to 100 miles wide.

California, Lower or **Old,** a long, narrow peninsula, a territory of Mexico, is bounded on the N. E. by the Gulf of California, and on the S. W. by the Pacific Ocean. It is about 750 miles long, and varies in width from 30 to 150 miles. Its most southern point, Cape Lucas, is in lat. 22° 52′ N., from which it extends in a N. N. W. direction to lat. 32° 30′ N. It is a mountainous, arid region of volcanic formation, having a sparse population. Capital, La Paz. This peninsula was discovered by Grijalva in 1534. Pop. in 1880, 23,195.

California, University of, was established by an act of the State legislature approved Mar. 23, 1868. It was an outgrowth of the College of California, which was chartered in 1855, and maintained on a non-sectarian basis. Prof. Henry Durant opened its preparatory school at Oakland, and thus became one of the earliest pioneers of education in the State. In 1860 the college admitted its first class, and it graduated classes yearly, 1864–69. It had no president. Rev. S. H. Willey (Dartmouth, 1845) was vice-president 1863–69. Finding the college fettered by its want of endowments, and wishing to see a larger and stronger institution, the trustees in 1867 offered all their property to the State. This included a new, unoccupied site of 160 acres at Berkeley, 5 miles N. of Oakland, and 9 miles from San Francisco. The State had accepted the Congressional provision for an agricultural college. A proposition to unite all interests in a university adequate to the wants and worthy of the name of the State was agreed to. The first board of regents, appointed in 1868, kept the college in existence another year. In 1869 the university received its first class and in 1884 numbered 215 students, had already five large buildings at Berkeley, and an endowment of something over $1,600,000.

The first president of the university, elected in 1870, was Henry Durant, LL.D. President Daniel C. Gilman resigned in 1875, and was succeeded by John Le Conte, LL.D. In 1881, W. T. Reid became president; he was succeeded by Prof. E. S. Holden.

REVISED BY W. T. REID.

Calig'ula (CAIUS CÆSAR), a Roman emperor, born at Antium in 12 A. D., was a son of Germanicus. His mother was Agrippina, a granddaughter of the emperor Augustus. He succeeded to the throne 37 A. D., at the death of Tiberius, against whose cruel jealousy he had guarded himself by habitual dissimulation. His reign was at first mild and popular, with an ostentation of generosity, but he soon showed himself a monster of cruelty, and indulged his vicious propensities without restraint. He expressed a wish that all the Roman people had but one head, that he might decapitate them at one blow. He ordered that sacrifices should be offered to himself as a god. In 41 A. D. he was assassinated by conspirators.

Ca'liph [Ar. *khalifah*, a "successor"], the "commander of the faithful," the spiritual and temporal head of orthodox Mohammedanism—so called as being the "successor" of Mohammed. The caliphs are usually classed as follows: (1) The five "Arabian caliphs" of Medina, A. D. 632–661; (2) the fourteen "Ommyiades" of Damascus, 661–750; (3) the thirty-seven "Abbasides" of Bagdad 750–1258; besides these there were rival caliphates; (4) in Egypt the "Fatimites," fourteen in number, 909–1171; and (5) in Cordova, 756–1031, there were twenty-two successive caliphs (Ommyiades) who had authority in Spain and N. W. Africa. The caliphate of Persia, representing the Shiite, or protestant, wing of Mohammedanism, dates from 1502; the caliphate of the sultan of Turkey dates from 1517. Besides these caliphates, there were, between the ninth and thirteenth centuries, thirteen Mohammedan dynasties—eight in Central Asia, three in Western Asia, and two in Africa.

Calisaya, Calisaya Bark. See CINCHONA.

Calisthenics. See CALLISTHENICS.

Calisto'ga, on R. R., Napa co., Cal. (see map of California, ref. 3–B, for location of county), is celebrated for its warm springs and its picturesque scenery. Pop. in 1880, 467.

Calix'tines, the name given to a party of the Hussites, because they insisted on giving the cup (calyx) in the Eucharist to all who were not guilty of mortal sins. They defeated the Taborites (the other branch of the Hussites) in a battle at Lippau (1434). The Calixtines had been reconciled to the pope in 1433. The term Calixtines has also been applied to the adherents of G. Calixtus, a Lutheran professor of theology at Helmstedt. (See CALIXTUS.)

Calix'tus, originally **Callisen** (GEORGE), an eminent Protestant theologian, born at Medelbye, in Sleswick, Dec. 14, 1586. He became professor of theology at Helmstedt in 1614, and wrote several treatises against the doctrines of the Roman Catholics. He was distinguished for his learning and tolerance as well as his talents. Among his works are an "Epitome of Moral Theology" (1634) and "De Tolerantia Reformatorum" ("On the Tolerance of Reformers," 1658). He was accused of heresy and cryptopapism by some Lutherans, but his doctrines were accepted by many followers, who were called Calixtines. Died Mar. 19, 1656. (See W. C. Dowding, "Life of Calixtus," 1864.)

Calixtus I. (Pope), Saint, succeeded Zephyrinus 219 A. D. Died 223.—Calixtus II. succeeded Gelasius II. in 1119. He concluded the concordat of Worms with the emperor Henry V., which ended the difficulty with respect to investitures. Died Dec. 12, 1124.—Calixtus III. (Alonzo Borgia), born in 1379 in Valencia, succeeded Nicholas V. in 1455. He attempted to institute a crusade, without success. Died Aug. 6, 1458.

Cal'la, a genus of plants of the natural order Araceæ. The genus is characterized by a flat spathe, within which is a cylindrical spadix covered with naked flowers, appearing as a mere mixture of stamens and pistils, and a 1-celled ovary. The *Calla palustris* is a native of Europe and the U. S., growing in swamps and bogs. It has cordate leaves, a white spathe, and very acrid rhizomes, which are cooked for food by the Laplanders. The *Calla Æthiopica* or *Richardia Æthiopica* is prized for the beauty of its flowers.

Calla'o, a fortified town of Northern Peru, on the Pacific Ocean, 6 miles W. of Lima, of which it is the port; lat. 12° 4′ S., lon. 77° 13′ W. It is connected with Lima by a railway, and has a commodious quay and a fine fortress. The harbor or roadstead, which is sheltered by the island of San Lorenzo, is the best on the coast of Peru. The chief exports are specie, copper, cotton, hides, and bark. The town was destroyed by an earthquake in 1746. Pop. 33,502.

Callaway (Elisha). See Appendix.

Call'cott (Sir Augustus Wall), an English landscape painter, born at Kensington (London) Feb. 20, 1779. He was chosen a member of the Royal Academy in 1810, was knighted in 1837, and became conservator of royal pictures in 1844. Among his works are "Morning," "Evening," and "Harvest in the Highlands." Died Nov. 25, 1844.

Callcott (John Wall), Mus. Dr., an eminent English composer, a brother of the preceding, was born at Kensington in 1766. He composed many anthems, glees, and other pieces of music. He published a "Musical Grammar" (1805). Died in May, 1821.

Calle'ja (Don Felix del Rey), a Spanish general, born in 1750. He commanded the royal army in Mexico against the insurgents who revolted in 1810, and he became viceroy of Mexico in 1813. Died in 1820.

Cal'lender (John), born in Boston, Mass., in 1706, graduated at Harvard in 1723, became pastor of the Baptist church of Swansey, Mass., in 1728, and in 1731 of the church at Newport, R. I. His best-known work is a centennial historical discourse, delivered in 1738, which is of great value in the early history of Rhode Island. Died Jan. 26, 1748.

Callic'rates [Gr. Καλλικράτης], an eminent Greek architect who flourished about 440 B. C. Among his works was the Parthenon of Athens, in which he was assisted by Ictinus. It was adorned with sculptures by Phidias, and was surrounded by forty-six Doric columns.

Callicrat'idas [Gr. Καλλικρατίδας], a Spartan general who obtained command of the fleet in 406 B. C. He defeated the Athenian general Conon, and blockaded him at Mitylene. The Athenians soon sent to the relief of Conon another fleet, which defeated the Spartans at Arginusæ in 406 B. C. Callicratidas was killed in this action.

Callig'onum, a genus of plants of the order Polygonaceæ, having a quadrangular fruit (*achenium*) winged at the angles. The *Calligonum Pallasia*, a succulent shrub, is found in the sandy steppes near the Caspian Sea. Its acid fruit and shoots serve to allay the thirst of travellers. From its root exudes a nutritious gum which is similar to tragacanth, and is used as food by the Calmucks.

Callig'raphy [Gr. καλλιγραφία, from κάλλος, "beauty," and γραφή, "writing"], the art of beautiful writing. The scribes who copied manuscripts before the invention of printing have been termed calligraphers or calligraphists. Their art consisted not merely in writing, but also in embellishing their work with ornamental devices. (See Illumination.) Some extant manuscripts, written in the early part of the Middle Ages, exhibit admirable specimens of the art, with letters of gold, vermilion, etc.

Callim'achus, a Greek sculptor and architect who is supposed to have lived about 450–400 B. C. His statues were finely finished. The invention of the Corinthian capital is ascribed to him.

Callimachus [Gr. Καλλίμαχος], a celebrated Greek poet and grammarian, was born at Cyrene, and flourished about 260–240 B. C. He was patronized by Ptolemy Philadelphus, and was appointed chief librarian of the great Alexandrian library. He was a prolific writer and an eminent teacher; among his pupils was Eratosthenes. He wrote an epic poem, "Galatea," several important prose works, and tragedies, elegies, comedies, etc. His works are nearly all lost, except his epigrams and hymns. Quintilian regarded him as the best of the Greek elegiac poets.

Calli'nus [Καλλῖνος] **of Ephesus,** the earliest of the Greek elegiac poets, is supposed to have lived about 600 or 650 B. C. Only small fragments of his poems are extant.

Calli'ope [Gr. Καλλιόπη], one of the Nine Muses, presided over epic poetry, and was said to be the mother of Orpheus and Linus. She was represented as holding a tablet or closely-rolled parchment in her hand.

Callip'pic Period, a correction of the Metonic cycle, proposed by Callippus. The Metonic cycle was a period of nineteen solar years, at the end of which the new moons return again on the same days of the year. The period contained exactly 6940 days. Now, 6940 days exceed 235 lunations by only seven hours and a half. At the end of four cycles, or seventy-six years, the accumulated excess of seven and a half hours amounts to one day and six hours. Callippus proposed to quadruple the period of Meton, and to deduct a day at the end of it.

Callip'pus, or **Calippus** [Gr. Κάλλιππος or Κάλιππος], an ancient Greek astronomer, born at Cyzicus, lived about 330 B. C. at Athens. He associated with Aristotle. He invented a new cycle of seventy-six years, which was adopted by astronomers, and was called the "Callippic Period." It began 331 B. C.

Callis'thenes [Gr. Καλλισθένης], an historian, born at Olynthus, in Thrace, about 365 B. C., was a relative and pupil of Aristotle. He accompanied Alexander the Great in his expedition against Persia in 334 B. C., and gained the favor of that prince, but afterwards offended him by his boldness of speech, and was put to death on a charge of treason in 328 B. C. He left a history of Alexander's expedition against Persia, which is not extant.

Callisthen'ics, or **Calisthenics** [from the Gr. κάλλος, "beauty," and σθένος, "strength"], a system of exercises designed to promote beauty and strength; in other words, to impart grace of movement and physical strength at the same time. These exercises are better adapted to girls than ordinary gymnastics, as they do not subject the muscles to so violent a tension. The apparatus used in these exercises consists of a light wooden staff about four feet long, a pair of light dumb-bells, parallel bars, two square weights, and a short roller fixed in sockets near the top of an open doorway.

Callis'tratus [Gr. Καλλίστρατος], an eloquent Athenian orator who lived about 380–360 B. C. His eloquence and the applause which he received excited the emulation of Demosthenes, and induced him to cultivate the art of oratory. Callistratus was banished from Athens in 361 B. C. Having returned without permission, he was put to death.

Cal'litris, a genus of trees of the order Coniferæ. *Callitris quadrivalvis*, a large tree of Barbary, called arar, yields a very hard, almost indestructible, fragrant wood, and the aromatic gum-resin called sandarach. The timber is highly prized, and is used for floors of mosques.

Callot (Jacques), a French engraver, born at Nancy in 1592 of a noble family, who greatly opposed his pursuit of art as a profession. He studied at Rome, and attained great excellence, chiefly as an etcher and designer; was patronized by Richelieu and Louis XIII., for whom he executed battle-pieces. Among his works is notable the series of etchings "Les Misères de la Guerre." His drawings are highly esteemed, and were executed with great care. Died March 24, 1635.

Calluna. See Heath.

Cal'lus [Lat.], the exuded material by which fractured bones are consolidated together. If the broken ends are accurately adjusted, there is merely a slight deposition of callus between the two surfaces; if, however, the adjustment is not accurate, it is effused in such quantity as often to form a considerable hard swelling round the seat of the fracture; any excess is, however, usually absorbed during the last stage of the repair of a fracture. The term callus is also applied to the thick skin formed on hands or feet which are exposed to much rubbing and pressure.

Calmar. See Kalmar.

Calmet (Augustine), a learned French Benedictine and commentator on Scripture, was born near Commercy, in Lorraine, Feb. 26, 1672. He became in 1728 abbot of Senones, where he resided for many years. He published besides other works, a "Commentary on the Bible" (23 vols., 1707–16), and a "Historical and Critical Dictionary of the Bible" (2 vols. folio, 1720), which was translated into several languages. Died Oct. 20, 1757.

Calms. *Equatorial Calms.*—A belt of calms, variable winds, sudden squalls, and tornadoes, and almost daily thunder-showers, situated about and somewhat N. of the equator, 4° to 6° of latitude in breadth, and separating the two bodies of N. E. and S. E. trade-winds. This is the region where the heated air at the equator ascends to return from the height of the atmosphere towards the poles. (See WINDS, GENERAL CIRCULATION OF.)

Calms of the Tropics of Cancer and Capricorn.—Two belts of calms and light winds, almost rainless, situated in the neighborhood of, but outside, the tropics. They are found at the polar limit of the trade-winds, which they separate from the region of variable winds of the temperate zones. Each belt occupies but a few degrees in latitude, but the position and limits of both are less defined than those of the equatorial belt. The region of the calms of Cancer, in the Atlantic, is called by American mariners the *horse latitudes.* It is said that in colonial times the numerous vessels freighted with horses from New England for the West Indies were often long detained in these dreaded calms, under the burning rays of the sun of these latitudes, causing a great mortality among their living freight. Hence the name. (See WINDS, GENERAL CIRCULATION OF.) ARNOLD GUYOT.

Cal'mucks, or **Kalmuks,** called by the Tartars *Khalimick* ("renegades"), the largest of the Mongolian peoples, inhabiting large regions of the Chinese and also Russian dominions. There are four tribes: the Choshots, ruled by descendants of Gengis Khan; the Soongars, in the seventeenth and eighteenth centuries the masters of the other races; oppressed by the Chinese, they migrated in great numbers in 1758 to Russia, but, finding the new yoke still more grievous, returned in 1770 to Soongaria; the Derbets, who dwell in the valleys of the Don and Ili; the Torgots, formerly united with the Soongars. The former in 1616 removed to the plains of the Volga, but a large part sought their native regions again. The Calmucks are a nomadic race. Their wealth consists in herds of horses, camels, sheep, and cattle. In Russia there are at present about 85,000, the greater part of whom are found in Astrakhan and are Lamaists in religion. The European Calmucks are mostly Booddhists, but some are Mohammedans and some are Christians.

Calomar'de (FRANCISCO TADEO), COUNT, a Spanish minister of state, born at Villel in 1775. He studied law, joined the absolutist party, and became in 1823 minister of grace and justice. He persecuted the liberals, favored the Jesuits, and abused his power with cruelty. In 1833 he was disgraced and exiled in consequence of his abortive intrigues to raise Don Carlos to the throne. Died in 1842.

Cal'omel [from the Gr. καλός, "beautiful," "good," and μέλας, "black," perhaps so named because it was supposed to be good for black bile] is one of the compounds of mercury (Hg) and chlorine (Cl), known to chemists as the subchloride of mercury, or, according to the new nomenclature, mercurous chloride (Hg_2Cl_2). It is prepared by taking two equal portions of mercury, dissolving one portion in hot sulphuric acid, which forms sulphate of mercury, then adding the second part, and triturating the whole in a mortar till the metal becomes incorporated with the sulphate. This mixture is added to one-half its weight of common salt, and heated in a retort, when calomel condenses in the cool part of the receiver as a white powder. It is also sometimes prepared by precipitation. A minute quantity of corrosive sublimate which accompanies it is removed by washing. Calomel is very heavy. It is not soluble in water, and sparingly so in acids. It turns black on the addition of lime-water, potash, soda, or ammonia. When heated it sublimes unaltered, and readily condenses again on any cool surface held near it. Its medicinal properties are of a decided character, and though capable of being misused, and thus doing great harm, it is still of great value in the treatment of certain diseases. REVISED BY WILLARD PARKER.

Calonne, de (CHARLES ALEXANDRE), a French courtier, born at Douay in 1734. He was appointed controller-general of finances in 1783, at a time when the public revenue was not equal to the expenses of the state. He was profuse in the expenditure of the public money, and supplied the deficit by loans, extraordinary taxes, and other temporizing expedients, in which he showed himself fertile. In 1786 he advised the king to convoke an assembly of the Notables, in order to devise some remedy for the financial crisis. He was removed from office in 1787. Died Oct. 30, 1802.

Calophyl'lum [from the Gr. καλός, "beautiful," and φύλλον, a "leaf"], a genus of trees of the order Guttiferæ, natives of warm climates. Some of the species produce edible fruits and valuable timber. The resin called East Indian tacamahac exudes from the trunk of *Calophyllum Inophyllum*, a beautiful tree, which has large shining leaves and fragrant white flowers. This is one of the most valuable timber trees of the South Sea Islands. The timber is very durable, and resembles mahogany, but is of a lighter color. It is used for building and for the masts of vessels. The fruit of this and the other species is a drupe.

Caloric. See HEAT, by PROF. W. P. TROWBRIDGE.

Caloric Engine. See HOT-AIR ENGINE, by PRES. F. A. P. BARNARD.

Calorimo'tor [from *calor*, "heat," and *moveo, motum*, "to move"], a name given to a peculiar form of the voltaic apparatus, invented by Dr. Hare, composed of one pair of plates, which have great extent of surface, the electricity of which, when transmitted through good conductors, produces intense heat.

Calottistes (*Le Régiment de la Calotte*), an association of wits and satirists under the reign of Louis XIV. They were so called from their custom of sending to a public character who had made himself ridiculous a "patent," authorizing him to wear the *calotte*, a small cap, to protect the weak part of his head. The society was dissolved under the ministry of Cardinal Fleury.

Caloy'ers (*i. e.* "good old men"), [from the Gr. καλός, "good," and γέρων, an "old man"], a name applied to the monks of the Greek Church. They mostly follow the rule of Saint Basil, but those at Mount Sinai and Mount Lebanon follow the rule of Saint Anthony; from the caloyers the bishops and patriarchs are chosen. Among their numerous monasteries those of Mount Sinai in Asia and Mount Athos in Europe are the most celebrated.

Cal'pee, or **Kalpee,** a city of India, in Bundelcund, is on the right bank of the Jumna, in lat. 26° 7′ N., lon. 97° 28′ E. It is 46 miles S. W. of Cawnpore. Paper and refined sugar of superior quality are made here. Calpee was conquered by the British in 1803. In May, 1858, it was captured by Gen. Rose from the mutinous Sepoys, of whom Calpee was one of the head-quarters. The navigation of the Jumna River is commanded by the fort of this city. Pop. 21,812.

Calpur'nia, the fourth wife of Julius Cæsar, was married to him in 59 B. C. She was a daughter of L. Calpurnius Piso, who was consul in 58 B. C. She urged her husband not to leave home on the day of his assassination, the ides of March, 44 B. C.

Calpur'nius, a Latin poet, surnamed SICULUS, who about the beginning of Nero's reign (54–68) wrote seven eclogues in imitation of Theocritus and Virgil. The events of his life are unknown. Several of his eclogues are extant, and have some merit.

Caltagiro'ne (anc. *Calata Hieronis?*) a city of Sicily, in the province of Catania, on the slope of a hill about 32 miles S. W. of Catania. It is the see of a bishop, and has a college, a hospital, and several convents; also manufactures of cotton fabrics and pottery. The inhabitants are esteemed the best workmen in Sicily in the useful arts. Pop. in 1881, 32,323.

Caltaniset'ta, an Italian province, bounded on the N. by Palermo, on the E. by Catania and Siracusa, on the S. by the Mediterranean, and on the W. by Girgenti, in the central part of Sicily. Area, 1455 square miles. Pop. in 1881, 266,006.

Caltanisetta, a fortified town of Sicily, capital of the above province Here are mineral springs and extensive sulphur-works. This place is supposed to be the site of the ancient *Nissæ.* Pop. in 1881, 30,031.

Caltavutu'ro, a town of Sicily, province of Palermo, 30 miles S. E. of the city of Palermo, is of Saracenic origin. Jasper is found in this vicinity. Pop. 5119.

Cal'tha, the Latin name of the marigold. *Caltha palustris* is the systematic name of the marsh marigold, often called in America "cowslip," a plant of the natural order Ranunculaceæ, which grows in swamps and wet meadows in Asia, Europe, the U. S., and even in Alaska. It is boiled and eaten in the spring as a potherb, the poisonous properties which it is said to possess being destroyed by cooking.

Cal'trop, or **Calthrop,** a low herb of the genus *Tribulus*, growing in the S. of Europe; its burs are armed with strong spines, which inflict wounds upon the feet of men and beasts if trodden upon. This name is also applied to a four-pointed piece of steel, so shaped that one prong always points upward. It is used in military operations to annoy an advancing enemy.

Caluire-et-Cuire, a village of France, in the department of Rhone, a suburb of Lyons, on the Saône, 3 miles N. N. E. of that city. Pop. 9182.

Cal′umet [said to be of French origin], the pipe of peace used by the North American Indians in the ratification of treaties. It is a tobacco-pipe, having a long stem made of hollow reed and ornamented with feathers. Some tribes of the aborigines appear to think that a treaty is not valid or complete until both parties have smoked the calumet together.

Calumet, on R. R., Houghton co., Mich. (see map of Michigan, ref. 1–E, for location of county). Pop. of tp. in 1870, 3182; in 1880, 8299; in 1884, 8725.

Calvados, a maritime department of France, formed of part of the old province of Normandy, is bounded on the N. by the English Channel, on the E. by Eure, on the S. by Orne, and on the W. by Manche. Area, 2181 square miles. The southern part is hilly, but extensive plains occur in other portions. The soil is fertile. The chief rivers are the Orne, Dromme, and Vire. Among the mineral productions are iron, coal, marble, and slate. Many horses, cattle, and sheep are raised here; the fisheries on the coast are extensive. Principal port, Honfleur; capital, Caen. Pop. in 1881, 439,830.

Calvart, Calvaert, or **Calvert** (Denis), born at Antwerp in 1555, went to Italy in his youth; studied with Fontana and Sabbatini, and established a school of painting at Bologna, which afterward became very celebrated. His best paintings are "St. Michael" and "Purgatory." Guido, Domenichino, and Albani were among his pupils. Died at Bologna in 1619.

Calvary, Mount, the scene of our Saviour's crucifixion. The word occurs but once in our authorized version of the New Testament (Luke xxiii. 33), the term in the Greek being Κρανίον, which means "skull;" the Hebrew word *Golgotha* has the same meaning. The identification of the spot is a matter of great difficulty as well as of great interest. Of six hypotheses, the one now most favored is that which puts the crucifixion on the hill outside of the present Damascus Gate, on the north side of Jerusalem. The Greek name very well describes the hill. Recent explorations likewise help the hypothesis.

Calvel′lo, a town of Italy, in the province of Basilicata, 12 miles S. of Potenza. It has two convents. P. 5172.

Calvert, on R. R., a city, capital of Robertson co., Tex. (see map of Texas, ref. 4–I, for location of county), 130 miles N. N. W. of Houston. Pop. in 1880, 2280.

Calvert (George and Cecil). See Baltimore, Lord, by Hon. Henry Stockbridge.

Calvert (George Henry), born at Baltimore, Md., Jan. 2, 1803, is a descendant of Lord Baltimore and of the painter Rubens. He graduated at Harvard in 1823, studied at Göttingen, and became a journalist of Baltimore. Besides many dramas, translations, and poems, he has published "Scenes and Thoughts in Europe" (1846–52), "An Introduction to Social Science" (1856), "The Gentleman" (1861), and other works. Since 1843 he has been a citizen of Newport, R. I.

Calvert (Sir Henry), a descendant of the Calverts of Hertfordshire, England, served in North America under Clinton, Howe, and Cornwallis, and was taken prisoner at Yorktown, Va., in 1781. He also served in the Netherlands in 1794 as aide-de-camp to the duke of York, and was made adjutant-general in 1799; aided in organizing the military colleges at High Wycombe and Marlow, and became major-general in 1803, baronet in 1818, and a general about 1821. Died in 1826.

Calvert (Leonard), younger brother of Cecil, second Lord Baltimore. He was the first governor of Maryland, whither he led the first colony in 1634. He was a Roman Catholic, and appears to have been a man of liberal views, but existing details of his life are few. Died June 9, 1647.

Cal′vi, a seaport and fortified town of Corsica, on a peninsula of its N. W. coast, 38 miles W. S. W. of Bastia. It has a good harbor and a strong citadel. Calvi was besieged and taken by the English in 1794, but was retaken by the Corsicans in the following year. Pop. 2069.

Calvi (anc. *Cales*), a decayed town of Italy, 7½ miles N. N. W. of Capua, is a bishop's see. It was formerly important, and was celebrated for its baths.

Cal′vin, the Latin [*Calvinus*] for **Cauvin** (John), born at Noyon, some 70 miles N. E. of Paris, July 10, 1509. His grandfather was a wine-cask cooper in the neighboring village of Pont l'Évêque. His father, Gerard Cauvin, was apostolic notary, fiscal attorney of the county, proctor of the cathedral, and secretary of the bishop of Noyon. His mother, Jeanne Lefranc of Cambray, was noted for her personal beauty, as also for great religious fervor and strictness. John was the second of her four sons and six children. His father destined him to the priesthood. After being a while at the college of the Capettes in Noyon, he was kindly permitted to share in the lessons given by an able tutor to the sons of the noble family of De Mommor. When twelve years of age, his father's income being small, provision was made for him by securing the chaplaincy of the Chapel de la Gesine. He then (May 15, 1521) received the tonsure, though never ordained. In 1523 he went with the young De Mommors to Paris, entering first the College of La Marche, where he studied Latin with Mathurin Cordier, and, shortly after, the College of Montaigu, where a Spaniard trained him in dialectics, and where, some years later, Ignatius Loyola also studied. He was an ardent and precocious scholar, bright, sharp, sedate, severe. His companions called him the *Accusative*. In 1527 he got the curacy of Marteville, which was exchanged in 1529 for Pont l'Évêque, where he sometimes preached. Near the close of 1527 he went to the University of Orleans, and the year after to the University of Bourges, to study law. At Orleans he heard the eminent jurist Pierre de l'Étoile, and was intimate with his relative Olivetan, whose French Bible appeared in 1535. At Bourges he was a favorite pupil of Andreas Alciati, then the most distinguished law-professor in Europe, and came in contact with Melchior Wolman, a learned German Lutheran, who both taught him Greek and opened to him the gospel. In the summer of 1531, his father having died May 26, he returned to Paris, and in 1532 published, with a commentary, the *De Clementia* of Seneca, aiming as yet at nothing higher than a reputation like that of Erasmus. In Nov., 1532, a speech prepared for his friend Nicholas Cop, rector of the university, drove him out of Paris. Befriended by Margaret of Navarre, sister of Francis I., he returned the year following, but only to flee again, and finally to leave the country, going to Strasbourg in 1534 (Dec.), to Bâle in 1535, and to Geneva, his final home, in 1536. Meanwhile, what he calls his "sudden conversion" occurred in 1533. In 1534 he resigned his two benefices, and published his first theological work, "Psychopannychia." His greatest work, the "Institutes" (1536), was at first only a catechism. He revised it for the last time in 1559. The discipline he set up in Geneva was too stern to be endured. He was banished Apr. 22, 1538; at Strasbourg, in 1540, married the widow Idelette de Bures, with whom he lived happily nine years; in 1541 returned in triumph to Geneva, and died May 27, 1564. The French language owes him a debt like that which the German language owes Luther. Civil liberty, the world over, is likewise his debtor. He is the father of Presbyterianism, and the greatest of all Protestant commentators and theologians. There is but one blot upon his memory. The burning of Servetus for heresy (Oct. 27, 1553), though sanctioned even by Melanchthon, was a shocking tragedy. The standard ed. of Calvin's works is that of Amsterdam (1671, 9 vols. fol.). Reuss's exhaustive ed. began to appear in 1863. The best biographies are by Beza (1564), by Paul Henry (3 vols., 1835–44), by Dyer (1850), by Stähelin (2 vols., 1863), and by Kampschulte, R. C. (1869, only 1 vol.). Another Roman Catholic biography by Audin (1841, 2 vols.) is bitter and scurrilous.

R. D. Hitchcock.

Cal′vinism. Calvinism, as also Pelagianism and Lutheranism, is a term used to designate, not the opinions of an individual, but a mode of religious thought or a system of religious doctrines, of which the person whose name it bears was an eminent expounder. There have from the beginning coexisted in the Christian Church three, and only three, generically distinct systems of doctrine, or modes of conceiving and adjusting the facts and principles understood to be revealed in the Scriptures. One of these is the Pelagian, which denies the guilt, pollution, and moral impotence of man, and makes him independent of the supernatural assistance of God. At the other pole is the Calvinistic system, which emphasizes the guilt and impotence of man, exalts the absolute justice and sovereignty of God, and refers salvation absolutely to the undeserved favor and the new creative energy of God. Between these comes the manifold and elastic system of compromise once known as Semi-Pelagianism, and in modern times as Arminianism, which admits man's original pollution, but denies his guilt, regards redemption as a compensation for innate and consequently irresponsible disabilities, and refers the moral restoration of the individual to the co-operation of the human with the Divine energy, the determining factor being the human will. The system to which this article is devoted was known originally, and is now designated more generally and indefinitely, by the title *Augustinianism*, from its earliest champion, the illustrious Augustine, bishop of Hippo Regius in Northern Africa (395–430 A. D.); while the more modern and specific title is Calvinism, from the fact that it was developed into a perfect form, and infused into the creeds of all Protestant churches, and into the life of modern nations, through the instrumentality of John Calvin, the Reformer of Geneva (1509–1564). The authentic statement of its constituent doctrines is not to be drawn exclusively from the writings of either of the great men mentioned, but from the public confessions of those churches which have professed this form of doctrine, and from the classical writings of their representative theologians.

It is proposed in this article to present, in necessarily meagre outline, a statement (1) of the fundamental characteristics of the system; (2) of the history of its development and prevalence both before and after Calvin; and (3) of its practical moral influence upon individuals and upon communities.

A. *Statement of Principles.*—Calvinism, as a system of doctrines, derives its character from the following fundamental positions or foci of organization:

I. *The Relation of the Creator to the Creation.*—There are three generically distinct views as to the relation of the Creator to the creation, each, of course, embracing many specific varieties under it.

1st. The Deistical view, which admits a creation *ex nihilo*, and an original endowment of the elements with their active powers, and the subjection of the whole system of things to certain general laws, adapted to the evolution of certain fixed plans. The general plan and order of the creation is attributed to the Creator, and all events are referred to Him in a general sense as the indefinitely remote First Cause, who inaugurated the ever-onflowing line of second causes. This view, however, denies the continued immanence of the Creator in the creation, and the momentary dependence of the creature on the Creator for the continuance of its substance, the possession of its properties, and the exercise of its powers.

2d. The opposite extreme is the Pantheistic mode of thought, which identifies God and the universe as His existence-form, or at least so confines Him to it as to deny His transcendence beyond the universe as an extra-mundane Spirit and conscious Person whose actions are rationally-determined volitions.

3d. Between these extremes stands Christian Theism. It emphasizes at once the transience of God beyond, and the immanence of God within, the world. He remains ever a conscious personal Spirit, without and above the world, able, in the exercise of His free volitions, sovereignly to exercise a supernatural influence (*potestas libera*) upon any part of that system of nature which He has established, ordinarily working through second causes, "yet free to work without, above, and against them at His pleasure." At the same time He continues to interpenetrate the inmost being of every element of every creature with the infinite energies of His free intelligent will, and His creatures momentarily continue absolutely dependent upon the energy of that will for substance and for the possession of the powers communicated to them as second causes in all their exercises.

All Christians, of course, are Theists in the sense thus defined, but the different schools of Christian theology take their points of departure here, as, on the one hand, they press the essential dependence of the creature upon the Creator in substance, properties, and actions, or as, on the other hand, they press the self-active power of second causes, and by consequence their self-sufficiency and independence. Here we have the ultimate antithetical grounds of Pelagianism and Augustinianism. Pelagius, who was characterized by a rationalistic habit of thought and a superficial religious experience, believing that power to the contrary is an inalienable attribute of every act of free-will, necessary to render it responsible and therefore moral, maintained, in the supposed interests of morals, that every free agent is so adequately endowed by God as to be self-sufficient for action, each in a manner appropriate to his kind. Augustine, on the contrary, held that every creature exists and acts only as its substance is momentarily sustained, and its action conditioned, by the omnipresent and omnipotent energy of God. While admitting the free self-determining power of the human soul, he referred the moral character of the volition to the disposition which prompted it, and the moral nature of man to the influences of the Spirit of God. Anterior to apostasy, therefore, the spirit of man depended for spiritual life and moral integrity upon the *concursus* of the Spirit of God, the withdrawal of which is the immediate cause of spiritual death and moral impotence. This Divine influence, in one degree and in one mode or another, is common to all creatures and all their actions, and it is called "grace" when, as an undeserved favor, it is in a supernatural manner restored to the souls of sinful men with the design of affecting their moral character and action. This view of Augustine was subsequently elaborated by his disciples into the theory of the "previous," "simultaneous," and "determining" *concursus* of the Thomists and Reformed theologians. (*Summa of Tho. Aquinas*, 2. 1. 10; and *Turretin*, 6. 6. 6 and 7.)

II. *The End or Design of God in Creation.*—Every intelligent Theist must regard the universe as one system, and must therefore believe that the Creator had from the beginning one general end, for the accomplishment of which the whole and all its parts were intended. This general end must have determined the Creator in every step He has taken in the evolution of the universe, and hence our conception of it will give shape to any speculations we may form with respect to the relations of God and His works. It is evident that no solution of this transcendent question can be reached by reasoning from *a priori* principles, or by generalizations drawn from the comparatively few facts at present accessible to our observation, and that it can be rationally sought for only in a direct revelation. For the most part, this general end has been referred to the essential benevolence of God, prompting Him to confer the greatest possible amount of blessedness, in the highest forms of excellence, upon innumerable objects of His love. Leibnitz, in his "Théodicée" (1710), which has exerted a wide influence on all modern speculation, lowered this view by emphasizing the "happiness" of the creatures as the great end of the creative goodness.

The Scriptures, on the contrary, emphatically declare that the manifestation of His own glorious perfections is the actual and most worthy possible end of the great Designer in all His works of creation, providence, and redemption, and hence likewise the final end of all His intelligent creatures in all moral action. The recognition of this great principle, and its application to the interpretation of all God's dealings with man, and of all man's duties to God, has always been an essential characteristic of Calvinism. Pelagians and Semi-pelagians, with more or less decision, place the general end of the system of things in the well-being of the creature: Calvinists place it absolutely in the glory of the Creator, which carries with it, not as a *coordinate* design, but as a *subordinate* yet certain effect, the blessedness of all loyal creatures.

III. *The Relation which the Eternal Plan of God sustains to the Actual Evolution of Events in Time.*—Every Theist believes that the eternal and absolutely perfect intelligence of the Creator must have formed from the beginning a plan comprehending the entire system of creation and providence in reference to the great end for which they were designed. Pelagius himself admitted that the absolute foreknowledge of God embraced the future volitions of free agents, as well as all other classes of events, while he denied their foreordination. The Socinians, who have developed Pelagianism into a complete system, more consistently deny foreknowledge, as well as foreordination, since, if it is essential that a volition should be purely contingent in order that it should be responsible, it must be indeterminate before the event, and while indeterminate it cannot be certainly foreknown. The Arminians admit foreknowledge, but deny foreordination. The Calvinists maintain the following positions: 1. This eternal and immutable plan of God has constituted man a free agent, and consequently can never interfere with the exercise of that freedom of which it is itself the foundation. 2. However, according to the principles above stated, this created free-will is not independent, but ever continues to have its ground in the conserving energies of the omnipresent Creator. 3. In the case of an infinitely wise, powerful, and free Creator of all things *ex nihilo*, it is obvious that the certain foreknowledge of all events from the absolute beginning virtually involves the predetermination of each event, without exception; for all the causes and consequences, direct and contingent, which are foreseen in creation, are, of course, determined by creation. As Sir William Hamilton asserts (*Discussions*, Appendix 1, A.), "the two great articles of foreknowledge and predestination are both embarrassed by the selfsame difficulties." 4. Since all events constitute a single system, the Creator must embrace the system as a whole, and every infinitesimal element of it, in one all-comprehensive intention. Ends more or less general must be determined as ends, and means and conditions in all their several relations to the ends which are made dependent upon them. Hence, while every event remains dependent upon its causes and contingent upon its conditions, none of God's purposes can possibly be contingent, because in turn every cause and condition is determined in that purpose, as well as the ends which are suspended upon them. All the decrees of God are hence called absolute, because they are ultimately determined always by "the counsel of His own will," and never by anything exterior to Him which has not in turn been previously determined by Him. 5. This determination, however, instead of interfering with, maintains the true causality of the creature, and the free self-determination of men and angels. Since the holiness of the created moral agent is conditioned upon the indwelling of Divine grace, and its turning from grace is the cause of sin, it follows that all the good in the volitions of free agents is to be referred to God as its positive source, but all the evil (which *originates* in defect, privation) is to be referred simply to His permission. In this view, all events, without exception, are embraced in God's eternal purpose; even the primal apostasies of Satan and of Adam, as well as all those consequences which have flowed from them.

It is in view of these principles that Calvinism has been so often confounded with fatalism, and held up as distinguished from the majority of human opinions by its preeminent offensiveness. It should be remembered, however, that the philosophy which has underlain the religions and the speculations of the immeasurable preponderance of the most intelligent nations in the past (Augustinian Christianity excepted), as well as of the advanced thinkers of the present, has been fatalistic. Witness the fatalism of the ancient Stoics and the modern Mohammedans and Deists —the eternal and necessary conflicts of the dualism of Zoroaster, perpetuated among the Gnostics and Manichæans —the ceaseless modifications of the one eternal essence in the pantheism of the Booddhists, the Brahmanists, the ancient Greeks, and the modern disciples of Spinoza—the eternal interplay of unconscious and immutable natural laws as held by Positivists, Humists, and all modern scientific materialists, after the manner of the ancient Epicureans. How infinitely superior to all this is the Calvinistic conception of the all-penetrating and all-energizing will of the personal Jehovah, who, being at once perfect Love and perfect Light, constitutes and conserves our free agency, and through its free spontaneity works continually the ever-blessed counsel of His own will, weaving even rebellious volitions into the instrumentalities of His purpose, and making every consenting soul a conscious co-worker with Himself.

As to the bearing of this principle upon the question of the design of God in the application of redemption (predestination), see below.

IV. *The Manner in which the Divine Attributes of Benevolence, Justice, and Grace are illustrated in the Scheme of Redemption.*—Arminians have generally held, with Leibnitz, that "justice is benevolence acting according to wisdom"—*i. e.*, inflicting a lesser pain in order to effect a greater or more general happiness. The necessity for punishment therefore lies not in the essential and inexorable demands of righteousness, but in its being the best means to secure the moral reformation of the sinner, and the best motive to restrain the community from disobedience. Grotius maintained that the moral law is a product of the Divine will, and therefore capable of being relaxed by that will. In the gospel scheme, therefore, God, in the exercise of His sovereign prerogative, relaxes His law by forgiving sinners upon repentance and reformation, while as an administrative precaution He makes an exhibition of severe suffering in the person of His Son, in order that all other subjects of His moral government may be deterred from making the impunity of repentant men an encouragement to disobedience. The atonement, therefore, was an exhibition solely of the Divine benevolence, but not of justice in the ordinary sense of that word.

Calvinists, on the contrary, hold that justice as well as benevolence is an essential and ultimate property of the Divine nature, and hence lies back of, and determines the character of, the Divine volitions. By the perfection of God's nature He is always benevolent to the innocent, and just as certainly is He determined to punish the guilty. In the gospel, God has sovereignly separated the sin from the sinner in certain cases; in the vicarious penal sufferings of His Son punishing sin in strict rigor of justice, and then treating the believing sinner as a righteous person—that is, as a person with regard to whom all the demands of justice are fully satisfied. Hence He has exercised both justice and benevolence—justice to the sin and to the law, benevolence to the sinner; which benevolence to the undeserving is sovereign grace. While Arminians in their view of the gospel emphasize benevolence, Calvinists in their view emphasize justice and grace.

V. *The Degree of Guilt and Moral Damage entailed through the Apostasy of Adam upon his Posterity.*—The answers respectively given to this question impose form and character upon all the various systems of theology.

1. Pelagius held that free-will (*liberum arbitrium*), in the sense of an absolutely unconditioned power of choice between good and evil, is essential to responsible moral agency, and hence inalienable from human nature. Since, then, all men continue after the apostasy to be responsible moral agents, their nature in this essential respect must remain in the same condition in which it was created. The moral agency of a man at any one moment cannot determine the character of his moral agency at any other moment, and he possesses throughout his entire existence ability to will and to do all that God has any right to require of him. Hence Pelagians deny—(1.) All original sin or corruption of nature, because sinfulness can be predicated only of free acts, and man in order to be responsible must always possess plenary ability to will aright. (2.) All original *guilt* or desert of punishment common to the race, and prior to actual transgression, since it would be a violation of justice to hold one moral agent responsible for the wrong volitions of another. (3.) Hence men need redemption through Christ only to deliver them from the guilt of actual and personal transgression, and only those need it who have thus sinned. Those dying in infancy can be benefited by Christ only by being raised to a higher plane of blessedness—the *regnum cœlorum* as distinguished from the *vita æterna*.

2. Augustinians and Calvinists, on the contrary, maintain—(1.) That the entire soul, with all its constitutional faculties and acquired habits, is the organ of volition, the agent willing. (2.) That this soul possesses the inalienable property of self-determination, the moral character of which determination always depends upon the moral condition of the soul acting. (3.) That the holy moral condition of the soul, and hence its spontaneous disposition to will that which is right, depends upon the indwelling of the Divine Spirit. The free agency of God is an absolute self-existent and self-sufficient perfection, self-determined to good and incapable of evil. The freedom of saints and angels is dependent upon Divine assistance, but, like that of God himself, it is the very opposite to the "liberty of indifference" or "power to the contrary," being a *non posse peccare*, a *felix necessitas boni*. Adam was created in fellowship with God, and hence with a holy tendency of heart, with full power not to sin (*posse non peccare*), but also, during a limited period of probation, with power to sin (*posse peccare*). He did sin. As a punishment, the Holy Spirit is withdrawn from the race, and he and his descendants lost the *posse non peccare*, and retained only the *posse peccare*, which thus became the fatal *non posse non peccare*.

This *theological* doctrine of total moral inability has nothing whatever to do with the *psychological* theory of "philosophical necessity" as an attribute of voluntary action, which, since the time of President Edwards, has been too frequently regarded essential to the defence of Calvinism. It has been conclusively shown by Principal Cunningham (*Theology of the Reformers*, Essay IX.) that this metaphysical doctrine is not essential to Calvinism; while Sir William Hamilton (*Discussions*, Appendix, 1, A.) and Sir James Mackintosh (*Dissertations on the Progress of Ethical Philosophy*, Note O) propose to prove that it is absolutely inconsistent with Calvinism as historically taught. The phrases "bondage of the will," etc., so frequently used by all classes of Augustinian theologians, and above all by Luther in his treatise "De Servo Arbitrio," are intended to apply only to the corrupt spontaneous tendency of fallen man to evil, which can be reversed only by a new creating energy from above. At the same time, every Calvinist holds devoutly to the free self-determination of the soul in every moral action, and is at liberty to give whatever psychological explanation of that fact may seem to him most reasonable. (See *Confession of Faith*, ch. 9, and *Calvin's De Servitute et Liberatione Humani Arbitrii.*)

Hence Calvinists hold—First. As to original guilt. (1.) Human sin, having originated in the free apostatizing act of Adam, deserves God's wrath and curse, and immutable justice demands their infliction. (2.) Such, moreover, was the relation subsisting between Adam and his descendants that God righteously regards and treats each one as he comes into being as worthy of the punishment of that sin, and consequently withdraws his life-giving fellowship from him. Some refer this responsibility of Adam's descendants for his apostatizing act to a purely sovereign "divine constitution" (New England view); others hold that we all were in our generic essence guilty coagents with him in that act (Realistic view); while the common opinion is that God, as the guardian of our interests, gave to us all the most favorable probation possible for beings so constituted in Adam as our covenant representative (Federal view). The whole race, therefore, and each individual it embraces, is under the just condemnation of God, and hence the gift of Christ, and the entire scheme of redemption, in its conception, execution, and application, are throughout and in every sense a product of sovereign grace. God was free to provide it for few or many, for all or none, just as he pleased. And in every case of its application the motives determining God cannot be found in the object, but only in the good pleasure of the will of the Divine Agent.

Calvinists also hold—Secondly. As to original sin. (1.) Since every man thus comes into the world in a condition of antenatal forfeiture because of Adam's apostasy, he is judicially excluded from the morally quickening energy of the Holy Ghost, and hence begins to think, feel, and act without a spontaneous bias to moral good. (2.) But since moral obligation is positive, and the soul is essentially active, it instantly develops in action a spiritual blindness and deadness to divine things, and a positive inclination to evil. This involves the corruption of the whole nature, and absolute impotency of the will to good, is, humanly speaking, without remedy, and necessarily tends to the indefinite increase both of depravity and of guilt. It is therefore said to be total. Some Calvinists hold original guilt to be conditioned upon original depravity (*e. g.*, the advocates of mediate imputation and the *ex traduce* origin of souls). Others, as the writer of this article, hold original depravity to be the penal consequence of Adam's apostatizing act, and therefore to be conditioned upon original guilt (hence immediate imputation and creationism).

3. The advocates of the middle scheme have, of course, varied very much from the almost Pelagian extreme occupied by many of the Jesuits and the later Remonstrants, to the almost Augustinian position of the Lutherans and of the great Wesleyan Richard Watson. The Semi-pelagians admitted that the nature of man was so far injured by the fall that he could do nothing in his own strength morally good in God's sight. But they held that man is able to incline himself unto good, though he is not able to effect it; so that in every case of spiritual reformation the *first* movement towards good is from the soul itself, while the performance of it is the result of the co-operation of Divine grace with the human will. They consequently denied the *gratia præveniens*, but admitted the *gratia co-operans*.

The modern Protestant Arminians (Limborch, Episcopius, etc.) admit original *sin*, while they deny original *guilt*, and regard innate corruption rather as a vice or fault of nature than as a sin in the full sense of that term. Dr. D. D. Whedon ("Bibliotheca Sacra," April, 1862) admits—1. That Adam and Eve by their apostasy morally corrupted their own nature and that of all their descendants; 2. That every child of Adam is born with an inherent tendency to sin which he cannot remove by his own power; 3. That Adam and Eve were fully responsible for their apostasy, because they sinned in spite of possessing power to the contrary, and therefore might justly have been damned; 4. Nevertheless, their descendants, although corrupt and prone to sin from birth, are neither responsible nor punishable until there has first been bestowed upon them redemptively a gracious ability to the right; 5. After Adam sinned, therefore, only one alternative was open to Divine justice—either that Adam should be punished at once without issue, or that he should be allowed to generate seed in his own moral likeness, when equity required that an adequate redemption should be provided for all; 6. Hence Christ died for all men, and sufficient grace (including *gratia præveniens* and *gratia co-operans*) is given to all men, which is essential to render them responsible, and they become guilty only when they abuse (by failing to co-operate with) that gracious power to the contrary (*posse non pecare*) which has been conferred on them in the gospel.

Quoting the dictum of Pres. Edwards (*Will*, pt. 4, § 1), "The essence of the virtue or vice of dispositions of the heart and actions of the will lies not in their cause, but in their nature," Whedon says: "To this we oppose the counter-maxim, that in order to responsibility for a given act or state, power in the agent for a contrary act or state is requisite. In other words, power underlies responsibility." The only limit he allows to this principle is in the case of that moral inability which results from the previous abuse of freedom by the agent himself. This he declares is the fundamental ground upon which all the issues between Arminianism and Calvinism depend. Thus, while Calvinism exalts the redemption of Christ in its execution and in each moment of its application as an adorable act of transcendent grace to the ill-deserving, Arminianism, in its last analysis, makes it a compensation brought in by the equitable Governor of the world to balance the disabilities brought upon them without their fault by the apostasy of Adam. This difference is the practical reason that Calvinism has such a strong hold upon the religious experience of Christians, and that it finds such frequent irrepressible expression in the hymns and prayers of evangelical Arminians.

VI. *The Nature and Necessity of that Divine Grace which is exercised in the Moral Recovery of Human Nature.*—Grace is free sovereign favor to the ill-deserving. It is the motive to redemption in the mind of God. It is exercised in the sacrifice of His Son, in the free justification of the believing sinner on the ground of His vicarious obedience and sufferings, and in the total change wrought in that sinner's moral character and actions by the energy of the Holy Ghost. While the word *grace* applies equally to the objective change of relations and the subjective change of character, it is used in this connection to designate that energy of the Holy Ghost whereby the moral nature of the human soul is renewed, and the soul, thus renewed, is enabled to act in compliance with the will of God.

Pelagius found in his system neither need nor room for this Divine energy, except in the way of objective revelations and educational and providential influences.

Semi-pelagians admitted its necessity to help man to complete that which he had himself commenced, and that it is actually given to all those who had thus prepared themselves for it and made themselves worthy of it.

Arminians admit that it is necessary in order that the corrupt will shall be even predisposed to good, but they regard it as a compensation for the irresponsible defects of an inherited nature, which restores the native power for either good or evil, and which depends for its effects wholly upon the use made of it by the soul in which it acts. This is styled the theory of co-operation as held by the Arminians, and of "synergism" as held by the followers of Melanchthon in Germany. Regeneration is the result of the co-working of two energies, but the determining factor is the human will. Hence grace is *sufficiens* in every case, and *efficax ab eventu vel congruitate.*

Augustinians and Calvinists, on the other hand, hold—1. That, for Christ's sake, and in spite of all human demerit, a gracious influence is excited on the minds of all men of various intensities. This is "common grace," and is a moral and suasory influence on the soul, tending to good, restraining evil passions, and adorning the soul with the natural virtues; which may be resisted, and is always prevailingly resisted, by the unregenerate. 2. But at His pleasure, in certain cases, God exerts a new creative energy, which in a single act changes the moral character of the will of the subject, and implants a prevailing tendency to co-operate with future grace in all forms of holy obedience. This is *gratia efficax,* "effectual calling," which is always effectual because it consists in effecting a regenerative change in the moral nature of the will itself. The change which this grace effects is the "new heart" of Scripture, the *conversio habitualis seu passiva,* of which God is the agent and man the subject, which as a new habit of soul lays the foundation for all holy activities. Augustine has been followed by many in styling this grace "irresistible," because it cannot be resisted. But this is as incongruous as it would be to call the creation of the world or the generation of a child irresistible. Effectual calling consists in a new creative energy within the soul, making it willing, upon which it spontaneously embraces Christ and turns to God (the *conversio actualis seu activa*). It merges itself into the very spontaneity of the will, and enfranchises it from the corruption which had hitherto held it in bondage, and restores it to its normal equilibrium, in harmony with reason and conscience and the indwelling Spirit of God. 3. Afterwards this same Divine energy continues to support the soul, and prepare it for, and to concur with it in, every good work. This grace is now prevailingly co-operated with by the regenerated soul, and at times resisted, until the status of grace is succeeded by the status of glory.

Calvinists hold that this "grace" in all its stages is purely undeserved favor, and therefore sovereignly exercised by God upon whom and at what times He pleases; hence it is called *gratia gratuita et gratis data,* otherwise grace would be no more grace. It also works in its various stages progressively, except in the single regenerative act. It is at first the *gratia præveniens*, then the *gratia operans*, then the *gratia co-operans*, and finally the *gratia perficiens*, including the *donum perseverantiæ*, infallibly securing perseverance in faith, and obedience unto the complete redemption of soul and body in glory.

VII. *The Relation which the Eternal Plan of God bears to the Application of Redemption to Individuals.*—Predestination, or the purpose of God to secure the salvation of some men and not of all, has been popularly regarded as the distinguishing feature of Calvinism, and one most revolting to the moral sense. Some Calvinists, reasoning downward from the nature of God as absolute, and developing this doctrine in a strictly speculative manner, have made it the foundation of their whole system. These have necessarily conceived of it in the high and logically coherent Supralapsarian sense, which, in a speculative point of view, is impregnable. The vast majority of Calvinists, however, are brought to this point by practical rather than speculative considerations, such as the explicit authority of Scripture and the personal sense of absolute unworthiness and moral impotency, and therefore of absolute dependence upon grace. These are all willing to stop in the Infralapsarian view of the decree of redemption, which, if less logically complete, is nevertheless exactly conformed to all the facts open to our inspection or embraced in our experience, and to all the representations of Scripture. The Scriptures never speak of God as creating men in order either to save or damn them, nor of electing certain individuals considered merely as creatable, and then allowing them to fall in order that they might be redeemed; but they uniformly represent God as electing His people out of the mass of guilty sinners, and then as providing redemption for them in order to carry out the purpose of election. Arminians maintain that this decree of election is conditioned on God's foresight of faith and repentance; but Calvinists insist that if faith and repentance are the gifts of God and the fruits of His Spirit, they cannot be the conditions upon which election is suspended, but rather its predetermined and graciously effected results. Augustine held the Infralapsarian scheme. The position of Calvin has been disputed. Beza, his successor in Geneva; Gomarus and Voetius, the great opponents of the Remonstrants of Holland; Twiss, the prolocutor of the Westminster Assembly, have been the most conspicuous advocates of Supralapsarianism. On the other hand, the canons of the Synod of Dort (1619), the Confession and Catechisms of the Westminster Assembly (1648), the Formula Consensus Helvetica (1675), and the vast majority of Calvinists, ancient and modern, are decided Infralapsarians.

Gottschalk (848–868) insisted much upon a *predestinatio duplex* of the elect to salvation and of the reprobate to damnation, and this view has often been offensively insisted upon as essential to Calvinism by its enemies. It is, however, a gratuitous assumption and without scriptural warrant, and not taught in the recognized standards of Calvinism. God positively decrees grace, and thus produces all that is good. He only determines the permission of sin, and punishes it because he forbids and in every way morally discountenances it. He elects of free grace all those he purposes to save, and actually saves them, while those whom he does not elect are simply left under the operation of the law of exact justice, whatever that may be. Archbishop Whately, himself an Arminian, in his "Essays on Some of the Difficulties in the Writings of the Apostle Paul," honorably admits that the apparent harshness of Calvinism lies in the *facts* of the case as admitted by all Christians. All infants, idiots, and all believers in Christ are saved by grace—all others are left to the operation of pure justice. It is obvious that all who are born sin and die, that all do not believe, and that all are not saved. Calvinistic "particularism" admits the actual results of salvation in their widest scope, and refers all to the gracious purpose and power of God, but does not restrict it one iota within the limits determined by the facts themselves.

B. *The History of Calvinism.*—Pantheism, which is the only philosophical basis of polytheism (in the forms of Booddhism, Brahmanism, and underlying all forms of Greek philosophy), and the Dualism of Zoroaster (which was revived in the second and third centuries in a Christianized form in the various systems of the Gnostics and Manichæans), together constituted the substratum of all ancient philosophies and religions. All such systems were consequently essentially fatalistic, and made sin either an essential attribute of an eternal self-existent Principle, or a necessary condition of the eternal evolution of the infinite and absolute into the finite and contingent. In necessary antagonism to these fundamental heresies, the early Fathers, especially Origen and all his colleagues and followers of the Alexandrian school from the reaction of Neo-Platonism (200–350 A. D.), were led in a very unqualified manner to insist upon the independent, self-determining power of the human will, and to maintain that sin is the product of that freedom abused. They universally held that human nature was morally ruined by Adam's sin, and that it was redeemed by the blood and restored by the Spirit of Christ; but they conceived of these great principles in a crude and indefinite manner, without determining their relations to each other. All the ancient Fathers were induced to render special attention to the defence of human self-determining power as the basis of responsibility. As a general fact, the Greeks were specially distinguished for emphasizing the autocracy of the will, without denying the need of grace, while the Latins especially emphasized inherited depravity, without denying the freedom of the will. And the anthropology of the Greek Church has continued to preserve the same characteristics to the present day (*Athanasius, Expos. in Psalmos*, Ps. l. 7; *Orthodox Confession of Peter Mogilas*, 1642). On the other hand, there was during the third century a marked tendency in the Latin Church to more profound views as to the moral and spiritual nature and relations of man. This characteristic was developed most obviously in Tertullian of Carthage (220 A. D.), who taught the propagation (*ex traduce*) of a corrupt nature from Adam to each of his descendants; in Hilary of Poitiers (368); and in Ambrose of Milan (397), the most explicit defender in that age of the sovereignty of God and the moral impotence of man, and the immediate teacher of Augustine. But the "history" of all systematic theology properly commences with the great controversy of Augustine and Pelagius in the first quarter of the fifth century. On the one hand we have Augustine (354–430), a native of Tagaste, in Numidia, the son of a heathen father and of the sainted Monica, in turn a prodigal, unbeliever, Manichæan, Platonist, disciple of Ambrose, Christian of profound experience, preacher and teacher of transcendent genius, bishop of Hippo Regius from 395 to 430, and the greatest theologian of all time. On the other hand we have Pelagius (Morgan), a British monk, student of the Greek Fathers, a man of pure life, clear, practical intellect, and earnest zeal for the moral interests of human life. He was the moral author of the system which bears his name, while its intellectual constructor was Cœlestius, a youthful Roman advocate; and its most effective advocate was Julian, the deposed bishop of Eclanum, in Campania. The opinions of Pelagius were universally condemned by the whole Church, Eastern and Western, at the councils held at Carthage, 407 and 416 A. D., at the council at Mileve, 416 A. D., by the popes Innocent and Zosimus, and by the œcumenical council held at Ephesus, 431 A. D. This rapid and universal condemnation of Pelagianism, after making all due allowance for extraneous influences, proves that, however indefinite the views of the ancient Greek Fathers may have been, nevertheless the system taught by Augustine was in all essentials the common and original faith of the Church. In the history of the entire Church to the present moment, Pelagianism has been never adopted into the public creed of any ecclesiastical body except that of the Socinians (*Racovian Catechism*, 1605), and it has prevailed practically only among Rationalists, whose Christianity was disentegrating into Deism.

In the mean time, John Cassian, a disciple of Chrysostom, abbot of the monastery at Marseilles, brought into prominence the middle system of compromise, whose advocates were at first styled Massilians; during the Middle Ages and at present in the Romish Church, Semi-pelagians; among Lutherans, Synergists: and among the Reformed, Arminians. His most influential supporters and followers were Vincentius of Lerinum (434), Faustus, bishop of Rhegium (475), Gennadius, and Arnobius; and his opinions prevailed in France for a long time, and were confirmed by the provincial synods of Arles (472) and of Lyons (475). Against this party Augustine wrote his great works "De Prædestinatione Sanctorum," and "De Dono Perseverantiæ," and he was ably represented by Prosper and Hilarius, and the unknown author of the great work "De Vocatione Omnium Gentium," ascribed to Pope Leo I. (461); by Avitus, archbishop of Vienne (490–523), Cæsarius, archbishop of Arles (502–542), and by Fulgentius of Ruspe (1533). Semi-pelagianism was condemned by the decree of Pope Gelasius (496), and finally in the synods of Orange and Valence (529), which were confirmed by the edict of Pope Boniface (530); from which time a moderate form of Augustinianism became the recognized orthodoxy of the entire Western Church. It was taught by Gregory the Great, and held by the emperor Charlemagne, the two persons who exerted the greatest influence in the reconstruction of Europe at the commencement of the Middle Ages. It was held throughout those ages by all the greatest Church teachers and ornaments, as the Venerable Bede (673–735), Alcuin (804), and Claudius of Turin (839). The history of the persecution and condemnation of Gottschalk, under the influence of Rabanus Maurus and Hinckmar, with which Scotus Erigena was involved (about 850), prove beyond question that the entire Church of that age, and even the part most opposed to Gottschalk, was agreed in adopting the Augustinian system (as they understood it), and all the consequences that flowed from it. (*Neander.*) All the most illustrious teachers of the scholastic age, making allowance for the extravagance of many of their speculations, were disciples of Augustine; as, for example, Anselm, archbishop of Canterbury (910); St. Bernard, bishop of Clairvaux (1140); Peter Lombard, "Magister Sententiarum;" Hugo de St. Victor; and, above all, Thomas Aquinas, "Doctor Angelicus" (1247), and Thomas Bradwardine, archbishop of Canterbury (1348). The Dominicans as a class followed Aquinas, while the Franciscans followed their champion, Duns Scotus (1265), "Doctor Subtilis," and in that age the ablest advocate of Semi-pelagianism. The controversies then revived have continued to agitate the Romish Church up to the present time, when they have been annihilated by the capitulation of the whole body to the Jesuits in the Council of the Vatican (1870). The Council of Trent (1546) attempted to satisfy both parties by indefinite decrees, and accordingly both Augustinians and Semi-pelagians, Thomists and Scotists, have claimed that their respective views were sanctioned. The truth is, that while the general statements of doctrines which are to be found among the canons are Augustinian in form, the more detailed explanations which follow are uniformly Semi-pelagian in sense. The Jesuit society, whose doctrines and casuistry have been signally ventilated in the "Provincial Letters" of the immortal Pascal, has always advocated Semi-pelagianism. The illustrious gentlemen of Port Royal, Paris, called Jansenists from Jansenius, bishop of Ypres (Tillemont, Arnauld, Nicole, Pascal, Quesnel, etc.), were at the same time devout Catholics, and in the matters of grace and predestination earnest Calvinists. They were persecuted by the Jesuits, and finally outlawed by the bulls of Popes Innocent X. and Alexander VII. (1653 and 1656 A. D.), and of Clement XI. (1713). By the suicidal action of the Œcumenical Council of the Vatican (1870) all Scripture, traditions, canons of councils, and classical theology have been superseded by the plenary inspiration of a pope who in turn is a creature of the Society of Jesus. Thus at last Popery has become definitely Semi-pelagian.

All the great evangelical teachers and forerunners of the Reformers in the century immediately preceding the Reformation were decided Augustinians (*Neander's Hist. Doc.*, vol. ii., p. 609). This is most conspicuously true of Wickliffe (1384), Jerome of Prague, John Huss (1415), John of Goch (1475), John of Wesalia, Jerome Savonarola, a Dominican (1498), John Wessel (1499), "the Light of the World," and his disciple, the great Grecian, John Reuchlin, in his turn the teacher of Melanchthon, and Staupitz, vicar-general of the Augustines and the spiritual teacher of Luther.

All of the great national Reformers, Zwingle of Switzerland, Luther of Germany, Calvin of France, Cranmer of England, and Knox of Scotland, although each movement was self-originated and different from the others in many permanent characteristics, were alike strictly Calvinistic. The complete agreement of Zwingle with what was afterwards called Calvinism on the point of absolute predestination, although denied by Mosheim and Milner, is beyond question. (See his work "De Providentia Dei," written when Calvin was twenty years old; also Scott's "Continuation of Milner," vol. iii., p. 142–231; Neander's "Christ. Doc.," vol ii., p. 668; and Cunningham's "Theology of the Reformers," Essay V.) That Luther agreed with Calvin on all points considered characteristic of his system, with the exception of the sacraments, is demonstrated by his great work, "De Servo Arbitrio" (1525), written against the "De Libero Arbitrio" of Erasmus, the sentiments of which were never retracted, and are obviously in harmony with all his religious opinions in their entirety. Melanchthon, in the earliest editions of his "Loci Communes" (1521), took extreme ground as to the moral impotence of the human will and absolute predestination, which, however, he gradually and radically modified in subsequent editions, until he finally assumed Synergistic or Arminian ground. The personal followers of Melanchthon excited the strong opposition of the stricter Lutherans, and the struggle came to an explosion in the Weimar Confutation (1558). The result was the triumph of the stricter party, who left to posterity that grandest monument of Lutheran symbolism, the "Formula Concordiæ" (1580). The system here presented agrees in all its deepest positions with Calvinism as presented in this paper. It differs from it (*a*) by making the sacrament of baptism the efficient means by which ordinarily regeneration is effected; (*b*) by making the difference between the saved and the lost to be ultimately determined by the "non-resistance" to grace of the former in contrast with the resistance of the latter. In all other respects, as to the guilt, pollution, and helplessness of the condition into which all children are born, as to justification, and the necessity and the efficacy of regenerating and sanctifying grace, it is one with Calvinism.

By far the greatest of the Reformers, viewed either as a theologian, an interpreter of Scripture, as a social organizer, and founder of churches and republics, was John Calvin. His "Institutes" (1530), written when he was twenty-seven years old, the first and grandest work of systematic divinity the world has seen, has recast Augustinianism in its final Protestant form, and handed it over to the modern world stamped with its great author's name. His "Commentaries" are acknowledged by the most advanced modern scholars of every school to be upon the whole the ablest and most complete work of the kind ever achieved by a single hand. His "Tractatus" consists of various controversial treatises in defence of the truth, and his "Epistolæ" consist of his voluminous correspondence with princes, nobles and commoners, statesmen and churchmen in every part of the Protestant world, concerning the important movements then revolutionizing Europe, both in Church and State. By him Calvinism and its correlates, Presbyterianism in the Church and republicanism in the State, were not invented, but advocated and disseminated with transcendent ability and success. His doctrines have been most consistently developed and illustrated in the writings of such men as Bullinger, Martin Bucer, Theodore Beza, Diodati, Heidegger, Turretin, Cocceius, Witsius, Vitringa, Markius, De Moor, Pictet, John Owen, and Jonathan Edwards; in the deliverance of the international Synod of Dort (1618–19), of the national Assembly of Westminster (1648), of the French synods of Charenton and Alez, and in the following creeds and confessions of the Church: The Creed of the Waldensian pastors at Angrogne (1532), the two Helvetic, the Gallic, Belgic, and Scotch Confessions, the Thirty-nine Articles of the Church of England, the Lambeth Articles (1595), the Articles of Religion of the Dublin Convocation (1615), the Heidelberg Catechism, the Savoy Confession of the English (1658), and the Boston Confession (1680) of the American Independents. Calvinism is professed by all those Protestants of Germany who embrace the Heidelberg Catechism, the national (Protestant) churches of France, Switzerland, Holland, England, and Scotland, the Independents and Baptists of England and America, and the various branches of the the Presbyterian Church in England, Ireland, and America,—in all about thirty-six millions of adherents, if the Episcopal churches are included. From the time of Archbishop Laud (1644) a large proportion of the clergy and influential writers of the Episcopal churches have been Arminian, and it has even been disputed whether the Church of England was originally Calvinistic or not. The fact that the founders and leading ministers of that Church were thorough Calvinists during the first hundred years of its history, and that its creed remains such to this day, is as certain and as conspicuous as any other fact in the history of mankind. The seventeenth article, "On Predestination," corresponds in spirit, design, and expression with all the other Calvinistic creeds in the world. Tyndal, Frith, Barnes, who suffered under Henry VIII.; Hooper, Latimer, Ridley, who suffered under Bloody Mary; Cranmer, the real author, and Jewel, who gave the finishing touch to the Thirty-nine Articles, were all Calvinists. Jewel wrote to Peter Martyr of Zurich, "We do not differ from your doctrine by a hair's breadth." Cranmer put Martin Bucer and Peter Martyr into the divinity chairs of Oxford and Cambridge. "The same is proved by the whole history of the proceedings connected with the Lambeth Articles, the cases of Baro and Barret (1595), the Irish Articles (1615), and the Synod of Dort (1619)." (*Cunningham.*) The sources of information, and the arguments on both sides of this controversy, may be found in the "Works of the Parker Society," Richmond's "Fathers of the English Church," the "Zurich Letters," the works of Heylin, Winchester, Daubeny, Tomline, and Lawrence on the Arminian side, and the works of Prynne, Hickman, Toplady, Overton, Goode, and Principal Cunningham on the Calvinistic side.

Over this vast area of time, and under all these various conditions of national and ecclesiastical life, Calvinism preserves its essential identity as a system of theological principles. It has, of course, undergone within these limits very various modifications as to details of structure and modes of statement. In Germany it has been rendered less thorough and definite through the influence of the compromising school of Melanchthon. In Holland, England, and Scotland it has been modified in form by the "Federal Scheme" introduced by Cocceius and the Westminster divines (1650). In France it was temporarily modified by the "Universalismus Hypotheticus," or the universal impetration and limited application of redemption (1642), as held by Amyraldus, Daillé, and Placeus on the Continent, and by Baxter, Davenant, and in modern times by Wardlaw and others, in England. In America it has been coerced through more radical and more transient transformations in the speculations of Hopkins, the younger Edwards, Emmons, N. W. Taylor, and others of the New England school.

C. *The Practical Effects of Calvinism on Personal Moral Character, and upon the Social and Political Interests of Men.*—From the time of Cœlestius and Julian, in the fifth century, to that of Heylin (1659) and Tomline (1811), the *a priori* objection has always been brought against Calvinism that its principles are necessarily immoral, and must lead either to licentious liberty or to abject subserviency, to discouragement in the use of means, and to undue disparagement and neglect of human reason. It is argued that the doctrine of the absolute moral impotence of man's will must destroy all sense of accountability, and that the doctrine of absolute decrees must cause the use of means to appear either unnecessary or ineffectual, and to lead to despair upon the one hand, or to licentiousness upon the other.

The advocates of Calvinism have triumphantly vindicated the moral character of their system in two ways: 1st, on the ground of reason. The recognition of the true (*i. e.*, actual) condition of man's nature and relations to God, as this is revealed in Scripture and experience, must be more moral in its effect than the most skillful misrepresentation possible of that actual condition can be. The historian Froude, himself held by no trammels of sect or party, says in his late address at St. Andrew's (1871): "If Arminianism most commends itself to our feelings, Calvinism is nearer to the facts, however harsh or forbidding those facts may seem." Archbishop Whately, himself an Arminian (in his essay on "Some of the Difficulties in the Writings of St. Paul"), acknowledges that the ordinary objections against the moral attributes of Calvinism are in effect objections to the open *facts* of the case. That standard of morals which places the ground of obligation in the supreme will of the All-perfect, instead of a tendency to promote happiness, and which utterly condemns fallen man, is obviously higher, and therefore more moral, than a more self-pleasing one which either justifies or excuses him. The system which teaches the total depravity and guiltiness of human nature from birth, its absolute dependence upon Divine grace, together with the universal sweep of God's absolute decrees, at once maintaining the free agency of man and the infallibility of the Divine purpose, must of course empty man of self, make all men equal before the law, and exalt the all-wise and all-powerful Father to the control of all events; such a system must make the highest attainments the condition and the fruit of God's favor, and must raise even the weakest believer to the position of an invincible champion for God and the right, "a co-worker together with God." 2d, In the second place, Calvinists claim that on the ground of an illustrious and unparalleled historical record they can show that their system has been eminently distinguished by the effects produced by it upon all the communities which have embraced it in its purer forms, as to the following particulars: (*a*) the general standard of moral character practically realized in personal and social life; (*b*) the amount of rationally regulated liberty realized both in Church and State; (*c*) the standard of popular intelligence and education actually attained; (*d*) the testimony yielded to the power of the truth by the number and illustrious character of its martyrs; and (*e*) the zeal and devotion expressed in sustained missionary efforts for the extension of the kingdom of Christ.

1st. As to the influence of Calvinism on the moral character of individuals, it is only necessary here to quote the ex-rector Froude's citation of the names of "William the Silent, Luther, Calvin, Knox, Andrew Melville, the regent Murray, Coligny, Cromwell, Milton, John Bunyan—men possessed of all the qualities which give nobility and grandeur to human nature." As to its effect upon the general moral character of communities, it will be sufficient to cite the Waldensians; the little radiant state of Geneva, whose Protestant reconstruction began with the establishment of a Court of Morals; the Huguenots, as compared with their Catholic fellow-citizens; the Jansenists, as compared with the Jesuits; the Dutch Protestants prior to the latter half of the seventeenth century; the Scotch Covenanters; the English Puritans, whose very name signalizes their eminent moral character, in contrast with the unparalleled corruption brought in at the Restoration in association with the ecclesiastical revolution effected by the despot Laud (see Macaulay's "Essays on Milton" and Hallam's "Constitutional History"); and finally, all those sections of America settled by English Puritan New Englanders, by the Scotch and Scotch-Irish, and by Presbyterians from France and Holland.

Mr. Froude (*Address*, p. 7) says: "The first symptom of its operation, wherever it established itself, was to obliterate the distinction between sins and crimes, and to make the moral law the rule for states as well as persons." Pascal, the sublime avenger of the persecuted religionists of Port Royal, shows in the first nine of his "Provincial Letters" the connection between the infamous morality of the Jesuits and their Semi-pelagian views as to sin and grace. Sir James Mackintosh, in vol. xxxvi. of the "Edinburgh Review," vindicates at length the morality of the theological doctrine of predestination by a general review of the history of its most conspicuous professors.

2d. It appears superfluous to prove the tendency of Calvinism to promote freedom and popular government, both in Church and State. Its principles strip the ministry of all sacerdotal powers; they make all men and all Christians equal before God; they make God absolute and supreme over all, and the immediate controller and disposer of human affairs. Hence all churches accepting Calvinism, unless prevented by external conditions, have immediately adopted popular constitutions, either Presbyterian or Independent. This is true of all the churches of Switzerland, France, Holland, the Palatinate, Scotland, America, and the free churches of England and Ireland. The apparent exception is the English Establishment. The history of its political relations explains its prelatical character. Cranmer and the other Calvinistic founders of that Church held, as did Archbishop Usher, a very moderate theory of the espiscopate, and submitted to the constitution actually established only for state reasons. Afterwards, as Calvinism became more thoroughly incorporated in the public faith, Presbyterianism was established by the Long Parliament, and Independency by the Puritan army and Protector. It is a conspicuous fact of English history that high views as to the prerogatives of the ministry have always antagonized Calvinistic doctrine.

The political influence of Calvinism was at an early period discerned by kings as well as by the people. The Waldenses were the freemen of the ante-Reformation period. The republic was established at the same time with Presbytery at Geneva. The Hollanders, grouped around the sublime figure of William the Silent (*Calvus et Calvinista*), performed deeds of heroism against odds of tyranny unparalleled utterly in all foregoing and subsequent history. This battle was fought by Calvinistic Holland, and the victory won (1590) completely before the Arminian controversies had commenced. Add to these the French Huguenots, the Scotch Covenanters, the English Puritans in the Old and in the New World, and we make good our claim that Calvinists have been successful champions of regulated freedom among men.

Bancroft, the historian of our republic, attributes over and over again the modern impulse to republican liberty to the little republic of Geneva and to its Calvinistic theology (vol. i., 266; ii., 461–464). He credits the moulding of American institutions chiefly to New England Independents, and to Dutch, French, and Scotch-Irish Presbyterians. "The Mecklenburg Declaration, signed on the 20th of May, 1775, more than a year before that of July 4, 1776, signed in Philadelphia, was the first voice publicly raised for American independence. And the convention by which it was adopted and signed consisted of twenty-seven delegates, nine of whom, including the president and secretary, were ruling elders, and one, Rev. H. J. Balch, was a Presbyterian minister." Tucker, in his life of Jefferson, says: "Every one must be persuaded that one of these papers must have been borrowed from the other;" and Bancroft has made it certain that the Declaration of Jefferson was written a year after that of Mecklenburg. The correspondence between the representative system and the gradations of sessions, presbyteries, provincial synods, and national general assemblies, developed in the Westminster Confession, to the federal system of State and national governments in the Constitution of the United States, is too remarkable to have been accidental.

3d. The relation of Calvinism to education is no less conspicuous and illustrious. The little republic of Geneva became the sun of the European world. The Calvinists of France, in spite of all their embarrassments, immediately founded and sustained three illustrious theological schools at Montauban, Saumur, and Sedan. The Huguenots so far surpassed their fellow-countrymen in intelligence and skill that their banishment on the occasion of the Revocation of the Edict of Nantes (1685) quickened the manufactures and trades of Germany, England, and America, and for a time almost paralyzed the skilled industries of France. (See Weiss's "History French Protestant Refugees.") The fragment of marshy sea-coast constituting Holland became the commercial focus of the world, one of the most powerful communities in the society of nations, and the mother of flourishing colonies in both hemispheres. The peasantry of Scotland has been raised far above that of any other European nation by the universal education afforded by her parish schools. The common-school system of Puritan New England is opening up a new era of human history. In this country, for the first two hundred years of its history, "almost every college and seminary of learning, and almost every academy and common school even, which existed, had been built up and sustained by Calvinists." (See "New Englander," October, 1845.)

4th. The martyrology of Calvinism is pre-eminent in the history even of the entire Church. We call to witness John Huss and Jerome of Prague, who perished for their adherence to this faith one hundred years before Luther. The Waldenses, of whom were the "slaughtered saints whose bones lie scattered on the Alpine mountains cold," the victims of the reign of "Bloody Mary," John Rogers and Bishops Hooper, Ferrar, Ridley, Latimer, and Cranmer, and their fellow-martyrs, were all Calvinists, as well as Hamilton and Wishart, the victims of Claverhouse and the "Killing Time" of 1684 in Scotland, and the victims of the High Commission and of the "Bloody Assizes" of England (1685). Under Charles V. and Philip of Spain, Holland had been made a spectacle to all nations by her sufferings, and had surpassed all other Christian communities with the number and steadfastness of her martyrs. When the duke of Alva left the Netherlands, December, 1573, he boasted that within five years he had delivered eighteen thousand six hundred heretics to the executioner. (Motley's "Rise of the Dutch Republic," vol. ii., p. 497.) Moreover, Calvinists claim the victims of the Inquisition in Spain and Italy; the history of the Huguenots of France, from the martyr-doom of Leclerc (1523) to the promulgation of the Edict of Nantes, 1598; the victims of the unparalleled atrocity of the massacre of St. Bartholomew, August 22, 1572, when some fifty thousand princes, noblemen, and commoners perished at one time by the hand of assassins; and all the hundreds of thousands of the very flower of France who fell victims either to the wars which raged with comparatively short exceptions from the Reformation to 1685, or to the dragoonings, the galleys, and the expatriation which preceded and followed that dreadful time.

5th. Calvinism has been proved an eminent incentive to all missionary enterprises, domestic and foreign. It is, of course, acknowledged that several Christian bodies not characterized by what are generally regarded as the peculiarities of Calvinism have been in the highest degree distinguished by missionary zeal and efficiency. The most remarkable instances of this kind have been the Nestorians in Western and Central Asia from the fifth to the ninth century, the Moravians from 1732, and the Wesleyan Methodists from about 1769 to the present time. These bodies (except the Nestorian) may be said to be eminently evangelical and Augustinian in the general usage of that term, nearly agreeing with the Calvinism set forth in this article in its most essential principles of total depravity, moral inability, and dependence upon divine grace. And it is obvious that these evangelical principles, common to these great missionary churches, with others whose Augustinianism is more pronounced, must supply the strongest incentives and encouragements possible to urge all Christians to the rescue of their perishing fellow-men.

In the early Church, St. Patrick, the missionary of Ireland, fifth century; Augustine, the missionary of Gregory the Great to England; and Columba and his missionary college at Iona in the Hebrides, and his disciples the Culdees, in the sixth century, as well as the Lollards, the followers of Wickliffe, in the fourteenth century, were all of the general school of St. Augustine. In 1555, through Admiral Coligny, Calvin sent two ministers to the heathen in Brazil. Cromwell in the next century proposed to appoint a council to promote the Protestant religion in opposition to the congregation *De Propaganda Fide* in Rome. One of the principal objects of the promoters of the Plymouth and Massachusetts colonies was the conversion of savages and the extension of the Church. The charter of the "Society for the Propagation of the Gospel in Foreign Parts" was granted by the Calvinistic prince William III. As to the number of missionaries to the heathen employed by the different branches of the Protestant Church at present, the following may be regarded as a fair statement as to the proportion of the several confessions in England and America and on the Continent: Congregational, including the Baptists (all Calvinists), about 400; Episcopal, a majority of those supporting missions being of the Evangelical school, and many of these being Calvinists, about 310; Presbyterians, about 430; Moravians, about 160; Methodists, about 300.

D. *Literature.*—This is so immeasurable that only a few books of the greatest interest from the stand-point of this article will be mentioned: "S. Aurelii Augustini Hipponensis Episcopi Opera," of different editions, especially his Anti-pelagian writings collected in the tenth tome of Ed. Bened., Par. 1690; "The Works of John Calvin," especially his "Institutes," his "Consensus Genevensis," and his "Letters," by Bonnet; "The Treatise on Predestination," by Moses Amyraldus, Saumur, 1634, and his "Answer" to Hoard's "Doctrinæ J. Calvin Defensio;" "The Works of John Owen," Edinburgh, 1850; "The Institutes of Theology" of Francis Turretin, Geneva, 1682; "Collectio Confessionum in Ecclesiis Reformatis Publicatarum," Niemeyer, and "Libri Symbolici Ecclesiæ Evangelicæ sive Concordia," Hase; Wiggers's "Historical Presentations of Augustinianism and Pelagianism," translated by Ralph Emerson; "The Works of the Parker Society," 1841–55; Mozley's "Treatise on the Augustinian Doctrine of Predestination;" Goode's "Vindication of the Defence of the Thirty-nine Articles," and his "Effects of Infant Baptism;" "The Works of Jonathan Edwards;" "The Reformers and the Theology of the Reformation," and "Historical Theology," by William Cunningham, D. D.; "Calvinism," an address by James Anthony Froude, M. A., delivered at St. Andrew's, March 17, 1871; "History of the Christian Religion and Church," by Augustus Neander, translated by Torrey; Neander's "History of Christian Dogmas," translated by Ryland; "History of the Christian Church," by Philip Schaff, D. D.; Pascal's "Provincial Letters," translated by Thomas McCrie, D. D.; Motley's "History of the Rise of the Dutch Republic;" Neal's "History of the Puritans;" Macaulay's "History of England" and "Miscellanies;" "Dissertation on the Progress of Ethical Philosophy," note O, included in the miscellaneous works of Sir James Mackintosh; "Our Theology and its Developments," by Dr. E. P. Humphrey, Presbyterian Board of Publication; "Comparative Influence of Calvinism and Arminianism on Civil Liberty;" "The New Englander," Oct., 1845; Bancroft's "History of the U. S." (See also the article ARMINIUS, ARMINIANISM, by D. D. WHEDON, D. D., LL.D.)

A. A. HODGE.

Calvinistic Methodists, in Great Britain, arose from a difference between Whitefield and Wesley respecting the Calvinistic doctrines, and are in three divisions: (1) "Lady Huntingdon's Connection," dating from 1748; (2) "Whitefield's Connection," dating from 1741; (3) "Welsh Methodists," from about 1750.

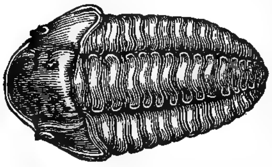
Calx (gen. *calcis*), the Latin name of quicklime, was applied by the alchemists to many products of combustion or oxidation, especially to those obtained from metals and other minerals, which were supposed to be converted into earths.

Calycan'thus [from the Gr. κάλυξ, a "cup," and ἄνθος, a "flower;" the bottom of the flower being cup-shaped], a genus of plants of the order Calycanthaceæ, allied to Rosaceæ. It comprises only a few known species, which are natives of the U. S. and Japan, and are shrubs with square stems. The flowers, bark, and leaves are fragrant and aromatic. The *Calycanthus floridus*, a native of Carolina, called Carolina allspice and sweet-scented shrub, is cultivated in many gardens of the U. S. Its flowers are of a lurid purple or rich-brown color.

Cal'ydon [Gr. Καλυδών], an ancient and celebrated city of Ætolia, on the river Evenus, a few miles from its entrance into the sea. It is often mentioned by Homer, and continued to be an important city in the historical period.

Calydo'nian Hunt, The, in classic mythology, was a celebrated enterprise against a wild boar which ravaged the dominions of Œneus, king of Calydon. Among the heroes who took part in this hunt were Meleager, Theseus, Jason, and Nestor.

Calym'ene, a genus of fossil trilobites, which is distinguished from the other genera of that order by the faculty which the animal had of rolling itself up into a ball, in which form they are often found. This genus is characteristic of the Silurian formation. The *Calymene Blumenbachii*, sometimes called "Dudley locust," is remarkable as a long-surviving species which is found in beds of several successive periods in England and the U. S.



Calymene Blumenbachii.

Calyp'so [Gr. Καλυψώ], a beautiful nymph and demigoddess of classic mythology, who was, according to Homer, a daughter of Atlas. She reigned over the island of Ogygia, on which Ulysses landed after he had been shipwrecked. She treated him kindly, and tempted him to marry her with the promise of immortality, which he declined for the sake of Penelope.

Calyp'so Borea'lis, a rare and beautiful plant of the natural order Orchidaceæ, growing in cold bogs and wet woods of the Northern U. S. and Canada. The flower is variegated with purple, pink, and yellow. It has a single, nearly heart-shaped leaf.

Calyp'tra, the hood which covers the urnlike sporecase of certain mosses.

Calyptræ'a [Gr. καλύπτρα, a "head-dress or veil"], a genus of gasteropod mollusks, the type of a family, Calyptræidæ, formerly included in the genus *Patella*, or limpet, and still known as chambered limpets, bonnet limpets, and slipper limpets. The shell is limpet-shaped, but the apex is spiral, and has a calcareous process from its inner surface for the attachment of a muscle. The Calyptræidæ differ in shape, some being very flat, and others very conical; some are elongated and slipper-like. The species are generally natives of the shores of warm climates. Calyptræidæ are common in the older fossiliferous rocks. Fifty living species are known.

Ca'lyx, plu. **Cal'yces** [Gr. κάλυξ, a "cup;" Fr. *calice*], a botanical term applied to the flower-cup, which is the outermost of the proper floral envelopes, or of the circles of modified leaves which surround the organs of reproduction, and along with them constitute the flower. The leaves or separate parts of the calyx are called *sepals*. They are generally green, but in some cases are richly colored and *petaloid*, as in the *Mirabilis*, *Salvia splendens*, and *Fuchsia*. The calyx serves to protect the interior organs of the flower. If it falls off before the corolla, it is called *caducous*, and if it remains until the fruit is ripe it is called *persistent*. When the calyx is adherent to the sides of the ovary, it is *superior*, and when quite free from the sides of the ovary, it is *inferior*.

Cam, or **Granta,** a river of England, rises in Essex, flows north-eastward through Cambridgeshire, and enters the Ouse 3½ miles above Ely. Length, about 40 miles. It is navigable from its mouth to Cambridge, which derives its name from it. The Cam is considered as a classic stream, on account of its associations with Cambridge University.

Cam, or **Camb,** in machinery, is a contrivance for converting a uniform rotatory motion into a varied rectilinear motion. The end of a rod which is free to move only in the direction of its length is held in contact, by the action of a spring or weight, with the edge of an irregularly-shaped mass which revolves uniformly upon an axis. A varied motion is thus communicated to the rod, which carries with it the machinery by which the motion is to be applied.

Cam (Diogo), a Portuguese navigator of noble ancestry, lived in the last half of the fifteenth century, and carried on, under Alphonso V., the discoveries commenced by Don Henry in Western Africa. He doubled Capes Gonçalvez and Catharina, and, having acquired great influence over the king of Congo, prepared the way in that country for Christianity. Cam was accompanied on his first voyage (1484) by Martin Behaim, the astronomer and cosmographer, and afterward explored as far as 22° S. lat.

Camaïeu. See Camayeu.

Camaldulen'sians, or **Camal'dolites,** an order of monks founded about 1018 by Saint Romuald at Camaldoli, in the Apennines, about 30 miles from Florence. They are divided into two classes—Cænobites and Eremites—and follow the rule of Saint Benedict. There are also a few houses of Camaldolite nuns.

Camanche Indians. See Comanche Indians.

Camargue, La, a populous island of France, department of Bouches-du-Rhône, is at the mouth of the Rhone, and enclosed on two sides by the arms of that river. It is an alluvial fertile delta, partly occupied by marshes. Area, about 240 square miles. Large quantities of salt are obtained here.

Camari'lla, a Spanish word, the diminutive of *camara*, a "chamber," signifies, literally, a "little chamber." It is applied to the private chamber or cabinet of the king of Spain, or to his courtiers and confidential advisers, who usually had great power in the government and exerted a pernicious influence. The term is also used in other European countries and languages to denote the influence of courtiers and secret counsellors, counteracting the opinions and policy of the legitimate ministers.

Camari'na, a celebrated Greek city of Sicily, on the southern coast, about 20 miles E. of Gela. It was founded by a colony of Syracusans in 599 B. C. It is said that no trace of it now exists.

Camas'sia [from its Nootka Indian name, *camass* or *quamash*], a genus of plants of the natural order Liliaceæ, consists of a single species, the *Camassia esculenta*, the quamash of the Nootka Indians. It grows in swampy places in the U. S. west of the Rocky Mountains, and resembles the *Scilla*, having bulbs which the savages use as food.

Camayeu (or **Camaïeu**) and **Mon'ochrome** are French terms used to denote a painting in a single color. Pictures of several tints, which do not represent the natural colors of objects, are said to be *en camayeu*. The same term may be properly applied to drawings in India ink and red chalk, as well as engravings.

Camb. See Cam.

Cambacérès (Jean Jacques Régis), duke of Parma, an able French statesman and lawyer, born at Montpellier Oct. 18, 1753. He was elected in 1792 a member of the National Convention, in which he acted a cautious and moderate part. After the death of Robespierre (9th Thermidor, 1794) he was president of the Committee of Public Safety, and opposed the continuance of the Reign of Terror. He became a member of the Institute about 1796. About the end of 1799 he was appointed second consul by Bonaparte, of whom he became a faithful adherent. He took a prominent part in the rédaction of the civil code. Under the empire he was arch-chancellor and president of the council of state. During the Hundred Days he was Napoleon's minister of justice. He held no office after the Restoration of 1816. Died Mar. 5, 1824.

Cambay', a seaport-town of Hindostan, is at the head of the Gulf of Cambay, and on the right bank of the Myhee, 82 miles N. N. W. of Surat. It has a fine mosque, several Hindoo temples, and a curious subterranean Booddhist temple. Ruined palaces and mosques attest the former magnificence and extent of this town, which was once much more populous than it is now. One cause of its decline was the increasing shallowness of the gulf. It still exports cotton, grain, ivory, etc. Pop. about 10,000.

Cambay, Gulf of, is an inlet of the Arabian Sea, in the W. part of Hindostan. It is about 75 miles long, and extends in a nearly N. and S. direction. The width of the entrance, which is the widest part, is 32 miles or more. It receives the rivers Nerbudda, Taptee, Myhee, and Subbermuttee. The tide here is very rapid, and rises about thirty feet.

Cam'ber [Fr. *cambre*], a term applied by builders to the slight degree of arching which is usually given to beams or other parts of a frame in order to compensate the settlement of the various parts or the subsidence of the joints. Camber in shipbuilding signifies a curvature upward, or a convexity. A deck is said to be "cambered" when it is higher amidships than at the bow or stern.

Cambis'ta, an Italian word signifying "a banker," "a money-changer." It is also used as the title of a book in which the moneys, weights, and measures of various nations are given in the equivalents of some particular nation.

Cam'bium, in botany, a mucilaginous, viscid substance which is secreted between the liber and alburnum of exogenous trees and other plants in early spring. It is supposed by some physiologists to be the matter out of which new wood and bark are formed; by others, to be a preparation of organizable matter out of which the horizontal growth of the cellular system and the vertical growth of the woody system may be nourished during their respective developments. These are the old views. Cambium is now known to consist of forming cells of wood and bark gorged with rich sap.

Cambo'dia is known under three different names: first, *Kampootcha*, which is given to it in the sacred books; *Youdra Skan*, the appellation by which it is best known to foreigners; and *Khamain*, the common name used among the natives themselves. This vast kingdom lies between Laos on the N. and Cochin China on the E., the China Sea and the Gulf of Siam on the S., and the kingdom of Siam proper on the W. The country between Cambodia and Siam is an inclined plane falling off to the sea, beginning from the Khoa Dong Rèke, or the highlands of Korat, which constitutes the first platform of the terraces that gradually ascend to the mountain-chain of Laos. Khoa Dong Rèke, the Cambodian Atlas, includes in its domain a magnificent and extensive forest, Dong P'hya Fai, or "the forest of the Lord of Fire," whence issue many beautiful streams to flow into the Pachim River. Its area is about 32,370 square miles. Its population is estimated at a little over 890,000. The religion is Booddhism, with a small but rapidly growing proportion of converts to Roman Catholicism. It is subdivided into Northern and Southern Cambodia, and the great province of Cançao on the S. E., and it teems with every species of mineral and vegetable wealth. Near the coast the country is covered with woods; a little farther inland, especially along the banks of the rivers and lakes, the land is well cultivated. But in the interior it abounds with impenetrable jungles, where elephants, lions, tigers, and wild buffaloes find shelter and afford excellent sport to the natives, who hunt them in large parties for their ivory and skins. Deer, hogs, goats, and a great many species of wild fowl abound in the forests, as well as in the more cultivated districts. The country abounds in iron, tin, precious stones, teak, sandal, and other wood, gamboge and numerous other dyestuffs. The finest gamboge is produced by the tree *Garcinia gambogoïdes;* and Bantabang is noted for its gold-mines. Saigon annually exports quantities of pepper, rice, cardamoms, cotton, hides, horns, and cocoanut oil.

The climate is warm but wholesome, the scenery varied and beautiful; the navigation of the Gulf of Siam and the China Sea, along with such splendid rivers as the Meikong and the Saikong, magnificent forests of fine woods, endless crops of rice, Indian corn, sugar-cane, and tea, and vast plantations of mulberry trees for the rearing of silkworms, producing the finest article of silk, are some of the prospective advantages of the superb region to which Saigon is the key. The export of rice alone during a single month, 1870, amounted to 130,000 piculs, sent to Europe, Mauritius, Singapore, Malacca, China, and Japan. The arrivals for that month at the port of Saigon alone were thirty-two vessels, of from 200 to 2000 tons, and there were twenty vessels loading under the British, French, and German flags, aggregating 9000 tons; and indigo and silk are now cultivated with splendid prospects of success.

The kingdom of Cambodia was in its day not only independent, but powerful. As to its antiquity, two opinions prevail; one ascribing to it a duration of 1300 years, the other 2400. The native historians reckon 2400 years from the building of the wonderful temples found in the neighborhood of Angkor, near the great lake Talasap. Angkor has even at this day sufficient proof, in its memorable ruins, that it was at some remote period the centre of a wealthy, powerful, and highly civilized state. Its decline probably dates from the dispersion of the Indian Booddhists, which took place from seven to five centuries before Christ. The ruins of Angkor Tom or watt are still in a tolerable state of preservation, and are composed of a central tower surrounded by four turrets and flanked by two other towers, all connected together by extensive galleries. At the top of the central tower are four immense heads in the Egyptian style, and every available space on these buildings is filled with exquisite sculptures in bas-relief. The scenes are drawn from the ancient mythological books of the Cambodians. There are here, also, several gigantic stone bridges of almost superhuman magnitude and solidity.

During the reign of His Siamese Majesty Phra-Chow-Maha-Chakraphat, who reigned in Ayodhia, the ancient capital of Siam, in the Siamese civil era 900 (corresponding to 1540 of our Christian era), the Cambodians fitted out an immense army and attacked Siam, marched their forces as far as Bangnah and Phrakanong, ancient seaport-towns of Siam, which they pillaged and destroyed. The Siamese thereupon set out with a powerful army and took possession of Inthapatiburee, the ancient capital of Cambodia, and remained masters of the citadel until the emperor of Cambodia acknowledged himself penitent and willing to become tributary to Siam. About a hundred years ago dissensions among the reigning family led to weakness, and Cambodia fell under the control of the Annamites, who exacted heavy tribute, and at last, in 1809, unblushingly divided its provinces between themselves and the Siamese.

The name Cochin China was applied to it by the Portuguese, who thought they saw a likeness in it to Cochin on the coast of Malabar. In 1471 it was reunited to the great province of Tonkin. In the sixteenth century it broke away, and in 1774, after a long and terrific war, Tonkin was reduced to submission and incorporated that fine country with the kingdom of Annam. It was about this time that European influence first began to be felt in this region. The first Christian missionary who entered the country was the Dominican monk Gaspar da Cruz, who labored there in the middle of the sixteenth century, and left some curious notes on the country. At that time not only the Portuguese, but also the Dutch and the English, had factories in the country, but their reciprocal jealousy seems to have left the Cambodian government completely independent of European influence. Meanwhile, the country was sorely pressed on one side by Siam, and on the other by Cochin-China. The emperor of Cambodia, Chow Ngayen, felt the need of some support, and offered, through a Christian missionary who was a bishop in the country, to place himself under the protection of France. On this many French officers went to the new kingdom in the East, disciplined its armies, and took a share in the government. In 1820 the old-school Booddhists, in order to revenge the indiscriminate pillage of the French officers on the property of the simple inhabitants, instituted a ferocious persecution of the Christians. Since then, French fleets have been sent out to demand indemnities and protect the Catholic missionaries. Thus, France and other European nations have made their way into Annam, until now France holds the best part of Southern Cochin China and the whole of the fine province of Cambodia. MRS. ANNA H. LEONOWENS.

Cambon (JOSEPH), a French statesman and financier, born at Montpellier June 17, 1756. He was elected to the National Convention in 1792, voted for the death of the king, and became a member of the Committee of Public Safety in 1793. He promoted the fall of Robespierre in 1794. As a member of the committee on finance he made several able reports, and is said to have laid the foundation of the modern financial system of France. He procured the adoption of the great book or register of the public debt. He held no office under the empire, was exiled in 1816, and died Feb. 15, 1820.

Cam'borne, a town of England, in Cornwall, 11 miles N. W. of Falmouth. Here is a church which has a stone inscription of the tenth century. Productive mines of copper, tin, and lead are worked in this vicinity. P. 13,607.

Cambray [Lat. *Camaracum*], a fortified city of France, in the department of Nord, on the Schelde, 45 miles by rail N. N. E. of St.-Quentin, the seat of an archbishop, celebrated for its fine linens, called *cambrics*. Cambray is an ancient city, with gabled houses, handsome streets, and is surrounded by a wall with ancient towers and gates. It has manufactures of laces, tulles, leather, soap, etc. Pop. in 1881, 23,448.

Cam'bria, the ancient and Latin name of Wales, which the Romans called Britannia Secunda. Cambria is derived from *Cymry*, by which name the Welsh people have always called themselves.

Cam'brian Rocks (or **System**), a name given by Prof. Sedgwick to the oldest known fossiliferous rocks, on account of their extensive development in North Wales (*Cambria*). They are in part the equivalents of rocks described by Murchison as lower Silurian. The Cambrian is therefore regarded by some geologists as a subordinate member of the Silurian group. The government geological surveyors confined the term to a series of sandstones, slates, and gritstones which underlie the Silurian lingula beds.

Cām'bric, the name generally given to the lightest and finest of linen and cotton fabrics, originally made at Cambrai, in France, whence the name is derived. In 1563 Dutch emigrants introduced the manufacture into England.

Cam'bridge [anc. *Granta;* Lat. *Cantabrigia*], a town of England, capital of Cambridgeshire, is situated on both sides of the river Cam, and on the Eastern Counties Railway, 48 miles N. N. E. of London. The site is level, and the town is embosomed among lofty trees. It is the seat of one of the great universities of England, and contains many noble edifices belonging to that institution. Among the remarkable buildings of the town are Trinity church and the church of the Holy Sepulchre, which was built in the reign of Henry I., and has a round tower. It is said that Cambridge was destroyed by the Danes in 871 A. D. The Doomsday Book mentions it as an important place under the name of *Grentebrige*. It obtained a charter from King John in 1200. Jeremy Taylor was born here. Cambridge returns two members to Parliament, besides those who represent the university. Pop. in 1881, 35,372.

Cambridge, on R. R., capital of Henry co., Ill. (see map of Illinois, ref. 3–C, for location of county), 140 miles N. by W. from Springfield, is an important grain-market. Pop. in 1880, 1203.

Cambridge, on R. R., capital of Dorchester co., Md. (see map of Maryland, ref. 4–F, for location of county), is on the S. side of the Choptank River, 50 miles S. E. of Annapolis. The river is here about 2 miles wide. Cambridge is the western terminus of the Dorchester and Delaware R. R., which extends 33 miles to Seaford. It has academies for both sexes, a flouring mill, a tobacco and a stave factory, and several canning establishments. Pop. in 1870, 1642; in 1880, 2262.

Cambridge, a city of Massachusetts, and one of the capitals of Middlesex co. (see map of Massachusetts, ref. 2–H, for location of county), is on R. R. and N. W. bank of the Charles River, which is here about 1 mile wide, and separates Cambridge from Boston. Cambridge, though incorporated as one city, was formerly divided into several villages, the local names of which still survive; these are Old Cambridge, Cambridgeport, East Cambridge, and North Cambridge. Harvard University is in Old Cambridge. Cambridgeport and East Cambridge contain many mercantile houses and manufactories, mostly of glass, furniture, organs, steam-engines, and boilers. East Cambridge is connected with Boston and Charlestown by bridges. West Boston Bridge connects Cambridgeport with Boston. Extensive printing establishments exist here, and the first printing-office in America was located in Cambridge. Near Harvard University is a fine soldiers' monument, erected in 1869–70 at a cost of $35,000. The city hall is in Cambridgeport. Cambridge is beautifully situated on a plain, contains some handsome public buildings, and a great number of elegant private residences, with spacious grounds ornamented with shrubbery and flowering plants. The city is furnished with water from Fresh Pond. Pop. in 1850, 15,215; in 1870, 39,634; in 1880, 52,669; in 1885, 59,660. It was settled in 1630. (See HARVARD UNIVERSITY.)

Cambridge, capital of Isanti co., Minn. (see map of Minnesota, ref. 9–F, for location of county), on Rum River, about 44 miles N. of Minneapolis. Pop. in 1885, 202.

Cambridge, on R. R., Washington co., N. Y. (see map of New York, ref. 4–K, for location of county), 35 miles N. E. of Albany. It has a fine academy, a foundry and machine-shop, tanneries, and a fine driving park. Pop. in 1870, 1530; in 1880, 1482.

Cambridge, R. R. junction, capital of Guernsey co., O. (see map of Ohio, ref. 5–H, for location of county), situated on Will's Creek and the Baltimore and Ohio (Central Ohio division) and Marietta and Pittsburg R. Rs., in a good agricultural and mineral region, 85 miles E. of Columbus and 65 miles N. of Marietta. It has several mills. Pop. in 1870, 2193; in 1880, 2883.

Cambridge (ADOLPHUS FREDERICK), DUKE OF, the seventh son of George III. of England, was born Feb. 25, 1774. He entered the army about 1790, was appointed governor of Hanover in 1816, and viceroy of that kingdom in 1831. Died July 8, 1850.

Cambridge (GEORGE WILLIAM FREDERICK CHARLES), Duke of, a British general, a son of the preceding, was born Mar. 26, 1819. He became a major-general in 1845, served in the Crimean war in 1854, was appointed acting commander-in-chief of the British army in 1856, and field-marshal in 1862.

Cambridge City, R. R. junction, Wayne co., Ind. (see map of Indiana, ref. 6–G, for location of county), on the Whitewater River, 15 miles W. of Richmond. It has the car-shops of the Indiana Car Company and other manufactures. Pop. in 1870, 2162; in 1880, 2370.

Cambridge Platform, a system of church government drawn up by a synod at Cambridge, in the colony of Massachusetts Bay, in 1648. The Congregational churches of New England at that time differed somewhat in regard to discipline, some being inclined to Presbyterianism and others to Independency, while the majority avoided both extremes. The synod reaffirmed the doctrines taught in the Westminster Confession, but recommended a form of church discipline substantially the same as that which now prevails in the Congregational churches.

Cam′bridgeshire, a county of England, is bounded on the N. by the river Nen, on the E. by Norfolk and Suffolk, on the S. by Essex and Hertford, and on the W. by Bedford and Huntingdon. Area, 820 square miles. Pop. in 1881, 185,475. The surface is mostly flat, and about one-fourth of the county is occupied by fens or marshes. The northern portion is part of the Bedford Level (which see). The soil is fertile, and the inhabitants are mostly engaged in agriculture. Among the staple products are wheat, beans, hay, oats, butter, and cheese. It is intersected by the river Ouse, and also drained by the Cam. In the N. part is a tract called the Isle of Ely. The chief towns are Cambridge, Ely, and Newmarket.

Cambridge, University of, one of the two ancient universities of England. In 1110, Joffrid, abbot of Croyland, sent to his manor of Cottenham, near Cambridge, Gislebert, a professor in divinity, with three other learned monks. They in a short time drew together so great a number of scholars that in the second year no single building was able to contain them. When Alfred of Beverly was there, in 1129 A. D., there were no public halls, but each one lived in his own lodgings. About the year 1257 students began to live together in hostels, under a principal, at their own charges. The hostels were named after saints or the churches which they adjoined, or the persons who built them. Trinity hostel survived to 1540. The hostels were the beginning of the college system, which distinguishes the universities of Oxford and Cambridge. A hostel for medical students was opened in 1859, and another has been opened in connection with Trinity College.

Before the close of the sixteenth century nearly all the foundations were endowed which now constitute the university. The predominance of the religious element in the discipline is to be attributed to the usage of the times in which the colleges were founded. There had been, from very early times, "religious houses," which were in many cases united with collegiate foundations, as, for example, the Dominicans, whose house is now Emmanuel College. The friars who lived in these convents kept their "acts" or exercises for degrees like other university-men. To the same cause is traced the condition of celibacy, upon which, with scarcely an exception, the fellowships are tenable. With some exceptions, the fellows are obliged to take holy orders within a limited period or to vacate their fellowships.

The present statutes were confirmed July 31, 1858. The governing body is a senate of eight members. All university laws are approved by the council, consisting of a chancellor and vice-chancellor, before they are submitted to the senate. The executive powers are a chancellor, high steward, vice-chancellor, commissary, and assessor. There are three terms—Michaelmas, Lent, and Easter. Dissenters are not excluded from taking degrees, except in divinity.

There are four classes, or orders, of students—viz. fellow-commoners and noblemen, pensioners, sizars, and scholars on the foundation of their college. The first are so called from their dining at the fellows' table; they wear silk or embroidered gowns and pay heavier fees. The pensioners are the students not on the foundation, who pay for their own commons and for their chambers. The sizars are the poorer students, who are admitted at lower charges than the pensioners, but wear the same dress, and no longer perform menial offices, as they once did. St. John's and Trinity have very liberal endowments for sizars, and pecuniary assistance is given. All students coming to the university are entered in one of the above classes. The scholars are elected, by examination, from the pensioners and sizars; they have rooms and commons free, and other emoluments. The fellows are generally elected from the scholars. The fellowships are given to members of the college, and are not, as at Oxford, open to the whole university. Before a student can be admitted he must be sufficiently instructed in Latin, Greek, and mathematics.

When the undergraduate comes in he is called a "freshman;" in his second year, a "junior soph;" in his third year, a "senior soph." The degree of bachelor of arts requires usually nine terms, or three years, of residence. The master's degree is conferred three years later. The candidates for degrees are called questionists.

The mathematical examination embraces the whole range of mathematics. The successful candidates are arranged in a tripos—*i. e.* in three classes, called respectively wranglers, senior optimes, and junior optimes; the first mathematician is called the senior wrangler. In the examination for classical honors the candidates are arranged in a tripos, and distinguished as first, second, and third class. The examinations for degrees are called the "great go." The previous examination, which comes in the second year of residence, is called the "little go." There is also a tripos for the natural sciences. The pecuniary value of the first place in either the classical or the mathematical tripos has been estimated at £10,000, for it secures to its possessor high social position, as well as lucrative employment. The next prizes are the fellowships, of which there are 430 tenable for life. The office of tutor is one of great honor and emolument.

The following is a list of the colleges and halls:

Name.	Founded
St. Peter's College	1257
Clare College	1326
Pembroke College	1347
Gonville Hall and Caius College	1348
Trinity Hall	1350
Corpus Christi College	1351
King's College	1441
Queen's College	1448
St. Catherine's College	1473
Jesus College	1496
Christ's College	1505
St. John's College	1511
Magdalene College	1519
Trinity College	1546
Emmanuel College	1584
Sidney Sussex College	1598
Downing College	1800

The Fitzwilliam Museum is the finest modern addition to the university. Viscount Fitzwilliam bequeathed, in 1816, £100,000, the interest of which was to build and support a museum. He bequeathed also a valuable collection of books, paintings, etc. The University Library is a fine mass of buildings of different periods, and contains at present more than 230,000 volumes, without reckoning those in the college libraries, some of which are very important. The Geological Museum contains the collection of Dr. Woodward, with recent numerous and interesting acquisitions. Besides this, there are other valuable scientific museums. (For full information about the university see the "Cambridge Calendar.") Revised by T. D. Woolsey.

Camby′ses [Gr. Καμβύσης; Old Persian cuneiform inscriptions, *Kabujiya*], king of the Medes and Persians, and a son of Cyrus the Great, whom he succeeded about 530 B. C. He invaded Egypt in 525, defeated Psammenitus, its king, in battle, and captured Memphis, the capital of Egypt. Having completed the conquest of that country, he led an army to Ethiopia, but was compelled by famine to retire before he had conquered it. He afterwards indulged in violent and capricious acts of tyranny and cruelty in Egypt, so that many believed him to be insane. Cambyses was an epileptic, but a man of strong though very cruel character. By his Egyptian subjects he was utterly detested. Died in 522 B. C.

Camden, capital of Wilcox co., Ala. (see map of Alabama, ref. 5–C, for location of county), is about 4 miles S. of the Alabama River and 80 miles S. W. of Montgomery. Pop. of Camden township in 1870, 3060; in 1880, 3795, including 590 in village.

Camden, R. R. junction, capital of Ouachita co., Ark. (see map of Arkansas, ref. 5–C, for location of county), is on the right bank of the Washita River, 110 miles S. by W. from Little Rock. Steamboats ascend the river to this point, which is connected by navigable water with New Orleans, and for two-thirds of the year steamers ascend the river to Arkadelphia. It was once called *Écore à Fabre*, and was a great hunting rendezvous. Pop. in 1870, 1612; in 1880, 1503.

Camden, Knox co., Me. (see map of Maine, ref. 9–D, for location of county), on the W. side of Penobscot Bay, about 8 miles N. N. E. of Rockland. It derives its support from the burning of lime, shipbuilding, commerce, and manufacture of cars, car-wheels, railroad spikes, and ship's furniture of various kinds. Pop. in 1870, including Camden township, 4512; in 1880, 4386.

Camden, city, an important R. R. centre and river-port of New Jersey, and the capital of Camden co. (see map of New Jersey, ref. 6–C, for location of county), is situated on a plain on the Delaware River opposite Philadelphia, and 32 miles by railroad S. W. of Trenton. The plan of the city is regular. It contains a court-house, also several iron-foundries and manufactures of machinery, chemicals, and other goods. There is a large manufactory of steel pens, and shipbuilding is an important branch of industry. Numerous steam ferry-boats cross the river at various points, and connect Camden with Philadelphia. Pop. in 1870, 20,045; in 1880, 41,659; in 1885, 52,884.

Camden, Oneida co., N. Y. (see map of New York, ref. 4–H, for location of county), on R. R., 18 miles N. W. of Rome. It has various manufactures. Pop. in 1870, 1703; in 1880, 1589.

Camden, capital of Kershaw co., S. C. (see map of South Carolina, ref. 5–E, for location of county), is on R. R. and the E. bank of the navigable Wateree River, 33 miles N. E. of Columbia. It contains four academies, and has good water-power. Gen. Gates was defeated here Aug. 16, 1780, by Lord Cornwallis, and April 25, 1781, Gen. Greene was defeated by Lord Rawdon at Hobkirk's Hill, near Camden. During the recent civil war this place was captured, Feb. 24, 1865, by the Federal forces under Gen. Sherman after a lively skirmish; 2000 bales of cotton and a large quantity of tobacco were destroyed by burning. There are ancient mounds near this town. Pop. in 1870, 1007; in 1880, 1780.

Camden, on R. R., capital of Benton co., Tenn. (see map of Tennessee, ref. 6–D, for location of county), 82 miles W. of Nashville. Pop. in 1870, 148; in 1880, 200.

Camden, MARQUESSES OF, earls of Brecknock (United Kingdom, 1812), Earls Camden (1786), Viscounts Bayham (1836), Barons Camden (1765, Great Britain).—JOHN CHARLES PRATT, born June 30, 1840, was member of Parliament for Brecon in 1866, and succeeded to the marquisate in the same year.

Camden (CHARLES **Pratt**), FIRST EARL OF, an eminent English statesman and lawyer, born in 1713, was a son of Chief-Justice Sir John Pratt. He was called to the bar in 1738, became attorney-general about 1758, and chief-justice of the court of common pleas in 1762. His decision against the legality of general warrants, which he gave in the trial of John Wilkes, rendered him very popular. He received the title of Baron Camden in 1765, and was appointed lord chancellor, but he resigned that office in Jan., 1770. He afterwards distinguished himself as a champion of constitutional liberty, and acted with Lord Chatham in opposition to the American policy of Lord North. In 1783 he became president of the council. He was created Earl Camden in 1786. Died April 18, 1794. "Among the names that adorn the legal profession," says Lord Brougham, "there are few which stand so high as that of Camden." On account of his liberal policy during the Revolutionary war his name became very popular in the U. S., and was given to several counties and many towns and villages.

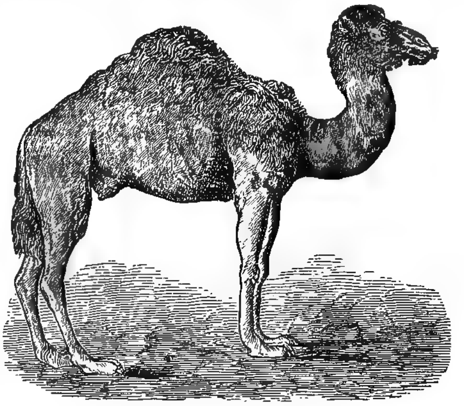
Camden (WILLIAM), an eminent English antiquary, born in London May 2, 1551, graduated at Oxford. He was appointed second master of Westminster School in 1575. His most important work is a description of Great Britain in Latin, entitled "Britannia sive Regnorum Angliæ, Scotiæ, et Hiberniæ, ex intima Antiquitate Chorographica Descriptio" (1586). He published several new editions of it, enlarged and improved. Among his works is "Annals of the Reign of Elizabeth" (in Latin), highly commended by Hume. He became head-master of Westminster School in 1593, and Clarenceux king of arms in 1597. His promotion to this position over the heads of all the College of Heralds led to many heart-burnings and recriminations, and embittered many years of the life of this worthy man, who has been called "the judicious Camden" and "the British Pausanias." He was buried in Westminster Abbey. Died Nov. 9, 1623.

Camden Court-house, capital of Camden co., N. C. (see map of North Carolina, ref. 2–K, for location of county), 219 miles E. N. E. of Raleigh, is a port of entry, and is on the navigable Pasquotank River. Pop. of township in 1870, 1759; in 1880, 1987.

Camden Mills, Ill. See MILAN.

Camden Society, an association organized in 1838 in London for the purpose of publishing the MSS. of old British authors, historical documents of importance, old records, visitations, both heraldic and ecclesiastical, and other matter of antiquarian, literary, or historical interest relating to England. Some of their materials are not very ancient, but are published for their general interest. The results of their work are contained in a large number of volumes, which are, as a whole, of very great value. The name was given in honor of William Camden, the historian.

Cam′el [Lat. *camelus;* Ger. *Kameel;* Gr. κάμηλος; Arabic, *gammel*], a genus of ruminant quadrupeds of which only two species now exist. This genus is the type of the family Camelidæ, which includes the genus *Auchenia*, the llama, alpaca, etc. The Camelidæ exhibit a wonderful adaptation to their native regions both in the Old World and the New. The dentition differs from that of all other ruminating animals in the presence of incisor teeth in the upper jaws, camels having canine teeth in both jaws, and the Auchenia in the lower jaw; the feet have not the cloven hoof of the rest of the order, but two elongated toes, each tipped with a nail-like hoof, the feet resting not upon the hoofs, but upon elastic cushions. In the camels the toes are united by a common sole, instead of having each a separate one, as in the genus *Auchenia;* the broad foot enabling the animals of the one genus easily to traverse the sand of the desert, while the separation of the toes in the other is suited to rocky heights. Camels have a hump or humps upon the back, of which the others exhibit no trace. With similarity of form the Camelidæ of the Andes exhibit a gracefulness which strongly contrasts with the gaunt angularity of those of the East. The Arabian camel (*Camelus dromedarius*) has only one hump on the back, while the Bactrian camel (*Camelus Bactrianus*) has two. The first-named species is found chiefly in Arabia, Syria, and Northern Africa. The other is a native of Central Asia, where it is still found wild. The Arabian camel is bred to some extent in Italy; the Bactrian in the Crimea. The two are sometimes crossed. The Bactrian is the larger, being often ten feet high. It is much hardier than the other. Confusion has arisen from the employment of the name dromedary as a designation of the former species, it being properly limited to a slender, graceful, and fleet variety of that species. The hump on the camel's back is chiefly a store of fat, from which the animal draws as the wants of its system require; and the Arab is careful to see that the hump is in good condition before a long journey. Another interesting adaptation is the thick sole which protects the foot of the camel from the burning sand. The nostrils may be closed by valves against blasts of sand. Most interesting is the provision for drought made by providing the second stomach and a portion of the first with great cells, in which water is long retained. This store of water is known to the Arabs, who sometimes avail themselves of it by killing some of the camels of the caravan. Sight and smell are extremely acute in the camel.


Dromedary, or Arabian Camel.

The Arabian camel carries about 500 pounds. The Bactrian camel is sometimes loaded with 1000 or even 1600 pounds weight, but can carry the latter weight but a short distance. The East India Company had at one time a corps of camels, each mounted by two armed men. The Persians mount light swivel guns upon the saddle of the camel. The pace of the loaded camel is steady and uniform: it proceeds from day to day at a rate of about two and a half miles per hour. Some of the dromedaries, however, can carry a rider more than 100 miles in a day. The motion of the camel is peculiar, jolting the rider in a manner extremely disagreeable to those who are unaccustomed to it. The camel produces a single young one at a time, or rarely two. It lives thirty or forty years. The patience of the camel has been celebrated by authors. But with all its general submissiveness, it is resentful of injury, and, according to some observers, is always ill-humored and morose, and during the rutting season is particularly vicious. The flesh and milk of the camel are valued by the Arabs as food. Its dung is a very useful fuel in the desert. The hair is used for the manufacture of cloth, some kinds of which are coarse, and others soft and fine. Camel's hair is also imported for the manufacture of pencils or small brushes used by painters. A fossil camel (*Camelus Sivalensis*), larger than either existing species, has been discovered in miocene deposits in Hindostan. Numerous remains of fossil Camelidæ occur in the tertiary of Dakota and Nebraska. These are of many species and several genera. The U. S. government in 1857 introduced a number of camels for service in the arid regions along the South-western frontier. These were owned and employed by the government, and performed good service; but, owing to the civil war and the unsettled condition of that region, the attempt to naturalize them for general use has not been successful. But their descendants still exist in Nevada, where they have proved very useful.

REVISED BY J. S. NEWBERRY.

Camel, a contrivance by which ships are floated over sandbars and shoals. A long caisson, or "camel," nearly filled with water, is fastened to each side of the ship: when the water is pumped out the caissons rise and lift the ship with them. The principle is more fully explained in the article DOCK (which see, by SAMUEL H. SHREVE, C. E.), for it is essentially the principle of all floating docks. Camels were formerly used at Nantucket and New Bedford, Mass. A similar machine is employed in raising sunken ships.

Camel'lia [in honor of G. J. Kamel, D. D., a German Jesuit missionary to Luzon in the last century], a genus of evergreen plants of the order Camelliaceæ, natives of China, India, and Japan, and extensively cultivated in greenhouses in Europe and the U. S. for the beauty of their flowers. The most admired species is the *Camellia Japonica*, a shrub which has ovate-elliptical, serrate, and shining leaves, and large, polypetalous flowers, which resemble a rose. Many others belong to *Camellia reticulata* and to hybrid varieties. In the wild state it bears red and single flowers, but the flowers of the cultivated varieties are generally double. Among their various colors are red, white, and yellow. Many of the varieties originated in China or Japan, and others have been raised by European and American florists. New varieties of them are annually produced. The value of the camellia is increased by the fact that it flowers in autumn and winter. The single camellia is propagated by seed, and the cultivated or double varieties by grafting, cuttings, or layers. The proper soil for these is a loose, black mould. They should be protected from frost, and liberally supplied with water, but are liable to be injured with an excess of moisture. It is important that they should receive a free access of fresh air and light. *C. Oleifera* and *C. Sasanqua* are cultivated in China for their seeds, which yield an oil similar to olive oil. Some writers refer the tea-plant to this genus.

Camellia'ceæ, a natural order of exogenous trees and shrubs, mostly natives of Southern and Eastern Asia and South America. North America has four species (loblolly bays and Stuartias), while Africa has also a few. They generally have beautiful flowers. The *Camellia* and the tea-plant are the most important.

Camelopard. See GIRAFFE.

Cameloparda'lis, a constellation of the northern hemisphere of the celestial globe called the GIRAFFE. It contains only sparsely scattered stars. It is situated between Cassiopeia, Perseus, Ursa Major, etc. It was added by Hevelius to the list of constellations.

Camel's Hair is used by the Arabs and Persians, who weave it into stuff for tents and clothing. A fine quality of camel's hair is imported from Persia, and is used to make pencils for artists. Camel's hair was extensively worn by monastics in the Middle Ages for the mortification of the body. It was harsh and rough. Camel's hair is woven to some extent in Europe, but most of the goods now so called are of wool.

Camel's Rump, or **Camel's Back Mountain,** in Vermont, is one of the highest peaks of the Green Mountains, and is 17 miles W. of Montpelier. Its height is 4188 feet.

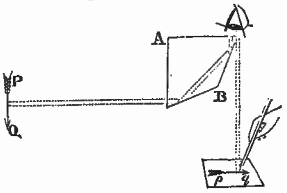
Camel's Thorn [Dutch, *kameel-doorn*], (*Alhagi*), a genus of plants of the order Leguminosæ, comprises numerous herbaceous and shrubby species, mostly natives of the deserts of Asia and Africa. They have simple leaves and jointed pods, with one seed in each joint. These plants grow where other vegetation is scarce, and afford valuable food for camels, which are fond of them. The *Alhagi camelorum* yields a kind of manna, which appears in the form of drops on the leaves. In South Africa fences of the camel's thorn are used to protect camps by night from wild beasts.

Came'næ, the general name of four prophetic nymphs of Roman mythology—viz. Antevorta, Postvorta, Carmenta, and Egeria. The Nine Muses were also called Camenæ by the Latin poets.

Ca'menz, or **Kamenz,** a town of the kingdom of Saxony, on the Black Elster, 20 miles N. E. of Dresden. It has manufactures of earthenware, tobacco, starch, etc. Lessing was born here in 1729. Pop. in 1880, 6812.

Cam'eo [Fr. *camaïeu*], a term applied to gems of various colors carved in relief, especially to diminutive pieces of sculpture, which are formed of precious stones having two strata or layers of different colors, the uppermost of which is partly removed so as to expose the lower stratum, which forms the background of the figure. The art of cutting cameos is of great antiquity, having been practised by the ancient Egyptians and Babylonians. It was brought to great perfection by the Greeks, and practised with success in ancient Rome. The cameos of the ancients were formed mostly of the onyx, agate, and sard, and were sometimes executed on a factitious stone called *vitrum obsidianum*. The famous Barberini or Portland Vase is a beautiful specimen of cameo in glass. The ancients used cameos as personal ornaments, and as cups, vases, and other articles. Many of the antique cameos now extant are marvellously beautiful in design and perfect in execution. Among the finest antique specimens are the Gonzaga cameo, which represents the head of a king and his queen, and is now at St. Petersburg; "The Judgment of Paris," in the cabinet of Prince Piombino at Rome; and the onyx called the "Apotheosis of Augustus," which is now in Paris. The last is twelve inches high and ten inches wide. The art revived in Italy in the fifteenth century, and was patronized by the Medici. Some specimens of this period are perhaps as perfect as the antique. The fabrication of cameos, both in *pietra dura* and in shell, has become in Italy an important branch of art.

SHELL CAMEOS are made from such shells as have layers of differently-colored material, such as the conch-shells of the Bahamas. The art—a modern one—of cutting these shells has been carried to a high degree of perfection. These cameos began to be cut at Rome about 1805, and the best work is done there now; but many shells are cut at Paris, especially for exportation to England and America.



Camera Lucida.

Cam'era Lu'cida [Lat. a "light chamber"], an instrument invented by Wollaston, and intended to facilitate the delineation of objects, consists of a quadrilateral prism of glass (A B) in a frame attached to an upright rod, having at its lower end a clamp to fix it to the edge of a table. The prism has its upper face horizontal, and two of its faces are at a right angle at A. Rays from an object (P Q) falling nearly perpendicularly on the first surface enter the prism and undergo reflection at the contiguous surface; they then fall at the same angle on the next surface, and are reflected again; finally they emerge nearly perpendicularly to the remaining surface. The eye receives the emergent light in such a way that an image of the object is seen projected upon a sheet of paper upon the table. The pencil and image being seen together upon the paper, a sketch of the latter can be taken. But the image and the pencil are at different distances from the eye, and cannot be seen together distinctly at the same time. To obviate this, a plate of metal with a small eyehole is placed under the eye, so that the rays through the prism and those from the drawing-pencil, which both pass through the eyehole, form only very small beams of light. By this the difficulty is diminished. It is, however, difficult to use the instrument satisfactorily, though many acquire readiness in its use. Besides this form of the camera lucida, which is the most common, there are others. Its simplest form is a piece of smooth glass fixed at an angle of 45° to the horizon. An image from a horizontal object falling on this glass will be perfectly reflected, so that the eye looking vertically down will see the image, and the artist will be able to trace it on paper. The name has been applied to other optical instruments. F. A. P. BARNARD.

Cam'era Obscu'ra [Lat. a "dark chamber"], an instrument whose invention is ascribed to Baptista Porta in the sixteenth century, but Roger Bacon described it 300 years before. It is known in a simple form as a box furnished at one end with a lens whose focal length is equal to the length and depth of the box, at the opposite end of which a plane reflector is placed at an angle of 45°, which throws the image of any objects to which the lens may be directed upon an opaque surface which is viewed through a slit in the box.

The camera obscura, being indispensable in photography, has received improvements which make it rank as a scientific instrument. The principle involved in all forms may be made intelligible by the following experiment: Let a hole be bored in a window-shutter and the room darkened. If the light entering the room by this hole be intercepted by a sheet of white paper at a small distance from the hole, an inverted image of objects without will be seen upon the paper. By placing a convex lens in the hole this image is rendered much more distinct. At a certain distance from the hole the image attains a maximum degree of sharpness, and if the paper be removed to a position either nearer to the hole or farther from it, the image becomes indistinct. F. A. P. Barnard.

Camera'rius (Joachim), an eminent German scholar, born at Bamberg April 12, 1500. His proper name was Liebhard. His ancestors were chamberlains to the bishops of Bamberg; hence he took the Latin name Camerarius, which signifies a "chamberlain." He was a friend of Melanchthon, and became president or principal of the University of Tübingen in 1535. He was rector of the University of Leipsic for many years after 1541. Among his works are numerous translations of Greek authors, a "Life of Melanchthon" (1566), "Elements of Rhetoric," and Latin "Commentaries on the Greek and Latin Languages" (1551). Died April 17, 1574.

Cameron, capital of Cameron parish, La. (see map of Louisiana, ref. 10–B, for location of parish), is situated on Calcasieu River, about 5 miles from its entrance into the Gulf of Mexico. Pop. not given in census of 1880.

Cameron, R. R. junction, Clinton co., Mo. (see map of Missouri, ref. 2–D, for location of county), 35 miles E. of St. Joseph. Pop. in 1870, 1428; in 1880, 2109.

Cameron, capital of Milam co., Tex. (see map of Texas, ref. 4–I, for location of county), is on R. R. and Leon River, 63 miles N. E. of Austin. Pop. in 1880, 441.

Cameron (Angus). See Appendix.

Cameron (Donald) **of Lochiel,** a Highland Scottish chief who fought for the Pretender in 1745. He was wounded at the battle of Culloden, and escaped to France in 1746. Died in 1748. He was the subject of Campbell's poem entitled "Lochiel's Warning."

Cameron (Sir Duncan A.). See Appendix.

Cameron (Henry Clay), Ph.D., D. D. See Appendix.

Cameron (James), brother of Simon Cameron, born at Maytown, Pa., Mar. 1, 1801, learned the trade of a printer, subsequently became an editor, and studied law. He entered the army at the beginning of the civil war as colonel of the Seventy-ninth New York Highlanders. In the battle of Bull Run, July, 1861, he was killed while gallantly leading his men in a charge. G. C. Simmons.

Cameron (James Donald). See Appendix.

Cameron (Richard), a Scottish minister, born at Falkland, was the founder of the sect of Cameronians or "Covenanters." He strenuously opposed the measures by which the government endeavored to establish the Episcopal Church in Scotland. He persisted in preaching in fields, which was prohibited by law. In June, 1680, he, with about twenty armed adherents, entered the town of Sanquhar and formally renounced their allegiance to Charles II. He was killed in a fight with the royal troops July 20, 1680. (See Cameronians.)

Cameron (Simon), an American Senator, born in Lancaster co., Pa., March 8, 1799. He was elected Senator of the U. S. by the Democrats in 1845, and having joined the Republican party, he was re-elected a Senator in 1856. He was secretary of war from Mar., 1861, to Jan., 1862, and was then sent as minister to Russia, from which he returned in 1863. In 1866 he was again elected to the Senate of the U. S. He was re-elected, but resigned in 1877, and was succeeded by his son, James D.

Cameron (Verney Lovett), born at Weymouth, Dorsetshire, June 1, 1844, entered the navy in 1857, and was made a commander in 1879. From 1872 to 1876 he made, under the auspices of the Royal Geographical Society, a comprehensive voyage of exploration through the interior of Africa, and made important discoveries in the region of the great lakes. In 1878 he made a journey through Asia Minor and Persia, in order to ascertain whether a railway could be built from the Mediterranean to India. He has published "Across Africa" (1876), "Our Future Highway" (1880), etc.

Camero'nians, the followers of Richard Cameron, who in 1680 made a public declaration that Charles II., by his suppression of civil and religious liberty, had forfeited all right to the crown. They were also called Covenanters, from their having demanded the strict observance of the Solemn League and Covenant received by the Parliament in 1643. The Cameronians still exist as a sect, both in Great Britain and America, under the name of Reformed Presbyterians (which see).

Cam'eronites were the adherents of John Cameron, a native of Scotland, who went to France in 1600, and became professor of theology at Saumur. "He devised a method," says Mosheim, "of uniting the doctrines of the Genevans, as expounded at Dort, with the views of those who hold that the love of God embraces the whole human race." They have sometimes been called Hypothetical Universalists.

Cameroons', or **Camerones,** a river of Africa, in Upper Guinea, enters the Bight of Biafra about lat. 4° N. and lon. 9° 40′ E. by an estuary 20 miles wide. Its length is not known. It has a cataract 90 miles from its mouth.

Cameroons Mountains, of Western Africa, culminate in a peak which is 13,000 feet high, and about lat. 4° 13′ N. and lon. 9° 10′ E.

Camil'la, a fabulous Italian virgin celebrated for swiftness of foot, was said to be a daughter of the Volscian king Metabus, and aided Turnus against Æneas.

Camilla, on R. R., capital of Mitchell co., Ga. (see map of Georgia, ref. 7–G, for location of county), 28 miles S. of Albany. It has an academy. From 6000 to 8000 bales of cotton are shipped from here annually. Pop. in 1870, 289; in 1880, 672.

Camillus (Marcus Furius), a celebrated Roman dictator and patrician, who became a tribune in 403 B. C. He was chosen dictator in 396, and soon captured Veii. About 390 he was exiled, and retired to Ardea. After Brennus and the Gauls had captured Rome in 390 B. C., Camillus was recalled and appointed dictator. According to the popular tradition, which is perhaps mixed with fable, he defeated the Gauls, and afterwards gained victories over the Volsci and other enemies. In 367 he was chosen dictator for the fifth time. Died in 364 B. C. (See Plutarch's "Life of Camillus;" Arnold's "History of Rome.")

Camisards, French Protestants who lived in the Cevennes early in the eighteenth century, so named from the *camise* or loose outer garment which they wore. They strove to obtain the religious liberty which had been sacrificed by the Revocation of the Edict of Nantes, and they fought under the pressure of a religious hysteria which made them almost invincible. The first plan of the government was extermination, but three marshals—Montrevel, Berwick, and Villars—were successively defeated: reconciliation was necessary. But the agreement between Villars and Cavalier, May, 1704, was rejected by a number of the Camisards; and when Louis XIV. in 1715 announced the complete extinction of the heresy, a large portion of Languedoc had been transformed into a desert. (See Hoffmann, "Geschichte des Aufruhrs in den Sevennen," Nördlingen, 1837.)

Cam'let, a fabric originally made of camel's hair, but in more recent times of the hair of the Angora goat. It is also made of wool, or a mixture of wool with other materials. Camlets are mentioned in Marco Polo's narrative as among the articles manufactured in Thibet.

Camo'ēns (Luis or Luiz), a celebrated Portuguese epic poet, was born of a noble family, probably at Lisbon, in 1524. He was educated at Coimbra, and soon after he left college fell in love with a lady of honor at court. He was consequently banished to Santarem. Having joined the army, he served with valor in several battles against the Moors. Before this time he had written some verses, which, like his military services, had been treated with neglect. He therefore resolved to emigrate, and embarked for India in 1553, exclaiming with Scipio, "Ingrata patria, non possidebis ossa mea." He wrote a political satire called "Follies in India," for which he was banished in 1556 from Goa to Macao, where he composed his great epic poem "The Lusiad" ("Os Lusiadas"), which celebrates the martial exploits of the Portuguese warriors and heroes, and is pervaded by patriotic sentiments. It was first printed in 1572. He was recalled from exile in 1561, and returned in 1569 to Lisbon, where he passed his later years in great poverty, and died June 10, 1580. Among his works are elegies, sonnets, odes, satires, and epigrams. The versification of "The Lusiad" is remarkably stately. (See John Adamson, "Memoirs of the Life and Writings of Luis de Camoens," 1820; Souza Botelho, "Vida de L. Camoens," 1817.)

Camor'ra, the name of a secret society of outlaws and robbers called *Camorristi* who infested the former kingdom of Naples. This society had a rendezvous in every large town. Under the Bourbon dynasty its members openly presented themselves at markets and public spectacles, where they extorted a portion of the money that passed from hand to hand. They were also addicted to violent crimes, and could be hired to commit murder. The society was thoroughly organized and subject to a strict discipline. Candidates for membership were not admitted until they had passed through a probation for a year, and given proofs of courage and obedience. They are said to have been tolerated by King Ferdinand II.

Camp [from the Latin *campus*, a "plain;" Fr. *camp;* Ger. *Lager*], in a general sense the ground (constructions included) upon which tents, huts, etc. are erected for the shelter of any collection of human beings; in a military sense, that occupied by an army under tents or temporary shelter in the field. It is usually distinguished from *bivouac* by the use of shelter (such as tents), as distinguished from passing the night in the open air (*à la belle étoile*). More exclusively yet, the ground and shelter of an army in *tents;* but in our "Army Regulations" a camp is the place where troops are established in tents, in huts, or in bivouac. The Roman camp (Lat. *castra*, a word which in the form of the termination *cester* or *chester* indicates the origin of numerous English towns, as arising from a Roman camp, and to which also are due the words *château* and *castle*), described with great detail in most cyclopædias, was in reality an *intrenched camp* (see Bardin, "Dictionnaire de l'Armée de Terre"). Such were constructed in the heart of invaded countries to secure for the troops a place of retreat, to control the district, to provide secure dépôts for provisions of all kinds, and to protect the communications with the frontier. A Roman army might occupy its camp several winters. In the mean time it sallied forth to resume its operations. Most commonly, when the legions had thus vacated them to undertake long marches, *veterans* remained behind to guard the ramparts, and thus became a kind of permanent garrison, which, by intermarriage, became the origin of a town or colony; *e. g.* the English "Chesters" and the German Cologne or Köln (*Colonia*).

The Romans necessarily had, besides these, temporary camps, sometimes of huts, but more generally tents of skins of animals. The details of these Roman camps are of little interest (unless to antiquarians); neither indeed, except to soldiers, those of the modern military camp. Its arrangements (as practised with us) are set forth in our "Army Regulations." Strictly speaking, the arrangements of a camp for a regiment of infantry or cavalry are governed purely by considerations of discipline and administration. The encampment of an army must indeed be sedulously governed by tactical considerations, such as the defence of the position and the formation of line of battle, the character of the issues, the approaches, etc. But these arrangements belong to "Tactics." An Intrenched Camp is a fortified position of greater or less extent, usually of field-works to be occupied during a campaign or the duration of a war. (See Intrenched Camps, by Gen. A. Brialmont, Belgian Army.) J. G. Barnard.

Camp-and-Garrison Equipage is a general name for the tents, furniture, utensils, etc. used in an army which serve to supply the wants of the soldiers, rather than to aid their military operations. The generals of Louis XV. also reckoned a theatre, with actors, actresses, dancers, and fiddlers, among their camp-equipage.

Camp-Followers, the sutlers and dealers who follow an army, and carry a variety of articles which they sell to the soldiers. In India the camp-followers of British armies are very numerous, comprising sutlers, servants, hostlers, water-carriers, snake-charmers, conjurers, and women. An army of 15,000 men which invaded Afghanistan in 1839 is said to have been accompanied with 85,000 camp-followers.

Campa'gna, a town of Italy, in Principato Citra, is situated amidst high mountains, 18 miles E. of Salerno. It is a bishop's see, has a fine cathedral, a college, and several convents. Pop. 9028.

Campa'gna di Ro'ma, an extensive undulating, desolate plain of Central Italy, nearly coinciding in limits with the ancient *Latium*, was formerly a province of the Pontifical States. It is bounded on the S. W. by the Mediterranean, extends along the coast from Cività Vecchia to Astura and the Pontine Marshes, and surrounds the city of Rome, which is near its centre. Its length is estimated at 75 miles, and its width varies from 27 to 40 miles. The highest parts of it rise about 200 feet above the level of the sea. The soil is of volcanic formation, and the climate is rendered unhealthy by pestilential malaria or miasmatic effluvia. This region, once rich and populous, is now almost deserted and uncultivated. In autumn the inhabitants of the Apennines descend into the Campagna with their flocks and herds, for which some parts of it afford good pasture. Numerous ancient monuments, aqueducts, and other ruins are scattered over this plain.

Campan (Jeanne Louis Genest), born Oct. 6, 1752, was reader to the daughters of Louis XV. and a companion and friend of Marie Antoinette. After the Revolution she was an instructress of high reputation. Died May 16, 1822. She wrote, among other works, "Memoirs of the Private Life of Marie Antoinette."

Campa'na, La, a town of Spain, in the province of Sevilla, on the river Madre Viega. It has a trade in grain, wine, and fruit. Pop. 3964.

Campana'rio, a town of Spain, in Estremadura, 72 miles E. of Badajos. It has manufactures of linen fabrics, wine, oil, and ropes. Pop. 6653.

Campanel'la (Tommaso), an eminent Italian philosopher and Dominican monk, born in Calabria Sept. 5, 1568. He published in 1591 "Philosophy Demonstrated by the Senses," which opposed the scholastic philosophy and gave offence to the partisans of Aristotle. On a charge of heresy and conspiracy against the Spanish government, he was in 1599 committed to prison in Naples, where he was confined about twenty-seven years, during which he wrote several works. Pope Urban VIII. procured his release in 1626. Campanella, after passing several years in Rome, retired to France in 1634, in order to avoid the renewed persecution of the Spaniards. He was kindly treated by Cardinal Richelieu. Among his important works are "Civitas Solis," etc. ("The City of the Sun, or the Idea of a Philosophic Republic," 1623), "The Five Parts of Rational Philosophy" (1638), and a "Discourse on the Spanish Monarchy" (in Latin, 1640). Died in Paris Mar. 21, 1639. (See Baldacchini, "Vita e Filosofia di T. Campanella," 1840; Dareste, "Thomas-Morus et Campanella," 1843.)

Campa'nha, a town of Brazil, in the province of Minas Geraes, about 156 miles N. W. of Rio de Janeiro. It has several churches, a hospital, and a theatre. Gold is found in the vicinity. Pop. about 6000.

Campa'nia, a province of ancient Italy, was bounded on the N. E. by Samnium, on the E. and S. by Lucania, on the S. W. by the Mediterranean, and on the N. W. by Latium. The Apennines extended along the N. E. border. Between these mountains and the sea was an extensive and very fertile plain, which was the *Regio felix* of the Romans. It was traversed by the Appian Way (*Via Appia*), the greatest thoroughfare of ancient Italy. Its principal cities were Capua, Pompeii, Neapolis (Naples), Cumæ, Salernum, and Herculaneum. Among its physical features was Mount Vesuvius. It embraces the modern provinces of Benevento, Naples, Principato Citeriore, Principato Ulteriore, and Terra di Lavoro, with an area of 6937 square miles and 2,895,519 inhabitants.

Campani'le, a structure standing by the side of the main church in many Italian cities, is a lofty belfry tower, often of elaborate, but of a lighter, profaner architecture than the sacred edifice. The finest of the campaniles are—that at Florence, designed by Giotto, the Leaning Tower of Pisa, and in Spain the beautiful Giralda of Seville, built by Guever the Moor.

Campan'ula, a Latin word signifying a "little bell," from *campana*, a "bell," is the name of a genus of hardy herbaceous plants, the type of the natural order Campanulaceæ (which see). The genus is characterized by a bell-shaped, 5-lobed corolla, five stamens, the filaments of which are dilated at the base, and a top-shaped capsule, with two to five cells opening by lateral clefts. It comprises numerous species, with beautiful blue or white flowers, to many of which the common name of bell-flower is given. Among the remarkable species are the *Campanula medium* or Canterbury bell, a native of Europe, and the *Campanula rotundifolia*, or harebell, which is indigenous both in England and the U. S.

Campanula'ceæ [from *Campanula*, one of the genera], a natural order of exogenous plants, herbaceous or suffruticose, with a milky juice, alternate leaves, and a calyx adherent to the ovary. The corolla is regular, monopetalous, bell-shaped, and valvate in the bud. The stamens, five in number, are free from the corolla, which is generally blue and showy. This order comprises nearly 500 known species, mostly natives of the temperate and cool climates of the northern hemisphere. Two genera are indigenous in the U. S.—viz. *Campanula* and *Specularia*.

Campbell (Alexander), D. D., a theologian, born in the county of Antrim, Ireland, in June, 1788, emigrated to the U. S. in 1809, after studying at the University of Glasgow. He founded a sect called Disciples of Christ, who accept the Bible as their only creed. In 1841 he founded Bethany College, West Va., of which he was long president. Died Mar. 4, 1866. (See Disciples of Christ.)

Campbell (Archibald), an American officer and engineer, born 1813 in New York, graduated at West Point 1835, serving while in infantry at frontier posts till he resigned, Sept. 30, 1836. Civil engineer 1837–44, chief clerk U. S. war department 1846–49 and 1853–57, and commissioner to establish the North-western boundary of the U. S. between Washington Territory and British America 1857–

69, and to run the 49th parallel from the Lake of the Woods to the Rocky Mountains, since 1872. Geo. W. Cullum.

Campbell (Bartley), born at Allegany City, Pa., Aug. 12, 1843, began to work for the press at Pittsburg in 1858, and produced his first play, "Through Fire," in 1871. Among his later plays are "The Big Bonanza" (1875), "My Partner" (1879), "Matrimony" (1880), etc.

Campbell (Sir Colin), Lord Clyde, a British general, born in Glasgow Oct. 20, 1792. He entered the army in 1808, and served in the Peninsular war (1809–14). In 1842 he obtained the rank of colonel. Having served with distinction in India, he was appointed in 1854 to the command of the Highland brigade, which he led at the battles of Alma and Balaklava in the Crimea. In 1855 he was raised to the rank of major-general, and created a knight grand cross of the Bath. He was appointed in July, 1857, commander of the army in India, then fighting against the mutinous Sepoys. He relieved Lucknow in Nov., 1857, defeated the Sepoys at Cawnpore, and quelled the mutiny in 1858. He was raised to the peerage as Baron Clyde in the same year. Died Aug. 14, 1863.

Campbell (Duncan R.), D. D., born in Scotland about 1797, received a university education, came while young to the U. S., was ordained to the Baptist ministry, and was president of Georgetown College, Ky. (1849–65). Died Aug. 11, 1865.

Campbell (George Washington), born in Tennessee in 1768, graduated at Princeton in 1794, was a member of Congress 1803–09, U. S. Senator (1811–14 and 1815–18), became secretary of the treasury in 1815, and minister to Russia in 1818. Died Feb. 17, 1848.

Campbell (James), an American jurist and statesman, born in Philadelphia in 1813, was a judge of the court of common pleas (1841–50), and became attorney-general of the State in 1852, and postmaster-general under President Pierce in 1853.

Campbell (John), Lord, an eminent British lawyer, was born in Fifeshire, Scotland, Sept. 15, 1779. He was called to the English bar in 1806, and soon obtained an extensive practice. In 1830 he became a Whig member of Parliament, and in 1834 attorney-general. He was made chancellor of Ireland and a peer of the United Kingdom in 1841. He was appointed chief-justice of the court of queen's bench in 1850, and lord chancellor of England in 1859. He published "Lives of the Lord Chancellors and Keepers of the Great Seal of England" (7 vols., 1846), which obtained much popularity, and "Lives of the Chief-Justices of England" (3 vols., 1849–57). Died June 23, 1861.

Campbell (John A.), an eminent jurist, born in Washington, Ga., June 24, 1811, was the son of Duncan G. Campbell, a distinguished lawyer of that State. He was educated in the Georgia University, where he graduated with distinction in 1826, and was admitted to the bar by special act of the legislature in 1829, some time before his majority. He moved to Alabama, where he soon took high rank in his profession, and was appointed associate justice of the U. S. Supreme Court by President Pierce in 1853. This position he resigned in 1861, after the outbreak of the conflict between the two sections. While he had opposed the policy of secession, he yet believed in its rightfulness. He was afterwards appointed assistant secretary of war of the Confederate States. He was one of the commissioners appointed by Mr. Davis to meet Mr. Lincoln and Mr. Seward at the Fortress Monroe conference in Feb., 1865. After the fall of Richmond and the surrender of the Southern arms, he was arrested and imprisoned for some time at Fort Pulaski, but was finally discharged on parol. Since then he has been engaged in the practice of the law in New Orleans.

Campbell (John McLeod), born May 4, 1800, at Ardmaddy House, near Kiluinver, Argyllshire, Scotland, died at Rosneath Feb. 27, 1872. He studied theology in Univ. of Glasgow in 1811–20, was licensed to preach in 1821, and was inducted to the parish of Row on Sept. 8, 1825. But in 1831 he was tried for heresy by the Assembly, convicted, and deposed, he having preached the doctrine of unlimited atonement. He returned to Kiluinver and preached there for some time, but began in 1833 an independent ministry at Glasgow, which he continued for twenty-six years, to 1859. The last years of his life he spent in studious retirement, partly at Glasgow and partly at Rosneath. His views of the atonement he set forth in his "Christ the Bread of Life" (1851, 2d ed. 1869), and "The Nature of the Atonement" (1856, 4th ed. 1873). He also wrote "Reminiscences and Reflections," published after his death (1873), and referring to his ministry in the parish of Row. (See D. Campbell, "Memorials of John McLeod Campbell," London, 1877, 2 vols.)

Campbell (Thomas), a popular British poet, born in Glasgow July 27, 1777. He was educated at the university of his native city, and became a good classical scholar. He produced in 1799 his admirable poem, "The Pleasures of Hope," which was considered by Lord Byron as "one of the most beautiful didactic poems in the English language." During a visit to the Continent he witnessed the battle of Hohenlinden, Dec., 1800, on which he composed a lyrical poem of great beauty and celebrity. He soon afterwards published short poems entitled "The Exile of Erin" and "Ye Mariners of England." Having married his cousin, Miss Sinclair, he removed to London in 1803, and adopted literature as a profession. In 1809 he produced "Gertrude of Wyoming," which is generally and greatly admired. He became editor of the "New Monthly Magazine" in 1820, and was elected lord rector of the University of Glasgow in 1827. He published, besides other works in prose, "The Life and Times of Petrarch" and a "Life of Frederick the Great." Among his finest poems is a spirited ode called "The Battle of the Baltic." He died June 15, 1844, and was buried in Westminster Abbey. "No poet at such an age," says Moir, referring to the "Pleasures of Hope," "ever produced such an exquisite specimen of poetic mastery—that is, of fine conception and high art combined." (See "The Life and Letters of Thomas Campbell," by William Beattie, 3 vols., 1850.)

Campbellites. See Disciples of Christ.

Campbell's Station, on R. R., Knox co., Tenn. (see map of Tennessee, ref. 6–I, for location of county). Here Gen. Burnside's army was attacked Nov. 16, 1863, by the Confederates under command of Gen. Longstreet. The engagement lasted from noon till dark, the Confederates being repulsed. Pop. of dist. in 1870, 1807; in 1880, 2116.

Camp'bellsville, on R. R., capital of Taylor co., Ky. (see map of Kentucky, ref. 4–G, for location of county), 75 miles S. S. W. of Frankfort. Pop. in 1870, 512; in 1880, 775.

Campbelton, a royal borough and seaport of Scotland, in the county of Argyle, and near the S. end of the peninsula of Cantire, 65 miles W. S. W. of Glasgow. It has a good harbor on the E. coast of Cantire, is the chief town in Argyleshire, and is a favorite resort in summer. Here are more than twenty distilleries of whisky. Pop. 6628.

Cam'pe (Joachim Heinrich), a German philanthropist and writer on education, was born in Brunswick in 1746. He was appointed superintendent of schools in the duchy of Brunswick in 1787, after which he was the proprietor of a publishing-house. He wrote several popular books for the instruction of youth, among which is "Robinson the Younger." Died Oct. 22, 1818.

Campeach'y, a state of Mexico, is bounded on the N. by Yucatan, on the E. by the Caribbean Sea, on the S. by Belize and Guatemala, and on the W. by the Gulf of Campeachy. Area, 26,084 square miles. Many ruins of ancient cities have been found in this province. Chief town, Campeachy. Pop. in 1880, 86,299.

Campeachy, a city of Central America and the principal seaport of Yucatan, is situated on the Gulf of Mexico and the W. coast of that peninsula, 90 miles S. S. W. of Mérida; lat. 19° 50′ N., lon. 90° 33′ W. It contains many good stone houses, a college, about six churches, several convents, and a theatre. The harbor is capacious, but shallow. Logwood, wax, and cotton are exported from this port. Pop. 15,000.

Campeachy Wood, a name of Logwood (which see).

Campello, Mass. See Appendix.

Cam'per (Pieter), born at Leyden May 11, 1722, died at The Hague Apr. 7, 1789. He received a liberal education, studied medicine, cultivated the fine arts, especially drawing and painting, and travelled in England, France, and Italy. In 1750 he was appointed professor of medicine at Franeker, in 1755 at Amsterdam, and in 1765 at Groningen; but in 1773 he resigned his post and retired into private life, residing first on his estate near Franeker, afterward at The Hague, and devoting himself partly to scientific studies and partly to politics. His papers on anatomy, surgery, obstetrics, and medical jurisprudence are numerous and valuable. In 1761 he discovered the auditory organs of fishes, and in 1771 the presence of air in the bones of birds. He was the first to dissect an orang-outang, and wrote a book on the anatomy of the elephant. Very interesting are also those papers and treatises of his in which he applies his anatomical knowledge to art, more especially his "Dissertation physique," in which he sets forth his theory of the facial angle and applies it both to nature and to art.

Cam'perdown, a village of Holland, 27 miles N. W. of Amsterdam, famous for the victory gained off its coast by the English, under Admiral Duncan, over the Dutch, commanded by Admiral de Winter, Oct. 11, 1797.

Camp'hausen (Ludolf), a Prussian statesman, born at Hünshoven in 1803. He became president of the council of ministers in Berlin in Mar., 1848, resigned in June of that year, and was soon appointed ambassador to the Diet at Frankfort. In 1851 he retired from political life.

Camphausen (Otto), a Prussian statesman, born Oct. 12, 1812, was appointed minister of finance in 1869. Through him the corn-tax and other burdensome taxes have been removed and replaced.

Camphene, or **Camphine,** a term applied to purified oil of turpentine, obtained by rectifying it over dry chloride of lime. It consists of 10 atoms of carbon combined with 8 of hydrogen, and is represented by the equivalent number 68. Camphene has been burned in lamps for the purpose of illumination, but many fatal accidents having resulted from its use, it has been superseded by coal oil or rectified petroleum. Ordinary camphor is a protoxide of camphene, which is sometimes called camphogen. Borneo camphor is by some chemists considered to be a binoxide of camphene.

Cam'philene, or **Artificial Camphor,** is obtained from the oil of turpentine, by acting on it with dry vapor of hydrochloric acid, and keeping the whole at a low temperature by immersing the vessel in a freezing mixture. A solid substance is produced in the form of white crystals, with the taste and aromatic smell of natural camphor. It is regarded as a hydrochlorate of camphene.

Camphine. See Camphene.

Cam'phogen [from *camphor*, and the Gr. γεννάω, to "produce," because from it is obtained artificial camphor], a synonym of Camphene (which see).

Cam'phor [Lat. *camphora;* Sp. *alcanfor* or *canfor;* Arabic *al kâfoor*, not improbably derived from the Sanscrit *khapur*, a name applied to several fragrant plants] is a concrete substance found in many plants, particularly those of the order Lauraceæ. The greater part of the camphor of commerce is the produce of the camphor laurel or camphor tree (*Camphora officinarum*, formerly known as *Laurus camphora*), a native of China, Japan, Formosa, and Cochin-China, and which has been introduced into Java and the West Indies. The camphor laurel is a tree of considerable height, with evergreen leaves and yellowish-white flowers in panicles. The fruit is not unlike a black currant. Every part of the tree smells strongly of camphor. The wood is much valued for carpenter's work. In the extraction of camphor the wood is chopped up and then steeped and boiled in water, when the steam carries off the camphor in vapor. The camphor is deposited around the straw (with which the head of the still is filled) in minute grains. The crude camphor is heated in a vessel, from which the steam is allowed to escape at a small aperture. The camphor sublimes as a semi-transparent cake. Camphor was unknown to the Greeks and Romans, and was first brought to Europe by the Arabs. It is a white, tough solid, slightly lighter than water. It is sparingly soluble in water, but freely soluble in alcohol, ether, acetic acid and the essential oils. It fuses at 347°, and boils at 399°, is very inflammable, and burns with a white smoky flame. When set fire to upon water it floats with a curious rotary motion. It has a peculiar aromatic taste and a characteristic odor.

Camphor is used in medicine, internally and externally, as a stimulant. In small doses it is an anodyne and antispasmodic; in very large doses a narcotic poison. Its alcoholic solution (spirits of camphor) and liniments in which it is an ingredient are much used in sprains and bruises, chilblains, and chronic rheumatism. Paregoric is a camphorated tincture of opium. The effluvium of camphor is very noxious to insects, and it is therefore much used for preserving specimens in natural history, as well as clothing.

The Borneo camphor, sometimes called hard camphor, is the produce of *Dryobalanops aromatica*, a large tree of the order Dipteraceæ. The camphor is obtained by cutting down the tree and splitting it into small pieces, being found in crystalline masses in natural cavities of the wood. To this substance the Chinese ascribe extraordinary medicinal virtues, so that it is taken in exchange by them for more than fifty times its weight of common camphor. It is seldom brought to Europe as an article of commerce. The tree yields also a pale-yellowish limpid fluid, which gushes out when deep incisions are made in the tree with an axe, and which is called liquid camphor, camphor oil, or borneole. When this oil is distilled it yields a light fragrant liquid called borneene, which is used in perfumery. It is sometimes imported into Europe. It has a smell somewhat resembling that of camphor, but more like oil of cajuput. It is supposed that from this fluid the hard camphor is deposited. Revised by C. W. Greene.

Campido'glio, Pala'zzo del, the name of a palace or pile of buildings erected by Michael Angelo on the Capitoline Hill in Rome, on the site of the ancient Capitol. Campidoglio appears to be a corruption of *Capitolium.*

Campi'nas, or **São Carlos,** a city of Brazil, about 65 miles N. of São Paulo. Much sugar is produced here. Pop. about 6000.

Cam'pion, or **Campian** (Edmund), a learned Catholic priest, born in London in 1540. He visited Rome in 1573, and having joined the Jesuits returned to England on a mission. He challenged the clergy of the Anglican Church to dispute with him. In 1581 he was convicted on a charge of treason, and put to death Dec. 1. He was author of a "History of Ireland" and other works.

Camp-Meetings are religious gatherings, with preaching, in the open air, and prayer-meetings during night, generally lasting for several days and held in groves or secluded places, where shelter is provided for the people present, in tents or temporary houses. The first camp-meeting was probably that held in 1790 on the banks of the Red River, Kentucky, and conducted by a Presbyterian and a Methodist minister. The Presbyterian Church afterward abandoned the institution, while the Methodist Church not only retained it, but even developed it by buying suitable grounds and erecting the necessary buildings. In England camp-meetings were first introduced by Lorenzo Dow in 1807. They were disapproved by the Wesleyan Conference of the same year, but the disapproval simply caused the foundation of the Primitive Methodist denomination, which uses camp-meetings. In the U. S. they seem to be more common in the Western than in the Eastern States.

Cam'po Bas'so (formerly called **Molise**), a province of Central Italy, is bounded on the N. by Chieti, on the N. E. by the Adriatic Sea, on the S. E. by Foggia, on the S. by Benevento, and on the W. by Caserta. Area, 1778 square miles. The country is mountainous and sterile, and there is very little industry. Chief town, Campo Basso. Pop. in 1881, 365,947.

Campo Basso, a fortified city of Italy, capital of the province of Campo Basso (formerly Molise), is on the declivity of a mountain, about 55 miles N. N. E. of Naples. It has a fine cathedral, a ruined castle, a college, several convents, and palaces of the nobility; also celebrated manufactures of cutlery and arms. Pop. 14,818.

Campobel'lo, a town of Sicily, in the province of Trapani, 50 miles S. W. of Palermo. Pop. 5141.

Campobello, an island in Passamaquoddy Bay, 2 miles E. of Eastport, Me. It is a part of Charlotte co., New Brunswick. It is 8 miles long, its N. point being in lat. 44° 57′ N., lon. 66° 55′ W. Copper and lead ores exist in the island. The inhabitants are chiefly engaged in the herring, cod, and mackerel fisheries. Pop. in 1881, 1160.

Campobel'lo di Lica'ta, a town of Sicily, in the province of Girgenti, 15 miles N. W. of Licata. Here are mines of sulphur. Pop. 5764.

Cam'po de Cripta'na, a town of Spain, in the province of Ciudad Real, about 50 miles N. E. of Ciudad Real. It has manufactures of coarse cloths, and a trade in grain and fruit. Pop. 6586.

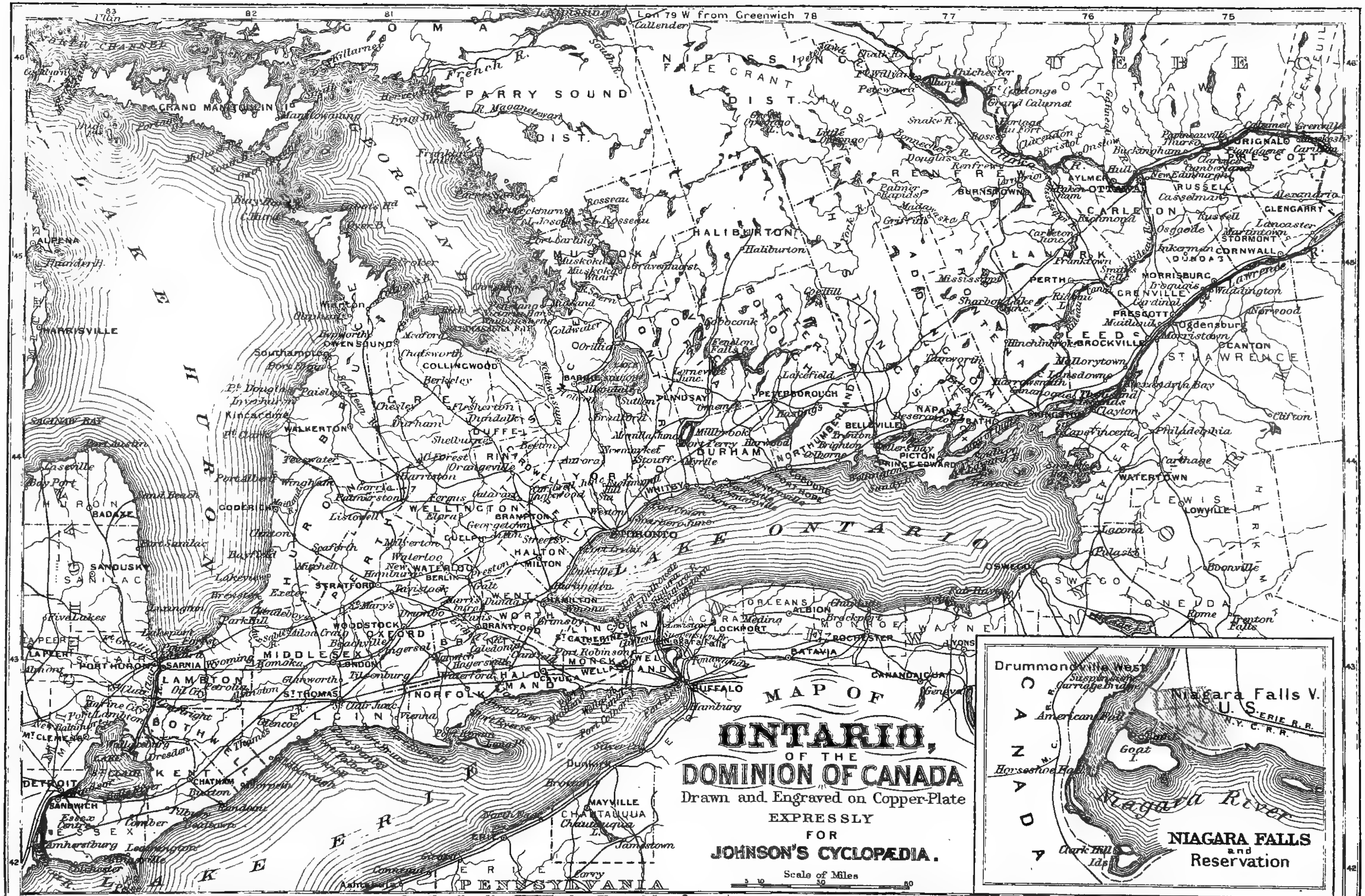
Cam'po For'mio, Campio Formio, or **Campo Formido,** a village of Northern Italy, in Friuli, about 66 miles N. E. of Venice and 7 miles S. W. of Udine. An important treaty of peace was concluded here between Austria and the French republic, Oct. 17, 1797. Alarmed by the recent victories gained by Bonaparte in Italy, Austria was inclined to peace, and negotiated with the French general this treaty, by which she ceded the Netherlands and recognized the independence of the Cisalpine republic, including Milan, Mantua, and other parts of Austrian Italy. In return for these concessions the French gave up Venice, Istria, and Dalmatia to Austria.

Campoma'nes (Pedro Rodriguez), Count, an eminent Spanish author and minister of state, was born in the Asturias July 1, 1723. He gained a high reputation by his writings on political economy, and was distinguished for his probity and enlightened policy. He became president of the royal council of Castile in 1788, and afterwards a minister of state. Among his works are a "Discourse on the Promotion of Popular Industry" (1774) and a "Discourse on the Popular Education of Mechanics" (1775). Died Feb. 3, 1802.

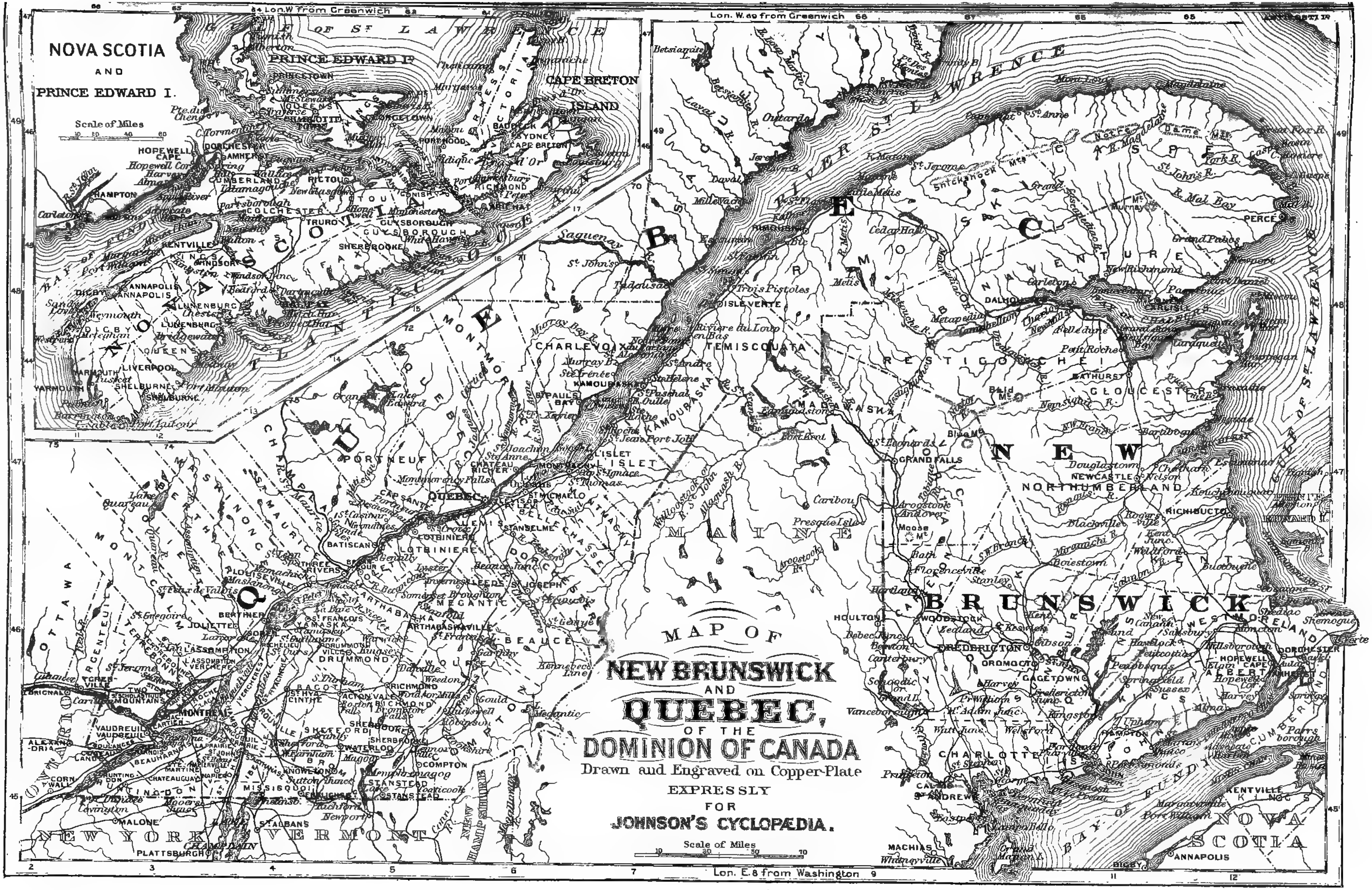
Cam'po Mayor', a fortified town of Portugal, in Alemtejo, about 16 miles N. W. of Badajos. Pop. 4998.

Camp Point, R. R. junction, Adams co., Ill. (see map of Illinois, ref. 6–B, for location of county). It has two mills, a manufactory of agricultural implements, and a fine public-school building. Pop. of township in 1870, 2130; in 1880, 2102, including 1131 in village.

Campton, capital of Wolfe co., Ky. (see map of Ken-


MAP OF
ONTARIO,
OF THE
DOMINION OF CANADA
Drawn and Engraved on Copper-Plate
EXPRESSLY
FOR
JOHNSON'S CYCLOPÆDIA.
Scale of Miles
Lon 79 W from Greenwich 78
83
82
81
77
76
75
46
45
44
43
42
LAKE HURON
GEORGIAN BAY
LAKE ONTARIO
LAKE ERIE
ALGOMA
PARRY SOUND DIST.
NIPISSING
FREE GRANT DIST. LANDS
MUSKOKA
HALIBURTON
RENFREW
OTTAWA
QUEBEC
CARLETON
LANARK
RUSSELL
PRESCOTT
GLENGARRY
STORMONT
DUNDAS
GRENVILLE
LEEDS
FRONTENAC
ADDINGTON
HASTINGS
PETERBOROUGH
VICTORIA
NORTHUMBERLAND
DURHAM
ONTARIO
YORK
SIMCOE
GREY
BRUCE
HURON
PERTH
WELLINGTON
DUFFERIN
PEEL
HALTON
WENTWORTH
WATERLOO
OXFORD
MIDDLESEX
LAMBTON
KENT
ESSEX
ELGIN
NORFOLK
HALDIMAND
BRANT
LINCOLN
WELLAND
MONCK
ST. LAWRENCE
JEFFERSON
LEWIS
OSWEGO
ONEIDA
ORLEANS
NIAGARA
MONROE
WAYNE
HURON
SANILAC
ST. CLAIR
PENNSYLVANIA
CHAUTAUQUA
OTTAWA
TORONTO
KINGSTON
HAMILTON
LONDON
BROCKVILLE
BELLEVILLE
PETERBOROUGH
COBOURG
PORT HOPE
BARRIE
COLLINGWOOD
OWEN SOUND
GODERICH
STRATFORD
GUELPH
BRANTFORD
WOODSTOCK
ST. THOMAS
CHATHAM
SARNIA
WINDSOR
SANDWICH
DETROIT
PORT HURON
BUFFALO
ROCHESTER
OSWEGO
WATERTOWN
OGDENSBURG
PRESCOTT
CORNWALL
PERTH
NAPANEE
PICTON
LINDSAY
WALKERTON
ORILLIA
Drummondville West
Suspension Bridge
Carriage Bridge
American Fall
Horseshoe Fall
Goat I.
Niagara Falls V.
U. S.
ERIE R.R.
N.Y.C.R.R.
Niagara River
Clark Hill Ids
CANADA
NIAGARA FALLS and Reservation

NOVA SCOTIA
AND
EDWARD I.
PRINCE EDWARD I.
CAPE BRETON ISLAND



MAP OF
NEW BRUNSWICK
AND
QUEBEC,
OF THE
DOMINION OF CANADA
Drawn and Engraved on Copper-Plate
EXPRESSLY
FOR
JOHNSON'S CYCLOPÆDIA.

tucky, ref. 3–J, for location of county), about 65 miles E. S. E. of Lexington. Pop. in 1870, 67; in 1880, 102.

Cam'pus, a Latin word signifying a "plain," "an open field," any level surface, as of the sea. It was sometimes used to denote a field of battle, and was applied figuratively to a subject of discourse, a field of debate or speculation. The grounds about college buildings in some places are called the campus.

Cam'pus Mar'tius (*i. e.* the "field of Mars"), a celebrated plain and open field of ancient Rome, was on the left bank of the Tiber, outside of the walls of the city. It was the place in which the Roman youth performed military exercises and evolutions, and in which the *comitia* assembled for the purpose of enacting laws and electing magistrates. It was subsequently used as a public park or pleasure-ground.

Campveer', Kampveer, or **Veer,** a decayed maritime town of the Netherlands, province of Zeeland, on the N. E. coast of the island of Walcheren, 4 miles N. N. E. of Middelburg. It has a beautiful cathedral, and a town-house with an elegant tower. The Scotch Staple was transferred from Bruges to Campveer in 1444, after which this town had peculiar trading relations with Scotland for several centuries.

Camus (Charles Étienne Louis), a French mathematician, born at Crécy-en-Brie Aug. 25, 1699. He was a member of the Academy of Sciences, which in 1727 sent him, with Maupertuis, to Lapland, to determine the figure of the earth. He wrote scientific works. Died Feb. 2, 1768.

Cam'wood, or **Bar'wood,** a dyewood which yields a brilliant but not permanent red color, and is used along with sulphate of iron as a dyestuff. It is the wood of the *Baphia nitida,* a tree of the order Leguminosæ, a native of Angola.

Ca'na, a village of Galilee, was the scene of Christ's first miracle. (John ii.) Its site is supposed to be indicated by some ruins 6 miles N. of Nazareth. The natives call this place *Cana-el-Jelîl.*

Ca'naan ("low," "lowland") occurs in the Bible as the name of the youngest son of Ham (Gen. ix. 18), of the tribe descending from him (Hos. xii. 7), and, most frequently, of the land inhabited by that tribe—the "land of Canaan" (Gen. ix. 31). In the last sense it denotes the whole region between the Jordan and the Mediterranean, from Negebh in the south to Phœnicia in the north. Its inhabitants, the Canaanites, spoke the same language as the Hebrews (Isa. xix. 18). Like the Phœnicians, they were a commercial people and lived in peaceful relations with the people who occupied the land before their arrival. They had, however, cities with walls and gates (Josh. x. 20), fortresses on the heights, and formidable chariots of iron (Josh. xi. 4). One of their cities was called Kirjath-sepher—that is, "the city of books" (Judg. i. 11)—which shows that they were not illiterate. They were divided into several tribes—the Hittites, the Perizzites, the Amorites, the Jebusites, etc.—and each tribe was governed by a king and a council of elders. But the political organization seems to have been rather loose, and the greater part of the people were idolatrous, superstitious, and licentious. They worshipped Baal and Astarte, practised witchcraft and magic, and were addicted to lust, cruelty, and the basest egotism.

Canada, Dominion of, embracing the provinces of Ontario, Quebec, Nova Scotia, New Brunswick, Manitoba, British Columbia, and Prince Edward Island, also the North-western Territories, is designed to include all the British possessions in North America lying north of the U. S. Its S. boundary is nearly conterminous with the N. boundary of the U. S., touching also upon the Atlantic on the E., the Pacific on the W., and stretching N. to the Arctic Ocean. Present area (including the thinly inhabited North-west Territory, 2,665,252 square miles), 3,470,392 square miles. Cap. Ottawa.

Rivers and Lakes.—The principal rivers on the Atlantic side are the St. Lawrence and its tributaries—the Ottawa, the St. Maurice, and the Saguenay; on the Pacific side, the Columbia and the Frazer. The Saskatchewan rises in the Rocky Mountains and falls into Lake Winnipeg in lat. 53° N. This lake is connected with Hudson's Bay, the most remarkable indentation of the American coast, by the Nelson or Port Nelson, about 500 miles in length. Lake Athabasca, in about lat. 58° N., receives the Peace River and the Athabasca. The Mackenzie, which falls into the Arctic Ocean, is among the largest rivers of the globe; there are also several other great Arctic rivers. Besides Lakes Ontario, Erie, Huron, and Superior, which lie partly in Canada, there are numerous lakes, the largest being Great Slave Lake and Great Bear Lake. The province of Quebec abounds in romantic and picturesque scenery. Seven miles below Quebec is the cataract of the Montmorenci, with a perpendicular descent of 240 feet. Among other remarkable objects is the sublime scenery of the Saguenay, which flows between high and precipitous rocks.

Climate and Productions.—The climate of the Atlantic provinces resembles that of Norway, with great extremes of heat and cold; that of Ontario is considerably modified by the influence of the great lakes; that of British Columbia, like the rest of the Pacific coast, is more equable than that of the Atlantic in corresponding latitudes. A considerable part of Canada is covered with pine forests, which furnish great quantities of lumber. Those portions lying upon the great lakes and the valley of the Red River produce good crops of grain and are well adapted for fruits.

Canals and Railways.—The canals of Canada are principally designed to facilitate navigation between the lakes and the river St. Lawrence. Foremost among these are the Welland Ship Canal around the Falls of Niagara, connecting lakes Erie and Ontario, and the Rideau Canal, 126¾ miles long, connecting Lake Ontario with the Ottawa River. (See Canals of Canada.) The railway system of Canada is very extensive. At the end of June, 1882, there were 8069 miles of R. R. in operation, 3189 miles in progress, and 3000 miles more had been surveyed, for which concessions had been granted by the government. The Canadian Pacific Railway, extending across the Dominion to the Pacific, is being rapidly constructed, aided by a guaranteed loan of £2,500,000 from the British government.

Government.—The provinces were united under the "British North America act," which went into operation July 1, 1867. It provided in substance that the constitution of the Dominion should be similar in principle to that of Great Britain, that the executive authority should be vested in the British sovereign and carried on in her name by a governor-general and privy council, that the legislative power should be vested in a parliament consisting of two houses to be called the Senate and the House of Commons. The governor-general, who is appointed by the crown, has a salary of £10,000 per annum. The senators, of whom there are 77, are nominated for life by the governor-general; a senator must be thirty years of age, and have real or personal property of the value of $4000. The members of the House of Commons (one for every 17,000 persons) are chosen by the people for a term of five years; there is a slight property qualification for the right of suffrage, varying in the different provinces. The provinces have also each a separate legislature and a lieutenant-governor. The Right Hon. Sir John Douglas Sutherland Campbell, marquis of Lorne, was governor-general of Canada 1878–83, and was succeeded by the Most Honorable H. C. K. P. Fitzmaurice, marquis of Lansdowne.

Religion and Education.—There is no State Church in the Dominion, each religion being governed by its own laws. April 3, 1881, there were in the Dominion 1,791,982 Roman Catholics, 676,165 Presbyterians, 574,818 Anglicans, 742,981 Methodists, 296,525 Baptists, 46,350 Lutherans, 26,900 Congregationalists. Miscellaneous creeds, 79,686; of "no religion," 2634; no creed stated, 86,769. Total, 4,324,810. Roman Catholics are most numerous in the province of Quebec, where there were 1,170,718 in 1881, or nearly 70 per cent. of the total adherents to that faith in the Dominion. In the province of Ontario there were, in 1881, 320,839 Roman Catholics, 366,539 members of Church of England, 417,749 Presbyterians, 591,503 Methodists, etc. The provinces of Quebec and Ontario have separate school laws, adapted to their prevailing religious elements. In the latter province the townships are divided into school districts, the schools being supported partly by local taxation and partly by government grants; before any teacher can receive this grant he must pass an examination or receive a license from the normal school of the province.

Finances.—The public debt, incurred chiefly on account of public works, was, July 1, 1882, $205,365,251. The entire revenue for the financial year ending June 30, 1882, was $56,411,624.72. The expenditures (including $12,605,252 for "redemption") were $55,794,448.41. For the financial year ending June 30, 1883, the estimates for expenditure were $45,504,145. Of the revenue nearly nine-tenths is from customs and excise. The military force of the Dominion consists almost entirely of its militia, the British government maintaining a force of only 2000, forming the garrison of Halifax. On Jan. 1, 1879, the active militia numbered 45,152, of all arms; the reserve militia comprised 655,000. Schools for artillery instruction exist in four of the provinces, and there is a royal military college at Kingston.

Commerce.—The trade of Canada is mostly with the U. S.

and Great Britain. The most of the imports are from the U. S.; the largest part of the exports are sent to Great Britain. The total value of the exports for the year ending June 30, 1881, was $98,290,823; of the imports, $105,330,840. The two staple exports to the U. S. are breadstuffs and lumber. The principal British imports are iron, woollen manufactures, and cotton goods. The total registered shipping of the Dominion, Dec. 31, 1881, was 7394 vessels, 1,310,896 tons.

Manufactures.—Among the most important in 1881 were: Flour and grist-mill products, $41,772,372; lumber, $38,541,752; leather, $15,144,535; sugar, $9,627,000; woollen cloth, $8,113,055. Total capital invested in manufactures of all kinds in the Dominion, $165,302,623; hands employed, 254,935; value of products, $309,676,068.

Fisheries.—The fisheries of the Dominion are very extensive and valuable, embracing cod, haddock, herrings, mackerel, salmon and lobsters, etc. In 1881 fisheries employed 1147 vessels, 30,427 boats, and 60,053 men.

The principal cities are Montreal and Quebec, in province of Quebec; Toronto, Hamilton, Ottawa (capital of the Dominion), and London, in Ontario; Halifax, in Nova Scotia; and St. John, in New Brunswick.

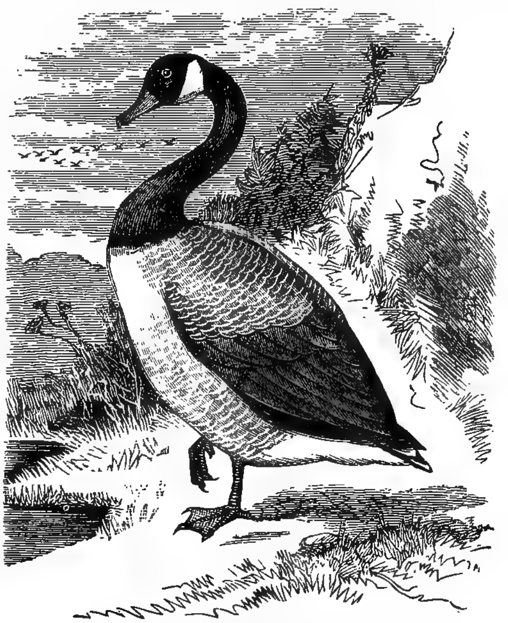
History.—The first settlement made by Europeans in Canada was made in 1541 at St. Croix' Harbor by Jacques Cartier, a French navigator, who sailed up the St. Lawrence. The French founded Quebec in 1608, after which numerous French colonists settled in Lower Canada, near the St. Lawrence River. The English general Wolfe captured Quebec in 1759, and the conquest of Canada was completed in 1760. Upper Canada was settled mostly by English emigrants. In 1791 Canada was divided into two provinces, called Upper and Lower Canada (afterward called Canada West and Canada East, and later Ontario and Quebec). Both were disturbed by an insurrection in 1837, and reunited in 1840. By an act of the British Parliament, passed March 29, 1867, and taking effect June 1 of that year, the Canadian provinces, Ontario and Quebec, and New Brunswick and Nova Scotia, were federally united into one Dominion of Canada. The legislature of Newfoundland declared in favor of joining the Dominion, but the people, in Nov., 1869, by a large majority, declared against it. From the Hudson's Bay Company the government of the Dominion purchased in the same year its vast territory. An insurrection of colonists and natives, who protested against having their land treated as a dependent territory, induced the government to organize in 1870 that part of the newly-purchased territory which is situated between lon. 96° and 99° W., and the U. S. boundary line and lat. 50° 38′ N., as an independent province of the Dominion, under the name of Manitoba. The immense unorganized territory beyond the limits of Manitoba is called the North-western Territory. On March 31, 1871, British Columbia was received into the Dominion. Invasions of Canada by armed Fenians from the U. S. were attempted in 1866 and 1870, but were repelled without difficulty. The long-pending controversies with the U. S. were mostly settled by the Washington treaty of 1871. In 1873 Prince Edward Island joined the Dominion. Since Sept. 1, 1880, all British possessions N. of the U. S., except Newfoundland and its dependencies, have been included in the Dominion of Canada. The North-western Territories were partly divided in 1882 into four provinces—Assiniboia, 95,000 square miles; Saskatchewan, 114,000 square miles; Alberta, 100,000 square miles; and Athabasca, 122,000 square miles. The half-breed and Indian rebellion in the N. W. Territories in the spring of 1885, led by Louis Riel, was put down in a few months. Riel was hanged the same year.

The population in 1800 was estimated at 240,000; by the census of 1871 it was 3,484,924; of 1881, 4,324,810.

A. H. Guernsey.

Canada Balsam [Lat. *Balsamum Canadense*] is a turpentine or oleoresin obtained from the *Abies balsamea*, a species of fir which grows in Canada and the U. S., and is sometimes called balsam fir. It is a pale yellow, transparent liquid, having a peculiar and agreeable odor. When it exudes from the bark it has the consistence of honey, but by age and exposure to air it becomes solid. It is used in medicine, in photography, in mounting objects for the microscope, and is an ingredient in varnishes.

Canada Goose, or **Wild Goose** (*Branta Canadensis*, and its numerous forms), of the family Anatidæ, is 30 to 35 inches long, brownish above, lighter beneath, with the head, neck, bill, and feet black, a white patch on each cheek; inhabits N. America, breeding at the N. and wintering in warmer regions. These birds usually fly in a >-shaped figure (though sometimes in a straight line), led by an experienced gander, who frequently gives utterance to his familiar *honk*. "Their spring migrations usually take place from the 20th of March to the last of April, but are wholly dependent upon the state of the season. They breed at the north, and linger there till the hard frosts warn them that the lakes and streams will soon be frozen over." While performing their long journeys they usually fly at a great height, probably a quarter of a mile or more.



Canada Goose, or Wild Goose.

Canadian River rises in the N. E. part of New Mexico, and flows through the N. part of Texas into the Indian Territory. Its general direction is nearly eastward. After a course of about 900 miles it enters the Arkansas River about 50 miles W. of Fort Smith. The North Fork of the Canadian is sometimes called Rio Nutria. It rises in the N. E. part of New Mexico, flows in an E. S. E. direction, and enters the Canadian about 50 miles from its mouth. Length, estimated at 600 miles.

Canajoharie, Montgomery co., N. Y. (see map of New York, ref. 4–I, for location of county), on the S. bank of the Mohawk River and on the Erie Canal, and opposite Palatine Bridge, on R. R., 55 miles W. N. W. of Albany. The village has an academy, a school district library of 800 volumes, a planing mill, malt-houses, and a large paper-bag factory. Pop. in 1870, 1822; in 1880, 2013.

Canal′ [Lat. *canalis*; from *canna*, a "hollow reed," or "pipe," hence a "channel"], an artificial water-course for drainage, irrigation, and especially for navigation. Whenever possible, advantage is taken of the natural river-courses for the purpose of canalization. A canal must be very nearly upon the same level. Whenever considerable elevations are to be overcome, it is usually accomplished by means of "locks." Valleys are generally crossed by means of embankments, with openings called "culverts" for the passage of streams. Canal-boats are usually hauled by animals who walk upon a "tow-path," upon one side of the canal. (See Navigation, Inland.)

Canal′, or **Canalet′to** (Antonio), an Italian painter, was born at Venice Oct. 18, 1697. He worked in his native city, and acquired a high reputation. He painted many views of Venetian palaces, canals, etc., which are highly commended by some critics, but others charge him with mannerism. He is said to have been the first who used the camera obscura for artistic purposes. Died Aug. 20, 1768.

Canal Dover, O. See Appendix.

Canalet′to, a surname of Bernardo Belotto, a Venetian painter, born in 1724. He was a nephew and pupil of the preceding. He worked in Rome, London, Dresden, and other places, and excelled in perspective. He painted many buildings and the environs of cities. Died at Warsaw in 1780.

Canals′ of Can′ada, The, may be classed under the following heads:

1st, The St. Lawrence and lake navigation, including the Lachine Canal, the Beauharnois, Cornwall, Farran's Point, Rapide Plat, and Galops canals, commonly designated the St. Lawrence canals, in the river St. Lawrence, surmounting its rapids between Montreal and Kingston; and the Welland Canal, between Lake Ontario and Lake Erie, surmounting the falls and rapids of Niagara; to which may be added the Burlington Bay Canal, through a sandbar at the mouth of that bay, at the head of Lake Ontario.

2d, The Ottawa and Rideau navigation, including St. Anne's Lock, the Carillon, Chute à Blondeau, and Grenville canals, surmounting the rapids of the Ottawa between Montreal and the city of Ottawa; and the Rideau Canal, connecting the river Ottawa with the St. Lawrence at Kingston, through the rivers Rideau and Cataraqui.

3d, The Richelieu and Champlain navigation, being the St. Ours Lock and Chambly Canal, surmounting obstacles on the river Richelieu from the St. Lawrence to Lake Champlain.

4th, The river Trent navigation, consisting of locks and dams on the river Trent, a large tributary of Lake Ontario, extending into the interior of the Newcastle district, originally proposed as a line of communication with Lake Huron.

5th, The St. Peter's Canal, connecting the Bras d'Or, a bay of the sea in the interior of the island of Cape Breton, with St. Peter's Bay, on the S. coast of the island.

Along with the foregoing may be noticed the following projected canals: the Caughnawaga Canal, to connect Lake Champlain with the river St. Lawrence above the Lachine Rapids; the Ottawa and Huron Canal, to form a direct and short route between Montreal and Lake Huron by the Ottawa and French River; a canal at Sault Ste. Marie; the Huron and Ontario, or Georgian Bay Canal; the Bay Vert Canal, from the Gulf of St. Lawrence to the Bay of Fundy; and the Shebandowan and Lake of the Woods navigation, forming 311 miles of the route from Lake Superior to Red River.

The canals of Canada derive an extraordinary importance from the vast extent and importance of that great system of inland navigation, the river St. Lawrence and its lakes, the obstructions in which they are almost exclusively designed to overcome.

When we consider the great extent of fertile lands of the States and provinces adjoining it, and the still vaster territories behind them of fertile prairies and wooded lands in the U. S. and Canada, for the traffic of which this great water-system must be the highway; that in 1871 alone the grain, or its equivalent in flour, brought for shipment to the five principal ports on the great lakes amounted to 140,000,000 bushels; and also that the extent of country within the limits of successful wheat cultivation in the infant, though prosperous, province of Manitoba, and the other Canadian territories on the Saskatchewan, the Athabasca, and the Peace River (on which last the mean temperature of its seven months' summer is equal to that of Toronto) is equal in area to ten times that of the State of New York, and whose traffic, from their remoteness, must, for the economy of water transport, seek the St. Lawrence as its highway,—it will be seen how important that highway and its canals must be, not only for the freight it may carry, but also for the beneficial effect of the free opportunity it offers to all of competing in the forwarding business and thereby checking the tendency of railway monopolies or combinations to establish rates of freightage oppressive upon the farmers especially.

The country on the Canadian side of the boundary, being hitherto much less known, may require a little more notice. The valley of the Saskatchewan or Nelson River and its tributaries resembles very much in formation, soil, and climate, as well as extent, that of the Volga of Russia, the greatest river in Europe. The region N. W. of it, drained by the Athabasca and the Peace River, the main arms of the river Mackenzie, each about a thousand miles in length, is fully as suitable for settlement; the Peace River country especially being superior in soil, both richly wooded and interspersed with rich, well-watered prairies, with a climate better than that of Red River Settlement or Northern Minnesota.

The extent of country within the valleys of these three rivers, and within the limits of successful cultivation of wheat, estimated on carefully selected evidence confirmed by recent explorations, is equal to ten times the area of the State of New York. It is remarkable for the great extent of very fertile and arable prairie and wooded land it contains, its vast coal-fields, and its abundance of petroleum. Iron ore is found in it, and gold that promises to afford profitable diggings has recently been definitely ascertained to exist on Peace River, besides what was already found on the Saskatchewan.

The cost of transport will no doubt check the exportation of heavy produce from the remote parts of these territories especially; but there are farm products, such as flax, wool, cured meats, etc., that can be carried with profit much farther than grain, which has hitherto been the chief export of the West; and every improvement in our means of transport, by canals or otherwise, that reduces the cost of it, will extend the distance from which grain can be exported. The gold of the mountain countries westward, alike in the U. S. and Canada, will encourage settlement and stimulate commerce, compensating as a remittance, in payment for imports, for the reduced value, as such, of heavier products. The outward and inward traffic, from all sources, by the Northern Pacific and Canadian Pacific R. Rs. will, from the greater economy of transport by water, to the utmost possible extent, consistent with the destination of the freight, use the route by the great lakes, the St. Lawrence, and its canals.

From Fort Simpson, on the Mackenzie, about 400 miles N. of Peace River, the Mackenzie is navigable uninterruptedly downward for about 800 miles, with a depth sufficient for the largest sea-going ships, to the Arctic Sea at its mouth, where there are whales in great abundance. The country between the Peace River and Fort Simpson is generally very fertile, arable land, and two-thirds of it is within the limits of successful wheat cultivation. Whale-fishing, as now carried on, has ceased to be profitable, owing to the competition of mineral and other oils, the increasing scarcity of whales, and their having to be sought farther into the Arctic, the dangers of the voyage, and the great distance the oil has to be carried—from the Arctic within Behring Strait to the Sandwich Islands, and thence home, in all about 24,000 miles. Were the Mackenzie connected by rail with the Canada Pacific Railway, the richest whale-fishing in the world could be rendered available, and 800 miles of transport on the Mackenzie, where coal and wood abound for steamers that might be used with great advantage in the fishing, and 1800 miles by rail, would bring the products of the fishing to Duluth on Lake Superior. Though the prospect of such communication be remote, it may be noticed in considering the area for which the St. Lawrence may be the commercial outlet.

The acquisition by Canada of the great territories formerly held by the Hudson's Bay Co., including so much valuable country, has greatly changed the position of Canada in relation to the improvement of the navigation of the St. Lawrence. Previously, it might be argued that it was absurd for the Canadian people to task their resources for the construction of a gigantic system of canals on the St. Lawrence to render it the great highway of the West, as the benefit of it would chiefly be to reduce the cost of transport and increase the value of the produce of the great Western grain-growing regions of the U. S.; but now that Canada has acquired an equal share of the vast fertile regions of the West, she has a common interest with the U. S. in the improvement of that great inland route of navigation, which must more or less be their common outlet. Though there may be antagonism between rival shipping-ports and routes of transport on the one side of the international boundary and the other, and large though such interests may be, they cannot be considered otherwise than secondary to that of the millions of producers, present and future, having a common interest in every work of improvement that tends to reduce the cost of transport, and thereby enhance the value of the products of the great regions of the West. With this view, the canals of Canada may be considered of important interest to the American people, especially now, since the right of using them for commercial purposes has been secured by the treaty of Washington.

Before describing the canals of Canada it may be suitable to take a brief view of the general character of the river St. Lawrence, and of the obstructions in its course which they are chiefly intended to overcome.

Notwithstanding these obstructions, it has certain specialities as a water-system which otherwise render it peculiarly suitable as a commercial highway for trade of the greatest magnitude. Its course is so free from minor sinuosities that though scarcely 2000 miles in length from its mouth at Anticosti to the W. end of Lake Superior, it extends as far into the continent as the Mississippi does with its course of 3160 miles; the upper part of which, even where navigable, is of insignificant capacity for transport compared with the great lakes of the St. Lawrence. Directness (which means shortness of route) and great capacity are most important advantages. The great proportion of it that consists of lakes and wide water—that is, three-quarters of its whole length—affording sea-room admitting of free navigation by sailing-vessels, is another important advantage. So also is the uniform height of its waters; from their being held in reserve in the great lakes, it never falls one-twentieth below its mean volume; and its navigation is free from all the disadvantages arising from low water that other rivers are liable to.

Its enormous volume also is attended with an important commercial advantage in the depth of water it affords on its rapids, which is such as to admit of large passenger steamers and lake vessels of 500 or 600 tons, if lightly loaded, passing as freely down through its vast swaying surges as the lightest bark canoe of the Indian descends the rapids of an ordinary river, and with an increased speed, instead of the delay necessarily attending the passage through the canals and locks which are so essential for vessels going upward. (For further description of the river St. Lawrence, see ST. LAWRENCE.)

As the treaty of Washington, besides securing the right of using the canals of Canada, provides that the river St. Lawrence, to and from the sea, "shall for ever remain free and open for the purposes of commerce to the citizens of the U. S.," the lower course of that river, with which the treaty secures unbroken communication, may now be considered as a subject of greater interest to Americans than heretofore. The right of in-shore fishing in the St. Lawrence and the Gulf, and of having fishing establishments along their coasts, will doubtless lead to great extension of the fisheries there and business connected with them. As the provisions necessary for their use can be supplied with much greater advantage from lake ports by the way of the St. Lawrence than otherwise, a considerable trade in that way will no doubt arise. This new interest in the lower St. Lawrence may justify its being noticed here in connection with its canals.

To ascend the St. Lawrence from the Atlantic we traverse the gulf for 426 miles from the entrance of the Straits of Belle-Isle to the mouth of the river St. Lawrence, which is at an imaginary line from Cape Gaspe to the head of the island of Anticosti, and thence to the N. shore.

To Quebec, 400 miles, the river is navigable for the largest ships that float, including the Great Eastern. Thence to Montreal the distance is 160 miles; midway is Lake St. Peter. Extensive shoals in the upper part of it had originally a depth of only 11½ feet at low water. A channel has been dredged through them to the depth of 25 feet at lowest water, 11½ miles long, commenced in 1842, completed in 1847 to 14 feet in depth, but scale increased successively to 16, 18, 20, 22, and very recently (30th June, 1882) throughout to 25 feet in depth and 300 to 400 in width, but by a resolution since of the House of Commons to be further increased to the depth of 27½ feet, at an estimated cost of $900,000. Cost to 30th June, 1882, $2,870,075.66.

The seaport of Montreal, 586 miles from the mouth of the St. Lawrence, is situated at the foot of the Lachine Rapids, which are surmounted by the Lachine Canal, 8½ miles in length, the first of the series of St. Lawrence canals. From the head of it, at Lachine, it is 15¼ miles through Lake St. Louis to the "Cascades," which, together with the "Cedars" and "Coteau" Rapids, are overcome by the Beauharnois Canal, 11¼ miles in length. Thence through Lake St. Francis it is 32¾ miles to the foot of the "Longue Sault" Rapids, which are surmounted by the Cornwall Canal, 11½ miles in length. At 5 miles farther, ascending the river, is "Farran's Point Rapid" and canal, ¾ of a mile in length. At 10½ miles farther by the river is the "Rapide Plat" and its canal, 4 miles in length. At 4½ miles is Galops Canal, 7⅝ miles in length, surmounting the "Pointe aux Iroquois," "Pointe Cardinal," and "Galops" Rapids. These, from Farran's to the "Galops" inclusively, are called the Williamsburg canals, terminating 7⅝ miles below Prescott. The descent from the head of the "Galops" to Montreal harbor, 111¼ miles, is 234 feet; Kingston, 178 miles from Montreal, is 59 miles above Prescott. From Kingston, where we enter Lake Ontario, to Port Dalhousie, at the foot of the Welland Canal, 27 miles from the head of that lake, the distance is 170 miles.

By the Welland Canal it is 27 miles to Lake Erie at Port Colborne, from which to the head of the lake, at the mouth of the Detroit River, as the entrance of the St. Lawrence is there called, is 232 miles. The Detroit River, 18 miles, Lake St. Claire, 25, and St. Claire River, 33 miles, reach to Lake Huron.

Lake Huron to its head at river St. Mary is 270 miles in length, river St. Mary up to the Sault, 47 miles; in all 625 miles of unbroken navigation from the head of the Welland Canal to the Sault Ste. Marie Canal, which is 1 mile in length; thence it is 7 miles to Lake Superior, which is 390 miles long to Fond du Lac, at the head of it; making in all the total distance of 2384 miles from the Atlantic at the entrance of the Straits of Belle-Isle, of which 71¾ miles are artificial navigation, and 2312¼ open navigation.

Reverting to the rapids between Montreal and Kingston, the navigation of them by steamboats was not attempted till 1842. Daily passenger steamers have run these rapids from Kingston to Montreal during open navigation for many years past. These steamers in returning ascend the Lachine, Beauharnois, and Cornwall canals, but ascend the Iroquois Rapid, Rapide Plat, and the Galops without entering the canals. It is not usual for freight vessels to run the lower rapids; but as the saving of time is very great in descending the rapids, compared with passing through the canals at much lower speed, besides detention in lockage, the improvement of the channel there necessary, so as to admit of the largest freight vessels fully laden descending the rapids at lowest water with perfect safety, has long been advocated, and is one of the works recommended to be prosecuted by the canal commission of the Canadian Parliament in 1871. In the "Galops Rapid" there is a short shoal, having not more than 9 or 10 feet water over it when lowest. In the "Longue Sault" the water is often over 50 feet in depth, but there is one shoal in it with only 12 feet of water over it. On the "Coteau Rapid" the depth is often over 20 feet, but there are two shoals with only from 7½ to 10 feet depth at lowest water. The "Cedars" are generally 12 to 25 feet in depth, but one or two shoals have been found with only 9½ to 10 feet depth at lowest water. In the "Cascades" there is a shoal having 6 or 7 feet in depth in dry weather; this is the shallowest spot in all the rapids of the St. Lawrence. In the lower part of the Lachine Rapids there are two shoals having not more than 8 feet over them at lowest water. The cost of completing a 12 to 13 feet channel from Lake Ontario level to Lachine by blasting has been estimated at $720,000, which probably might be much reduced by adopting a system of side-dams to gorge the channel as far as practicable.

Taking the works constructed to surmount the obstacles in the navigation of the St. Lawrence in the order in which they have been mentioned, the first is the Lachine Canal.

The Lachine Canal is 8½ miles in length, extending from the harbor of Montreal to the village of Lachine on Lake St. Louis. It surmounts the St. Louis or Lachine Rapids. Its construction was urged as a necessity as early as 1791; a grant by the legislature of £25,000 was obtained in aid of the project in 1815, on the recommendation of the governor-general, Sir George Prevost, who considered it important in a military point of view. In 1819 the grant of 1815 was repealed, and an act passed incorporating a joint-stock company for carrying out the design; but it proved abortive. In May, 1821, a bill was passed repealing its incorporation, and authorizing the construction of it by government in the month of July following. In 1825 the canal was opened for the passage of vessels. Its dimensions as then constructed were 28 feet in width at bottom and 48 feet at the water-line, with 4½ feet depth of water. It had seven locks, 100 feet long and 20 wide, built substantially of stone. The cost of that canal up to Mar., 1826, was $438,404.15, of which the British government contributed $50,000 and the province the remainder. This canal being found insufficient, a little before the union of the provinces of Lower and Upper Canada, Lieut.-Col. Phillpotts, R. E., at the instance of Earl Durham, made a report and estimate for the construction of a new line of canal, with locks 200 feet by 45, and 9 feet depth of water. After careful consideration of what were then considered to be the requirements of the trade of the great lakes, and with a view of satisfying the wants of Upper Canada, it was decided that the canal should be continued in the same site, and that it should be enlarged to its recent dimensions (with the exception of the lowest two locks), which were as follows:

Breadth of the canal at bottom	80 feet.
" " " at water-surface	120 "
Dimensions of locks	200 by 45 "
Depth of water on sills, 2 locks	16 "
" " " 3 "	9 "
No. of locks 5	
Total rise of lockage	44¾ feet.
Length of canal	8½ miles.

Such was the scale of works on this canal completed or being so on the close of the fiscal year ending 30th June, 1870, when, owing to greater capacity of transportation being required for the rapidly-increasing trade using it, the Canadian government in 1871 decided that all the locks on the St. Lawrence route of navigation should be enlarged to 200 feet in length between the gates, with 25 feet in width and 12 feet depth of water on the mitre-sills, and further, in 1875, directed that where not already under contract for enlargement the locks should be 270 feet between the gates, by 14 in depth on the mitre-sills, and that the foundations of all permanent structures should be laid at a depth corresponding thereto.

Accordingly, this canal now consists of a channel enlarged to 150 feet in mean width, completed throughout to 12 feet in depth (which can be increased to 14 by raising the banks), with two sets of locks the same in number. On the new line they are 270 feet long by 45. Three of them are adapted to 14 feet, and two at the entrance are 18 feet in depth of water on the mitre-sills. The old and the new locks have both been in use since June, 1882, which prevents delay from vessels ascending and descending at the same time. The total rise of lockage is 44¾ feet.

The expenditure on this canal up to 30th June, 1882, has been as follows, including $40,000 by the imperial government:

To 30th June, 1867	$2,587,532.85
Further enlargement and construction to 30th June, 1882	5,579,163.90
	$8,166,696.75
Add maintenance and repairs to June 30th, 1882, refunds not included	841,642.34
Total	$9,008,339.09

The new works at the Lachine entrance comprise the construction of a pier 6200 feet long and the excavation of the channel, and will be completed early in 1884.

The navigation of the Lachine Canal is open in general for 210 to 220 days during the year, and may be safely counted upon from the last week in April to the last week in November. In some years its period of navigation is considerably longer. In 1839 it opened on the 11th of April; in 1852 it was open till December 16th; in 1849 it was open 234 days. The freight that passes through the Lachine Canal is much greater than that passing by the canals between Lake St. Louis and Lake Ontario, as the trade of the Ottawa and the Rideau Canal joins that of the St. Lawrence in Lake St. Louis, and the export of sawn lumber from the Ottawa is very great.

The next in succession of the St. Lawrence canals is the Beauharnois Canal, 11¼ miles in length, connecting Lake St. Louis with Lake St. Francis, and surmounting the "Cascades," "Cedars," and "Coteau" rapids. Previous to the construction of the Beauharnois Canal four short canals had been made which admitted of boats carrying thirty barrels of flour, descending from Lake St. Francis to Lake St. Louis. Several small improvements were subsequently made on this part of the navigation of the St. Lawrence. In 1833 the increasing importance of the subject led the government of Lower Canada to appoint commissioners for the improvement of the navigation from Lake St. Louis to Lake St. Francis. Their engineer, Mr. Mills, made a survey with that view, and his reports and plans, which were for the construction of three short canals at the rapids, were approved of by a committee of the house of assembly, who recommended a grant of $960,000 for that purpose. The report, however, fell to the ground, and in 1839 Col. Phillpotts, before mentioned, recommended a canal on the N. side of the river for military reasons. After other projects had been entertained and abandoned, the present site, on the S. side, after much discussion, was adopted as the most favorable, on the recommendation of the chief engineer of the department of public works of Canada, and in 1842 contracts were entered into for the construction of it. The canal was opened at the close of the season of 1845, but it was found that its upper entrance was imperfect, its channel crooked, too shallow in dry seasons, and impeded by cross currents. On account of these and other difficulties, in the course of years up to a recent date considerable sums have been expended in constructing dams, regulating weirs, and dykes to give the required facilities for the trade passing through it, and the original difference of opinion as to which side is the best canal route exists up to this day. The work, however, was constructed in the same substantial manner and superior quality of masonry and workmanship as the Lachine Canal.

The present dimensions of the Beauharnois Canal are as follows:

Breadth at bottom	80 feet.
" " surface	120 "
Length of canal	11¼ miles.
Total rise of lockage	82½ feet.
Dimensions of locks	200 by 45 "

No. of locks 9; depth of water on sills 9 feet.

Total cost to 1st July, 1867, $1,611,424.11; costs since for works, $13,157.90; maintenance and repairs, $386,685.35; and there was paid for damages caused by dams before confederation $254,807.51, and since confederation $68,754.40.

The navigation of this canal is open on an average for 221 days of the year, opening about the 20th of April and closing about the 28th of November. Earliest opening on record, 12th of April; latest, 5th of May. Earliest closing, 24th of November; latest, 13th of December.

The Cornwall Canal is the next in ascending the St. Lawrence. It is on the N. side of the river, and extends from the town of Cornwall. It is 11½ miles in length, and surmounts the Longue Sault Rapids. This is the first of the St. Lawrence canals that was constructed on the present scale. In 1817 the governor of Upper Canada called the attention of the legislature of that province to the importance of improving the navigation of the river below Prescott, which is situated a few miles above the head of the rapids of the St. Lawrence. In 1818 a joint commission was appointed by the governments of Upper and Lower Canada, and reported favorably on the subject, recommending the construction of small canals of 4 feet depth of water. In this report the cost of transport from Montreal to Prescott, a distance of 119 miles, is stated as being then $16 a ton, and thence to Niagara $8. Nothing further was done till 1826, when, at the instance of the legislature of Upper Canada, a report was laid before it with estimates for such canals, and also others of larger dimensions, 8 feet in depth. In 1832 an appropriation was made for a scale of canals 9 feet in depth. In 1834 the work was put under contract, but its progress was retarded by the insurrection and financial difficulties, and it was not completed till 1843. This canal is similar in construction to the others already described, excepting that instead of striking back for a direct route, it winds along the shore of the river, having necessarily heavy embankments towards it, in which breaks have taken place that have been repaired at considerable cost.

Its present dimensions are, excepting enlarged locks:

Breadth at bottom	100 feet.
" at water-surface	150 "
Length	11½ miles.
Locks, 7 in number	200 by 55 feet.
Depth of water on sills	9 "
Total lockage	48 "

Cost to 1st July, 1867, $1,933,152.69; cost since for works, $589,367.12; maintenance and repairs, $310,459.02 to 1st July, 1882.

The work of enlargement at the lower channel entrance, and the construction of two new locks of 270 feet chamber by 45, with 14 feet water on sills, taking the place of three on the old line, in part of the general enlargement scheme, and the excavation of the basin, 825 feet long, between them, have been completed, leaving the enlargement of four locks and the prism of the canal still to be dealt with.

On an average this canal is open for 230 days of the year, opening about four days sooner and closing as much later than the Cornwall Canal. It has been known to open as early as the 7th of April, and the latest closing was on the 18th of December.

The next in the order of succession are the Farran's Point, "Rapide Plat," and "Galops" canals, known collectively as the Williamsburg canals.

Farran's Point Canal commences 5 miles above the head of the Cornwall Canal. It surmounts the Farran's Point Rapid, and is only three-quarters of a mile in length. Its dimensions are:

Breadth at bottom	50 feet.
" at water-surface	90 "
1 lock	200 by 45 "
Total rise of lockage	4 "
Depth of water on sills	9 "

Less breadth was considered necessary for this canal than the others below it, as it is used principally by vessels ascending. Descending vessels run down the rapids with ease and safety. Though proposed and surveys made of a site for it, this canal was not commenced till four years after the union of Upper and Lower Canada. It was completed for traffic in Oct., 1847.

The "Rapide Plat" Canal commences 10½ miles above the head of Farran's Point Canal. It surmounts the rapids after which it is named. Its other dimensions are the same as the preceding; it is narrow in width for the same reason. It has two locks, and a total lockage of 11½ feet.

The "Galops" Canal commences 4½ miles above the "Rapide Plat" Canal. It surmounts the rapids at "Pointe aux Iroquois" and the "Galops." It originally was in two parts, that were opened in Sept., 1847. The connecting portion was completed in 1856. It is 7⅝ miles in length. Its other dimensions are the same as the two preceding, for the same reason. It has three locks, and a total lockage of 15¾ feet.

These three canals are on an average open for navigation 233 days in the year; the dates of opening and closing closely resemble those given for the Cornwall Canal. The total cost of these three canals to 1st July, 1867, was $1,320,655.54; repairs and maintenance since to July, 1882, $216,545.20.

For the year to 30th June, 1872, on the St. Lawrence canals, including the Lachine Canal:

The total of tolls accrued was	$84,675.09
Of tonnage of vessels passed	1,134,446 in Canadian vessels. 52,320 in U. S. "
Of goods transported, tons	940,645

Since the practice of "through passes" has been adopted on the Welland and St. Lawrence Canals, instead of separate passes for each, the tonnage using each does not appear separately, as formerly, though included in statements of the whole route.

In the report of the minister of railways and canals of Canada for 1882 it is stated that the new works of the Galops Rapids improvement consist in the opening of a straight channel 3300 feet long through the rapid for a 14 feet navigation, one-half width of which has been done to the full depth, involving sub-marine excavation of 6000 cubic yards of rock.

The Welland Canal is the next that occurs in ascending the St. Lawrence navigation. The distance to it from the last is 226 miles. It is the most important of Canadian canals. It leaves Lake Ontario at Port Dalhousie, 12 miles westward of the mouth of the Niagara River, and at Port Colborne, 17 miles westward of the head of that river, it enters Lake Erie, surmounting the falls and rapids of Niagara. Its length, apart from that of its branches to Port Maitland and Chippewa, is 27 miles.

In 1816 the project of connecting these lakes by a canal was first taken into consideration, and reported upon by a committee of both houses of the Upper Canada Parliament. In 1821 a commission appointed to consider the subject of inland navigation reported favorably upon it, and suggested the formation of a commission to carry out the work. This led to the incorporation of a company, on the petition of W. H. Merritt and others, in 1824, who proposed constructing a combined canal and railway, the canal to admit of passing boats of 40 tons. In 1825 this scheme was abandoned, and another adopted of connecting the Welland River with Lake Ontario by a canal, with wooden locks 110 feet by 22, and 8 feet of water on the sills, to admit of the passage of sloops and schooners. The company went into operation in 1825 with limited capital and partial assistance from the imperial and provincial governments, encountering many difficulties, financial and physical; among others, a land-slide caused them to abandon the river Welland as a feeder and adopt the Grand River instead of it. In 1829 water was let into the canal, and two schooners ascended by it to the river Welland. Subsequently, the company obtained an extension of capital, and adopted the design of carrying the canal over the Welland River to Port Colborne, nearly on its present site, which was completed accordingly in 1833, but with small wooden locks. In 1839 an act was passed authorizing government to purchase all the private stock, which was not done till 1841, when the canal was placed under the board of works of Canada, and the enlargement of it decided upon. It was determined to rebuild all the locks in stone, 120 feet by 24, with 8½ feet water; the aqueduct to be rebuilt in stone; the Grand River feeder to be converted into a navigable canal; the harbors of Port Colborne and Port Dalhousie, one lock at the former and two at the latter, to be 200 feet by 45, with 9 feet of water; the Port Maitland branch to be constructed with a similar lock at its Lake Erie entrance. This led to the works being carried out in their recent dimensions, which *were* as follows on this, the main line from Lake Ontario to Lake Erie, though afterward enlarged, as will be immediately explained:

Length of canal	27 miles 1099 feet.
3 pairs of guard gates.	
2 lift-locks	200 by 45 feet.
24 "	150 by 26¼ "
1 lift-lock	230 by 45 "
Total rise of lockage to Lake Erie	330 feet.
8 feet by 2 feet Grand River level	16 "
Total lockage up and down	346 feet.
Depth of water on sills	10¼ "

For 14 miles the summit-level is 8 feet above Lake Erie, making 16 feet of lockage up and down, in addition to the difference in level of 330 feet between the lakes. The summit-level receives the branch from Grand River, which is the feeder of the main canal, besides being a navigable arm of it. But as the supply from it is found inadequate to meet the requirements of the steadily increasing traffic, the lowering of this summit-reach to the level of Lake Erie, which is to be the feeder of the canal through the Port Maitland branch, constructed for that purpose, has been completed.

The breadth of the main canal varies in different parts of it from 26 feet at bottom and 66 at surface to 70 feet at bottom and 110 at surface. The enlargement of this canal to a uniform scale of dimension of 100 feet breadth at bottom and 12 to 13 feet depth of water, with locks of 270 feet in length between the gate-quoins, and 45 feet in breadth, with 12 feet depth of water on the sills, has been decided upon, in accordance with the recommendation of such dimensions by the Canada canal commission of 1871, as a general scale to be adopted throughout all the Canadian canals on the St. Lawrence navigation. In pursuance of this decision, the enlargement of the main line from Port Dalhousie to Port Colborne, and of the locks on it, to the above dimensions, giving a 12 feet depth of water throughout (the locks being 270×45×12 feet), is now (Nov., 1883) completed, except at the Chippewa junction, where the new aqueduct carries the canal over the Chippewa River. This part of the work, as the nature of it forbids its being hurried, is not yet completed; but it causes no difficulty, as the old aqueduct, close by, is still used. Between Port Dalhousie, on Lake Ontario, and Allanburg, the summit level, 11¾ miles, the old canal and the new are both in operation. From Allanburg to Port Colborne, 14 miles, there is only one channel, the old canal having been enlarged; the branches, however, on this part of the canal, provide, like the double line to Allanburg, to a considerable extent, against incidental obstruction.

The existing twenty-seven lift-locks and their weirs, and three guard-locks, are all substantially constructed of durable stone masonry, excepting a guard-lock at Port Robinson, which is of wood and masonry. There is on it a substantial stone aqueduct, which carries this canal over the river Welland. A lock into the Welland above the aqueduct, and the connection by another below Port Robinson, enable vessels to pass down that river without serious obstruction from the aqueduct.

The Welland Canal has two branches—the Welland River or Chippewa branch, and the Grand River feeder; the latter has a short branch connecting it near its termination with Port Maitland on Lake Erie. The Welland River or Chippewa branch descends from the main line into the Welland River by means of a lock at Port Robinson. The river Welland is then descended 8¾ miles, with a short cut to the Niagara River at Chippewa. The canalling on this branch consists of—

The cut from Port Robinson to Welland River	2622 feet.
Length of lock above aqueduct	300 "
" " Chippewa Cut to Niagara River	1020 "
2 locks, each	150 by 26½ "
Depth of water on sills	9 feet 10 inches.

The Grand River feeder is 26 feet wide at bottom and 60 to 70 at the surface, and 8 feet deep. It taps the Grand River at Dunnville, where a dam 564 feet long raises the water of the river, making it navigable for 16 miles up to Cayuga.

Length of Grand River feeder		21 miles.
Locks	1 of	150 by 26½ feet.
	1 of	200 by 45 "
Depth of water on sills		10½ "
Total rise of lockage		7 to 8 "

Its branch to Port Maitland is 1¼ miles long, with one lock of 185 by 45 feet, and 11 feet depth of water on sills, with a total lift of 8½ feet.

During the season of navigation of the year 1882 the following vessels and tonnage passed through the Welland and St. Lawrence canals, taken together:

Steam-vessels.		*Tonnage.*
Canadian	234	35,308
United States	48	6,584
Sailing-vessels.		
Canadian	765	114,300
United States	423	61,417
Freight, tons		1,701,693

Amount of tolls collected on freight, passengers, and vessels during the season of navigation of 1882: on the Welland Canal, $140,177.84; the St. Lawrence Canal, $76,957.97. The total cost of the Welland Canal and its branches to July 1, 1867, was $7,638,239.83; cost since to July 1, 1882, for construction and enlargement, $12,690,488.25, besides for maintenance, staff, and repairs, $1,878,993.94.

It is on an average open for 241 days in the year. Its earliest opening on record was Mar. 25; latest, May 5. Earliest closing, Nov. 15; its latest, Dec. 19.

The Burlington Bay Canal is generally classed in the St. Lawrence navigation. It is merely a cutting of half a mile in length through a piece of low land which separates Lake Ontario from a large sheet of deep water, called Burlington Bay, at the W. end of it. It enables vessels to reach the city of Hamilton and the Desjardin Canal (a deepened channel), the property of a private company, leading up 5 miles to the town of Dundas. The canal is navigable for vessels drawing 12 feet of water; its width is from 108 to 138 feet between the piers on each side of it, that are of cribwork filled with stone. The outer end of the S. pier extends 300 feet into Lake Ontario. This work was begun in 1843; the upper part of the piers has been rebuilt since 1855. The total cost of this canal to July 1, 1867, was $432,684.40; cost since to July 1, 1882, for maintenance and repairs, including renewing superstructure of piers, $14,686.77; total of tolls collected during season of navigation of 1882, $3200.42.

This completes the list of existing Canadian canals on the St. Lawrence and its lakes.

The second part of the canals of Canada that presents itself for consideration is the Ottawa and Rideau navigation, which includes the St. Anne's, Carillon, Chute à Blondeau, and Grenville canals on the Ottawa, surmounting the rapids on that river between Montreal and the city of Ottawa, and the Rideau Canal, connecting the Ottawa with the

St. Lawrence, at Kingston, by the rivers Rideau and Cataraqui.

The Lachine Canal already described forms the first link in this line of navigation, as it serves alike the traffic of the Ottawa and the St. Lawrence between Lake St. Louis, where these rivers meet, and the harbor of Montreal. From the head of the Lachine Canal, 8½ miles from Montreal, there is a channel of fifteen feet and upwards in depth, but crooked in parts, through Lake St. Louis for fifteen miles, nearly to the St. Anne's lock. The formation of a new and direct channel of 120 feet in width and of ample depth, flanked with a guide-pier of cribwork, through the shoal below the entrance, has been contracted for and is in progress.

St. Anne's Canal is situated on the N. side of a channel of the Ottawa between Ile Perrot and the head of the island of Montreal. It overcomes a short rapid with a fall of 3 feet, the difference of level between Lake St. Louis and the Lake of the Two Mountains above it. The canal is half a mile in length, and the lock is 190 feet by 45, and has a depth of from 6 to 7 feet of water on the sill. It is built of substantial masonry. The lock was contracted for in 1840, and opened for use in 1843. The total cost of these works to July 1, 1867, was $134,456.51; cost since to July 1, 1882, for enlargement and construction, $404,787.15, and for maintenance and repairs, $76,944.62.

The new works of enlargement now completed embrace the construction of a lock 200 feet long between the gates, with 9 feet water on the sills, and the formation of a new channel of approach 100 feet wide at bottom and 150 at surface, with 10 feet depth of water at lowest level known.

For the year to June 30, 1872, on St. Anne's lock—

The total of tolls accrued was..	$2,991.98	
Of tonnage of vessels passed.....	3,460	in U. S. vessels.
	91,425	in Canadian vessels.
Tons of goods transported.........	100,865	

It is generally open from the last week in April to the last week in November.

From St. Anne's lock, with the exception of the imperfect upper entrance to it, and a shoal with 13 feet of water a little above it, the Lake of the Two Mountains is 20 to 30 feet deep; the distance through it and a short part of the Ottawa above it to the foot of the Carillon Canal is 27 miles.

The "Carillon," "Chute à Blondeau," and "Grenville" canals were constructed by the imperial government of Great Britain. They were projected in 1819, but it was not till April, 1834, that the Grenville Canal, the latest of them in being completed, was opened for navigation. In 1856 they were transferred to the province of Canada. It would be difficult to ascertain the cost of the original construction of these works under the direction of the royal staff corps. The expenditure upon them by the provincial government up to 30th June, 1867, was $63,053.64, and enlargement and construction to 30th June, 1882, $2,822,800.28, and for maintenance, staff, and repairs, $315,502.53, besides expenditure by imperial government, not of record, of Canada.

The Carillon Canal, as it at present exists, is of the following dimensions:

	In 1873.	In 1882.
Breadth at bottom.........	30 feet.	100
" " surface.........	50 "	100
Length of canal.........	2⅛ miles.	26
3 locks, two rising; in all.........	21¾ feet.	
one falling.........	13 "	
Total rise.........	8¾ "	
Dimensions of locks from 126½ to 128 by	32⅛ "	200 by 45
Depth of water on sills.........	6 "	9

All built of substantial masonry.

The inadequacy of this canal for the requirements of the increasing trade of the Ottawa, the lockage up and down of 34¾ feet to overcome a rise of 8¾ feet, and the insufficiency of the supply by the summit-feeder were reasons for abandoning the original canal; especially as, in accordance with the recommendation of the canal commission of 1871, the Canadian government decided on adopting an increased scale of dimensions for the Ottawa canals, with locks of 200 feet by 45, and 9 feet depth of water on the sills, and, as the designed improvement could be better effected by damming the river, that course was adopted.

Acting accordingly, a wooden dam has been constructed, about two thousand feet long, across the Carillon Rapids, flooding them up, and the Chute à Blondeau, with a raft-slide on the south side 550 feet long, and a canal ¾ of a mile long on the north side, by embankment in the side of the river, with two locks 200 feet long by 45 feet, having 9 feet of water on the mitre-sills. These new works will supersede the old Carillon and Chute à Blondeau Canals, besides greatly reducing the lockage, while the dam offers unlimited available water-power on a commanding position.

The "Chute à Blondeau" Canal commences 4 miles above the head of the present Carillon Canal. It surmounts the rapid of that name, and is half a mile long, cut through solid rock, on the N. side of the river. It is 30 feet in breadth at top and bottom, has one lock, 130⅚ feet by 32⅚ at the upper and 36⅓ at the lower end, and 6 feet depth of water on the sills. The total rise of lockage is 3¾ feet.

The Grenville Canal commences 1⅜ miles above the preceding. It is 5¾ miles long, and surmounts the "Longue Sault" Rapid. As originally constructed, its breadth at bottom was from 20 to 30 feet and at surface 30 to 60 feet, but much of it has been very recently enlarged. It has seven locks. The first and second are combined, and also the third and fourth. The works for the enlargement of this canal, commenced in 1871, comprise the construction of five new locks 200 feet by 45, and 10 feet depth of water on mitre-sills; mean breadth of bottom of canal 50 feet, surface 80, with crossing basins about every half mile. On 30th June, 1882, seven of the enlarged locks were completed and in use, and two more, that supersede the remaining four old ones, nearly so. The total rise of lockage is 45¾ feet.

The cost of these three canals, which is kept in one account, is already mentioned.

Culbute lock, Upper Ottawa, situated 117 miles above Ottawa City, on the Allumette channel of the Ottawa, connecting 37 miles of deep navigation with 43 below of 7 feet minimum depth, has two locks of 200 feet by 45 and 6 feet depth on sills, lockage 18 to 20 feet, built of wood. Nearly completed, with works connected in 1882. Cost to 30th June, 1882, $313,412.81 in construction; for staff and repairs, $3376.99.

Canal at Chatz Falls River, Ottawa, 5½ miles long; not completed. Lockage to be 49½ feet; cost for excavation done, $482,950.81.

The navigation of the Ottawa and the works upon it are noticed so fully here because they form part of the proposed Ottawa and Huron navigation, which, when the Caughnawaga Canal is constructed between Lake Champlain and Lake St. Louis, will offer by far the shortest and apparently the most advantageous line of navigation between New York and Chicago. These Ottawa canals are generally open from the 25th of April to the 30th of November.

From the head of the Grenville Canal to the entrance of the Rideau Canal, at the city of Ottawa, is, by the course of the river, 56 miles, making a total distance of 120 miles from the city of Montreal. The ordinary breadth of the river between Grenville and Ottawa is about half a mile, and its depth of channel 30 feet, excepting one short shoal of 8 feet at low water.

The Rideau Canal is 126¾ miles in length. From Ottawa to Kingston it is a system of continuous slack-water navigation, obtained by damming the rivers Rideau and Cataraqui between the river Ottawa and Lake Ontario. It was constructed by the British government, chiefly with a view to the defence of the province, by securing, in connection with the Ottawa, an interior route of water-communication between Montreal and Lake Ontario, avoiding alike the rapids of the St. Lawrence and the danger in time of war of transporting stores along that river where it formed the international boundary. Though fortunately never required for use under such circumstances, it was of great use commercially to the provinces from 1834, when the Ottawa canals were first opened to the public, till the opening of the St. Lawrence canals. Steamers with long lines of barges with up-freights ascended to Kingston by the Ottawa and Rideau, and the barges returned down through the St. Lawrence laden to Montreal. Since the opening of the St. Lawrence canals that traffic has been altogether discontinued, and the Rideau Canal has become of comparatively little importance. With respect to the Ottawa canals the case is otherwise in a very great degree, owing to the growth of the city of Ottawa, the progress of settlement, and the great development of the lumber-trade of the Ottawa, especially the manufacture of sawn lumber. During the year ending on 30th June, 1872, the traffic through the Ottawa and Rideau canals amounted to upward of 500,000 tons, three-fourths of which was sawn lumber.

For the year to 30th June, 1872, on the Ottawa and Rideau Canals—

The total of tolls accrued was....	$38,017.14	
Of tonnage of vessels passed......	25,245	in U. S. vessels.
	360,909	in Canadian vessels.
Of goods transported, tons...........	519,040	

And for the year terminating 31st Dec., 1882, on the Ottawa and Rideau Canals—

The total of tolls accrued was.........	$69,724.42
Of tonnage of U. S. vessels passed.........	76,299
" " Canadian vessels passed.........	659,227
Of goods transported, tons.........	898,825

The construction of the Rideau Canal was first taken into consideration in 1814, after various reports and projects respecting it had been submitted. The construction of it was decided on by the British government in 1825. In Sept., 1826, Colonel By was sent out to superintend the work, and on the 21st of the same month the excavation for ten locks was begun. It was completed and opened to the public in the spring of 1832. The works are all of the most substantial description, no expense being spared in their construction.

The length of the Rideau Canal from Ottawa to Kingston is 126¼ miles, but the total length of actual canals connecting the slack-water reaches is only 8½ miles. It has forty-seven locks, of which thirty-three ascend 282¼ feet from the Ottawa level to Rideau Lake, the summit, from which fourteen locks descend 164 feet to the Lake Ontario level at Kingston. The locks are all of the most substantial masonry, 134 feet by 33, with 5 feet of water on the sills. The breadth of the canal cuttings is at bottom 60 feet in earth and 54 in rock; at surface of water it is 80 feet in earth and 54 in rock. The line throughout admits of vessels passing of 4½ feet draft. Between Ottawa and the summit there are seven stone dams, from 200 to 548 feet in length and from 5 to 29 feet in height, and 11 of wood or earth, from 108 to 1616 feet long and 6 to 45 in height. Between the summit and Kingston there are four stone dams, 130 to 300 feet long and from 16 to 60 feet high. The extent of flooded lands caused by the dams and the broad lakes upon the line of the Rideau Canal made it impracticable to have a towpath along it.

The total cost of it to 1st July, 1867, was $4,064,764.47, of which the original outlay by the imperial government was £758,966 12*s.* 11¾*d.* sterling, apart from land damages. This canal was transferred to the Canadian government in 1856, and the cost for works and repairs from 1st July, 1867, to 1st July, 1882, was $67,906.03 for further works, and $618,053.78 for repairs, staff, and maintenance.

The distance from Montreal to Kingston is 68¼ miles longer by the Ottawa and the Rideau Canal than by the St. Lawrence. The Rideau Canal is generally opened in the last week of April, and closed at the end of November.

3. The Richelieu and Champlain navigation is the next to be considered.

The river Richelieu enters the St. Lawrence 46 miles below Montreal. It is rendered navigable from the St. Lawrence to Lake Champlain by a dam and lock at St. Ours, 14 miles above its mouth, and a canal of 12 miles in length 32 miles farther up the river, known as the Chambly Canal.

The St. Ours Locks and Dams.—At St. Ours the river divides into two deep channels. In the eastern channel a lock in cut stone, with a dam 300 feet long of earthwork, has been constructed, and in the western channel a dam 600 feet long, of cribwork filled with stone, has been made. The length of canal is one-eighth of a mile. The lock is 200 feet by 45, with 7 feet water on the sills at lowest; its total lift is 5 feet. These works raise the river from 4 to 7 feet above its natural level, and give a depth of not less than 7 feet up to the entrance of the Chambly Canal. They were commenced in 1844, and finally completed in 1851.

The Chambly Canal is 12 miles in length. It has nine locks of cut stone, varying from 118 to 125 feet in length and about 23½ feet in width, with 7 feet of water on their sills. The total rise is 74 feet. The canal is 36 feet wide at bottom and 60 at the surface of the water.

The construction of this canal commenced in Oct., 1831. After much delay in the progress of the work the charge of it was assumed by the department of public works of the united provinces, and in 1843 it was opened for use. The lock walls having proved weak, and the excavation of the canal being imperfect, an expenditure of $69,758 was found necessary for completing and repairing the work.

The account of cost of the St. Ours and Chambly canals is undivided in the public accounts. The total expenditure before and since the union of the provinces, up to 1st July, 1867, is given by the department of public works report as $756,249.41, of which $634,711.76 is stated to be for the Chambly Canal and $121,537.65 for the St. Ours works. The further cost for repairs to 1st July, 1882, for the St. Ours locks is $50,349.71, and for the Chambly Canal, $461,330.62.

For the year to 30th June, 1872, on these works—

The total of tolls accrued was......$30,610.38

Of tonnage of vessels passed......... { 327,911 in Canadian vessels.
{ 81,998 in U. S. "

Of tons of goods transported............346,148

The St. Ours lock generally opens about the middle of April and closes in the beginning of December. The Chambly Canal closes about the same time, but opens a little later.

For the year to 30th June, 1882, on these works—

The total of tolls was..................$25,190.79

The tonnage of vessels................. { 143,310 in U. S. vessels.
{ 207,119 in Canadian vessels.

Of goods transported......................263,711

The trade of the Richelieu, after increasing steadily from being swollen by the sawn lumber of the Ottawa going to the U. S., has since somewhat declined through fluctuations in the lumber trade and the increasing competition of railroads, which so largely curtailed the proportion of canal transports of grain and heavy goods in the U. S. and Canada, as shown in the report of the Canadian minister of inland revenue for 1882.

The Canadian canal commission have recommended the enlargement of the Chambly Canal locks to the Ottawa standard of 200 feet by 45, which doubtless will be done before long in the required rebuilding of them.

4. The river Trent navigation is the next subject in succession. It has to be noticed separately, not from its importance, but because it does not properly come under any other head.

The river Trent discharges into the Bay Quinté, Lake Ontario, about 67 miles above Kingston. It was originally proposed to form a line of slack-water navigation by it and the lakes of the New Castle district of Upper Canada through to Lake Huron, as a means of shortening the distance by water from Kingston to the far West. But that idea had to be abandoned, as the summit-level was found to have an elevation at Balsam Lake of 589½ feet, and the route is so crooked as to be more than double the direct one of 112 miles from Kingston to Lake Huron. In Feb., 1833, however, the legislature of Upper Canada appointed commissioners and authorized the raising of a loan for the improvement of this route, as a line of inland communication and for the descent of timber, as far as Lake Scugog, a distance of 190 miles, including the length of that lake. Work was commenced in 1833, and a short piece of canal and a wooden lock (since rebuilt in stone) were completed in 1855 at the rapid below Sturgeon Lake, 140 miles up the route, which permitted vessels navigating Chemong, Buckhorn, and Pigeon lakes to pass through Sturgeon Lake up to the town of Lindsay.

Afterwards several grants of money were obtained, and dams and other works constructed. After the union of the provinces various unfinished works were completed and others made, including four stone locks, 133 feet by 33, with 6 feet of water on the sills, and one of wood; also nine dams, one of which is of stone, and some short pieces of canal.

The total expenditure on these works, apart from timber-slides, roads, and bridges, up to 1st July, 1867, amounts to $319,371.31; expenditure since for repairs, $6398.01 up to 30th June, 1882. The amount of tolls collected during the year then terminating is $411.34; goods and lumber transported, 19,783 tons.

Steamers navigate the upper lakes above mentioned, chiefly for the towing of rafts and other purposes of the lumber-trade. Of the whole distance of 190 miles to the head of Scugog Lake, 152¾ miles are navigable, and 37¼ not practicable, even for boats. The Peterboro' and Port Hope Railway has diverted traffic from part of this route, and for some years the works were neglected. The opening and closing of this navigation may be taken to be nearly the same as of the Rideau Canal.

5th. The St. Peter's Canal is the only existing Canadian canal remaining to be noticed. It is the only canal in actual operation in the maritime provinces of Canada. It connects the Bras d'Or Lake of Cape Breton with the Atlantic at St. Peter's Bay on the S. coast of that island. The Bras d'Or is a large landlocked arm of the sea in the interior of the island. It is 60 miles long from its entrance on the N. E. coast to its southern extremity, and 15 miles in greatest breadth. It has several bays or arms that reach far inland in different directions. Its southern extremity reaches within half a mile of St. Peter's Bay, and it is across this narrow isthmus that the St. Peter's Canal is cut.

The project of constructing this canal was adopted by the legislature as designed by Captain Barry, and the work commenced in Sept., 1854. It was suspended for a time, and resumed at the instance of the Cape Breton representatives in 1864. It was handed over to the Dominion in 1867. It is 2400 feet in length and 26 feet wide at bottom. It has one tidal lock 122 feet by 26, with 13 feet depth of water on the sills at lowest tide. The lock has four pairs of gates. The extreme rise and fall of the tide in St. Peter's Bay is 9 feet. The total cost of it up to 30th June, 1882, was $653,321.12, of which $156,523.32 was expended by the government of Nova Scotia, the remainder by government of the Dominion.

During the season of navigation the amount of tolls from it was $833.83; the tonnage of vessels passed, 37,512 tons; the amount of goods transported, 8359 tons.

The Bras d'Or and its arms abound in fish, and the surrounding country is rich in mineral and agricultural resources. The traffic on this canal during the year ending 30th June, 1871, consisted of 656 vessels, freighted with coal, limestone, marble, fish, and flour, making an aggregate of 26,757 tons; besides 262 open boats. The canal opens about the 20th of April, and closes about the last of December.

The projected canals of Canada claim consideration, not only for the unusual magnitude of most of them as engineering works, and the importance of the objects to be attained by them, but especially because they are all calculated more or less to benefit the people of the U. S. by giving them improved outlets for the products of the great West, and otherwise facilitating their commerce and fisheries—some of them, indeed, to a greater degree than they can benefit the Canadian people. This is decidedly the case as to the Caughnawaga Canal. It was first brought prominently before the public by Messrs. John Young, L. H. Holton, and other merchants of Montreal in 1848. Mr. J. B. Mills, by direction of the governor-general, made a survey and reported in favor of a line from the Indian village of Caughnawaga, on the St. Lawrence opposite the head of the Lachine Canal, to St. John on the Richelieu, at the head of the Lake Champlain navigation. It was recommended by the commissioner of the public works in 1852, but no action was taken about it by government, excepting the obtaining of further surveys and reports by Mr. Jarvis and others of various routes. In 1870, at the instance of Mr. Young and others, a bill was passed incorporating a company to build the Caughnawaga Ship Canal from Lake St. Louis on the St. Lawrence to Lake Champlain, the locks not to be less than those of the Beauharnois Canal—that is, 200 feet by 45—and 9 feet of water on the sills; the canal to be completed in five years, otherwise the charter to expire.

Lake Champlain is only 29 feet above the St. Lawrence at Caughnawaga in Lake St. Louis. One of the proposed routes would be about 34½ miles long, with Lake Champlain as its summit-level and feeder; another of 25½ miles in length would have its summit 37½ feet above Lake Champlain, with a feeder from the St. Lawrence; and a third route, 37½ miles long, would connect Lake Champlain with the lower part of the Beauharnois Canal, of which it would, in a manner, form a branch. The opening of this canal would have very important results. It would very greatly benefit and expand the lumber-trade of the Ottawa. Its sawn lumber in barges, on reaching the mouth of the Ottawa in Lake St. Louis, instead of descending the Lachine Canal and St. Lawrence, 55 miles, and ascending the Richelieu and its canals, 58 miles, to St. John's, would pass from Lake St. Louis to St. John's, 28 miles, or thereby, by this canal, saving about 85 miles in distance and 86 feet of lockage.

A glance at a map will show that the entrance of this Caughnawaga route is directly opposite the mouth of the river Ottawa, the entrance to the proposed line of Ottawa and Huron navigation, the next projected work to be noticed.

The projected Ottawa and Huron Canal, as it is called, offers, according to the report of that eminent engineer, Mr. Walter Shanly, a route to Chicago 368 miles shorter than that by the St. Lawrence. It is true that the recent correction of the reputed distance by the lakes to Chicago by U. S. engineers will reduce this difference, but will no doubt more or less affect the lake portion of both routes; and the difference to Lake Superior and Duluth will in any case be 40 miles more in favor of the Ottawa and Huron route. The lockage by this route would be 157 miles more than by the St. Lawrence; nevertheless, by Mr. Shanly's calculations, based upon McAlpine's well-known rates for comparison, the movement of freight would cost fully one-ninth part less from Montreal to Chicago than by the St. Lawrence and Welland canals, or by the St. Lawrence and the Georgian Bay canals. The saving of time he estimates at 44 hours as compared with the St. Lawrence and Welland route, and 22 hours as compared with the route by the Georgian Bay Canal.

The Ottawa and the French River, which the route follows to Lake Huron, offer great facilities for canalization in the lakes and long trench-like reaches of deep navigable water which characterize their courses, and both are remarkable for their great volume of water, well sustained in dry weather. Lake Nippissing, the proposed summit-feeder of this route, presents an enormously redundant supply. The navigable reaches of the Ottawa vary from 10 or 15 to 50 or 60 miles in length. They are navigable now by steamers for upwards of 300 miles above its mouth. One of the upper boats draws 9½ feet, plying on a reach of 40 miles.

Mr. Clarke, who completed the canal survey of the Ottawa for government, estimated that canalling, where required, the whole route through to Lake Huron, 431 miles, with locks 250 feet by 45, with 12 feet of water on the sills, would cost $12,057,680, to be effected chiefly by damming; 21 miles of actual canalling only being required. Locks of 200 feet by 45, with 9 feet of water on the sills, is the scale adopted on the recommendation of the Canada canal commission for the progressive improvement of the Ottawa.

Apart from its claims as a highway to the West, the improvement of the Ottawa route is of great importance to the provinces of Ontario and Quebec in opening up their interior country, as the Ottawa is the boundary between them for 400 miles of its course. In that respect the Georgian Bay Canal, the next projected work to be noticed, is very different. Connecting Lake Ontario at Toronto with the S. extremity of the Georgian Bay of Lake Huron, it would be almost, perhaps quite, equal to the Ottawa and Huron route in shortening the distance for the trade of the West. It would feed the Erie Canal eastward of Oswego, but it would be of no use to the country around Lake Erie, and passing through an already occupied country, that has a railway connecting the same points as the canal, would, in its 100 miles of course, develop nothing new of importance. The chief objection to it is its impracticability except at enormous cost.

The canal commission of Canada in 1871 state in their report "that the public should be reminded of the facts that the proposed canal is of equal length with the Suez Canal, that has cost $80,000,000 and occupied fifteen years in construction. But it is encompassed with difficulties infinitely greater. While the Suez, being on a dead level from sea to sea, is unencumbered by a single lock, the Huron and Ontario has an intermediate summit of 470 feet above Ontario to surmount, which requires forty-two locks and 600 feet of lockage. It has also no less than three deep cuts, the least of which is larger than the celebrated deep cut on the Welland, and the largest of which exceeds it in volume of material eighty-fold."

The commission concludes with the opinion that, "admitting it to be physically possible, the cost of carrying out such a project would render it commercially worthless."

A canal at Sault Ste. Marie is the next Canadian project to be noticed. It is stated that a canal on the Canadian side of the river St. Mary would be much more commodious and secure, especially at the upper entrance, than the existing canal on the U. S. side of the river; that it would have deeper approaches and be one-third shorter; in short, that it would have every advantage over the latter. There was strong testimony in favor of it given before the Canadian canal commission, already mentioned, and the commission recommended it as a work of the first class in importance.

The next project proposed to be noticed is the Bay Verte Canal, which also has been included as of first-class importance by the canal commission. The object of this canal is to connect the waters of the Gulf of St. Lawrence at Bay Verte with those of the Bay of Fundy at Cumberland Basin, by cutting across the isthmus of Chignecto, which unites Nova Scotia with New Brunswick, so as to admit of vessels engaged in the coal-trade of Pictou and the fisheries of the Gulf, and the coasting-trade of the St. Lawrence, the Gulf, and the Bay of Fundy, passing directly between these waters, which are only 15¼ miles apart, instead of having to make a circuit of 600 miles out through the Gut of Canso to the Atlantic, and round the peninsula of Nova Scotia. In addition to former surveys, one has just been made by order of the government of the Dominion of Canada for a site for this canal. It will present serious and unusual difficulties in its construction, owing to the great difference in the height to which the tide rises on each side of the isthmus. Spring tides rise 45¼ feet in the Bay of Fundy, and but 10½ in Bay Verte. The canal commission recommended a canal with locks of 270 feet length of chamber, by 40 feet in width, having 15 feet in depth of water on the sills. The estimated cost is $3,250,000.

The last route of communication proposed to be noticed in this article is the Shebandowan and Lake of the Woods navigation, which forms about 311⅓ miles of the line of communication established by the Canadian government between Thunder Bay of Lake Superior and Fort Garry in Manitoba, known as the Dawson route, which is 451⅓ miles in length. This is the route by which the military expedition under Col. Wolsey passed through to Red River Settlement in 1870.

The slack water consists of deep trench-like lakes generally, with the exception of Rainy River, which is large and deep. The ten portages amount together to nearly 7¾ miles.

The total fall to be overcome by lockage in the distance of 311⅓ miles from the summit-level at the commencement, to be obtained by damming, to the N. W. angle of the Lake of the Woods, is 425 feet, or an average of $1\frac{37}{100}$ feet per mile. This is more favorable than the Erie Canal, which has an average of $1\frac{81}{100}$; the Rideau Canal has $3\frac{51}{100}$. There is much valuable pine and other timber on the tributaries of Rainy Lake. As the supply of water is abundant and permanent, with prevailing deepness, it could be made a line of water-communication of great capacity. For the W. half of its extent it is the boundary of the U. S. Its eastern extremity reaches within 45 miles of Lake Superior. An important lumber-trade for the supply of the prairie country beyond will necessarily arise in this wooded region. From the Lake of the Woods westward the Canadian Pacific Railway and its connections will give the means of distributing the manufactured lumber.

The following table of tonnage and tolls levied on freight and passengers on all Canadian canals from 1871 to 1882 shows the progress of traffic upon them during that period; it also shows the extent to which they were used by American commerce:

Tonnage and Tolls levied on Freight and Passengers passed through all the Canadian Canals from 1871 *to* 1882, *inclusively, whether from or to Canadian or United States Ports* (*Extracted from the Annual Reports of the Inland Revenue Department of Canada*).

YEARS.	From Canadian to Canadian ports.	From Canadian to American ports.	From American to Canadian ports.	From American to American ports.	Total freights.	Tolls collected on freight and vessels and passengers.		Remarks.
	Tons.	Tons.	Tons.	Tons.	Tons.	$	cts.	
1871	2,604,780	747,882	540,877	764,688	4,658,227	446,536	63	
1872	1,943,327	550,469	565,900	654,669	2,721,364	431,023	77	For 1872 and the following years the amounts are given for the period of navigation or civil year terminating on 31st December.
1873	1,729,333	436,447	849,027	370,296	3,672,163	451,092	60	
1874	1,700,873	416,549	706,917	753,199	3,577,558	442,835	74	
1875	1,239,385	314,267	669,202	482,327	2,292,321	340,996	62	
1876	1,562,612	279,832	596,571	589,946	3,039,972	354,603	84	
1877	1,353,583	264,276	820,106	496,388	2,944,257	364,978	63	
1878	1,269,902	287,117	562,371	562,371	2,594,728	315,531	94	
1879	1,454,185	286,289	364,286	285,057	2,690,737	309,427	63	
1880	1,660,081	438,775	680,641	182,414	2,961,381	324,984	59	
1881	1,648,775	447,144	559,145	118,160	2,853,230	300,175	83	
1882	2,223,004	567,019	722,193	186,284	2,999,700	316,486	61	

Number of Vessels and their Tonnage, Tons of Freight, and Amount of Tolls Collected on Vessels, Passengers, and Freight that passed through the under-mentioned Canals of Canada during the period of Navigation of 1882.

CANALS.	Canadian vessels.		American vessels.		Total tons of freight carried.	Tolls on freight passengers and vessels.	
	No.	Tonnage.	No.	Tonnage.			
Rideau	2768	176,869	64	5,416	108,425	$6,544	64 cts.
Ottawa	4018	482,758	717	70,883	790,400	63,179	78 "
Welland	2450	491,803	881	230,268	790,643	140,177	34 "
St. Lawrence *	9421	1,777,594	1506	135,431	9,110,050	76,957	97 "
Chambly	1894	207,119	1422	143,310	263,711	25,190	79 "
Burlington Bay	779	290,860	......	....	107,329	3,200	42 "
St. Peter's	762	37,512	......	....	8,359	833	33 "
New Castle and Durham (Trent)	68	6,452	......	....	19,783	411	34 "

The numbers and amounts given in these tables and elsewhere in this article are derived from the annual reports of the ministers of public works, of railways and canals, and of inland revenue, of Canada. A. J. RUSSELL.

Canandai'gua, R. R. centre, capital of Ontario co., N. Y. (see map of New York, ref. 5–E, for location of county), is 28 miles S. E. of Rochester, at the N. extremity of Canandaigua Lake, which is navigated by daily lines of steamers. It is picturesquely situated on high ground which commands an extensive view of the lake. The beautiful scenery of the lake and the fishing and boating accommodations make Canandaigua a popular pleasure resort. Canandaigua (or, as originally, *Canandarqua*, signifying in the Indian tongue the "chosen spot") is a beautiful village with wide shaded streets, fine public buildings, and handsome residences. There are an academy, a female seminary, a library association and museum, various manufactures, two orphan asylums (one public and one private), a private lunatic asylum, a jail, and a fine court-house built jointly by the county and the U. S. government. Pop. in 1870, 4862; in 1880, 5726.

Canandaigua Lake of Western New York is mostly included within Ontario co. It is 15 miles long, and varies in width from three-fourths of a mile to 1½ miles. It is surrounded by high banks which present beautiful and diversified scenery. The water is discharged at the northern extremity of the lake by an outlet which communicates with Clyde River, an affluent of the Seneca River. The surface of this lake is 437 feet higher than that of Lake Ontario, and 668 above the sea. The lake is navigable by steamers.

Cana'ries, or **Cana'ry Islands** (anc. *Fortunatæ Insulæ*), a group of islands in the Atlantic Ocean, belonging to Spain, are about 60 miles W. from the coast of Africa. They are between lat. 27° 49′ and 29° 26′ 30″ N., and between lon. 13° 25′ and 18° 16′ W. The names of the seven largest islands are Lanzarote, Fuerteventura, Gran Canaria, Teneriffe, Gomera, Palma, and Ferro (or Hierro); besides which there are several small islets. Their total area is 2943 square miles. The Canaries, are of volcanic formation, and have high rocky coasts. The surface is mountainous, and the highest point, the Pico de Teyde, in Teneriffe, rises 12,182 feet above the level of the sea. The climate is mild and equable, the heat being moderated by the sea-breezes. The vegetation is arranged in zones, according to the height above the sea. The first or lowest zone produces the date-palm, sugar-cane, etc.; in the second flourish the grapevine, olive, and maize. The highest summits are barren and naked rocks. The largest island of the group is Teneriffe, which is nearly 60 miles long, and has an area of about 900 square miles. The Canaries have belonged to Spain since 1493, and the population is Spanish. The aboriginal race, called Guanches, was conquered in the latter year. The islands were known to the Romans and have been described by the elder Pliny, who, however, states that at his time they were uninhabited. Incidentally rediscovered in 1334 by a French vessel, they were for a century and a half the prize of various French and Spanish adventurers. By the final conquest the native population, whose former history and ethnographical relations are entirely unknown, was nearly eliminated. The meridian of the island of Ferro (17° 39′ 51″ W. of Greenwich) is usually taken as the dividing-line between the eastern and western hemispheres. It was considered by ancient geographers the most westerly point of the world, and they drew through it the first meridian. Longitude is still reckoned from it by some geographers. Pop. 280,388,

Cana'rium, a genus of trees of the order Amyridaceæ, natives of the East Indies, having compound leaves and diœcious flowers. The fruit is a drupe. The *Canarium commune* is cultivated in Java and the Moluccas for the sake of its fruit, which is edible and yields a lamp oil. This tree grows about fifty feet high, and is supposed to be one of the trees which produce elemi.

Cana'ry Bird (*Serinus canarius*), a well known singing-bird of the family Fringillidæ, native of the Canary Islands. Its color in the wild state is gray above, with darker spots; the other parts yellow. In its domesticated form the whole bird is often yellow. In its wild state it builds on shrubs or trees, and produces five broods in a year. In confinement it seems to be contented, and breeds readily several times in a year. Its favorite articles of food are canary seed, hempseed, sugar, and bland green leaves, such as those of chickweed or lettuce. It has great imitative powers, and can be trained to sing various notes. Some of the wild canary birds are said to surpass the best trained singers in loudness and clearness of note.

Canary Grass (*Phalaris Canariensis*), a grass the seed of which is used as food for cage-birds. It is a native of the Canary Islands, and is cultivated for its seed in England and continental Europe. This plant is sparingly naturalized in the U. S., and is also somewhat cultivated for its seed. A fine flour is prepared from canary seed, which is employed as dressing in fine cotton-weaving and for the finishing of silks. The groats and flour of this seed are also used in the Canary Islands, in Barbary, and in Italy as food, the flour being made into bread which is very nutritious and palatable. The reed canary grass (*Phalaris arundinacea*) is very common on the banks of lakes and rivers and in other places in Europe and America. It yields a great bulk of coarse grass, very nutritious when cut early, but it is stated that its seeds are so infested with ergot as to render it sometimes poisonous to cattle. A variety with curiously striped leaves is well known in gardens as *ribbon grass*.

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* Includes Beauharnois and Cornwall and Lachine.

Canary Seed, the product of CANARY GRASS (which see).

Canary Wine, or **Teneriffe Wine,** is produced in the Canaries, and so much resembles Madeira wine that it is often sold for that article. It is improved by a long voyage. The term Canary is properly applied to the Bidogue wine, which is the juice of grapes gathered before they are ripe, and is not good until it is rendered mellow by age.

Canasto'ta, R. R. junction, Madison co., N. Y. (see map of New York, ref. 5–G, for location of county), on the Erie Canal, 20 miles E. of Syracuse. It has a high school and an academy. Salt brine in paying quantities has been found by boring. There are sulphur and sulphur-and-iron springs within the village. Pop. in 1870, 1492; in 1880, 1569.

Can'by (EDWARD RICHARD SPRIGG), LL.D., born in 1817 in Kentucky, graduated at West Point 1839, major-general U. S. volunteers May 7, 1864, and July 28, 1866, brigadier-general U. S. A.; being in infantry till June 18, 1846, assistant adjutant-general to Mar. 3, 1855, and in infantry till July 28, 1866. He served in Florida 1839–42 on quartermaster duty; in emigrating Indians, garrison duty, etc., 1842–46; as adjutant Second Infantry 1846–47; in war with Mexico 1846–48, engaged at Vera Cruz, Cerro Gordo, Contreras, Churubusco (brevet major), and city of Mexico (brevet lieutenant-colonel); as assistant adjutant-general of Pacific division 1849–51; in adjutant-general's office, Washington, D. C., 1851–55; on Utah expedition 1857–60; and in command of Navajo expedition 1860–61. In the civil war he served in command of the department of New Mexico 1861–62, where, after the defection of his seniors, he displayed great energy and skill in defending the country at Fort Craig, Valverde (brevet brigadier-general), and Peralta against a formidable inroad from the South; on special duty in war department at Washington and suppressing New York draft riots 1863–64; in command of division of West Mississippi 1864–65 (wounded on White River); in command of the expedition which captured Mobile and its defences (brevet major-general), Montgomery, Ala., and received the surrender of the armies of Gen. R. Taylor and E. K. Smith; in command of various Gulf departments 1865–66, and of department of Washington 1866–67. After the war he was placed on various important special duties, and when fatigued by a long and laborious career in 1869 he voluntarily consented to take command of the department of the Columbia, which he held till treacherously shot dead April 11, 1873, by the chief "Jack" while he was endeavoring to mediate for the removal of the Modocs from their rocky fastness on the northern border of California.

GEORGE W. CULLUM.

Cancale, a seaport-town of France, in the department of Ile-et-Vilaine, is situated on the English Channel, 9 miles E. N. E. of St. Malo. It has good anchorage. Large quantities of good oysters are procured from a chain of rocks, called Rochers de Cancale, which partly enclose the port. Pop. 6400.

Cancan, a French word, the primary signification of which is noise, pother. It is also the name of an irregular French dance which is not restrained by conventional proprieties.

Cancao, or **Kang-Kao,** the Chinese **Ha Thiau,** on E. side of Gulf of Siam, at mouth of the river Cancao. It was once the centre of Cambodian commerce, and still exports considerable rice and salt.

Cancella'ria, a genus of univalve mollusks of the class Gasteropoda and order Prosobranchiata. The shell is oval or turreted, the spire is prominent, the last whorl is ventricose, the surface reticulated, and the columella plicated. All the recent species are natives of tropical or sub-tropical seas. Numerous fossil species are found in the strata above the chalk.

Can'cer [from the Lat. *cancer*, a "crab," the swollen veins around it being likened to crabs' claws], the popular name for carcinoma, a disease characterized by tumors or slow ulcerations in various parts, occurring either simultaneously or in succession, and having a malignant character; that is, a tendency to spread to other parts, and to grow worse, resisting medication, and usually ending in the death of the patient.

Among the tumors admitted by general consent into the order of cancers there are widely different degrees of malignancy; some having the tendency to spread rapidly and infect the system at an early period, while others remain local for a considerable time, and may be removed with good hope of a permanent recovery.

The practical distinction or *diagnosis* of these tumors is founded upon a careful comparison of the characters of malignant and non-malignant tumors, and also upon a thorough knowledge of the anatomy and relations of the textures in which they arise. The attempts to distinguish these from other growths call for the highest qualities of the surgeon, including a knowledge of minute structure as obtained by the use of the microscope. What the characteristic microscopical element of cancer is it is, however, not easy to define. But Billroth confidently asserts that it always springs from true epithelium, and that the modified epithelial cell is the constant characteristic element of cancer.

The most common seats of cancer are, among external parts, the female breast, the eye, the tongue, the lip, the male genital organs; among internal organs, the liver, stomach, uterus, rectum, gullet, peritoneum, and lymphatic glands. Scirrhus or hard cancer, observed most frequently in the breast, uterus, and stomach, is more frequently solitary than encephaloid (brain-like), otherwise called medullary or soft cancer; the rare colloid cancer is of a glue-like consistency; melanosis, or melanic cancer, a variety charged with brown or black pigment, is almost always multiple in its occurrence; while epithelial cancer, or epithelioma, of which examples are frequently found in the lip, scrotum, or tongue, is so generally solitary as to have led some pathologists to place it in a class altogether apart from the truly cancerous growths. Again, there are varieties of fibrous and of cartilaginous tumor, as well as certain tumors of bone and bone-like tumors in soft parts (osteoid), which occupy a doubtful position between the malignant and non-malignant growths, the so-called "cauliflower excrescence" being one of the number.

A tumor falls under the suspicion of being cancer when it infiltrates the texture in which it arises and passes into the surrounding textures; when it invades the lymphatic glands; when it is attended by stinging or darting pains, or by obstinate and slowly extending ulceration; when it occurs in a person having impaired health or past middle life, and is not traceable to any known cause of inflammatory disease or local irritation, nor to any other known constitutional disease, such as syphilis or scrofula. But the elements of diagnosis here referred to ought to be early submitted to the scrutiny and judgment of a well-educated medical adviser.

The removal of cancerous tumors is resorted to by surgeons, and when performed early in well-selected cases it has been followed by long-continued exemption. Operations are rarely performed after the lymphatic glands are involved, or when there is evidence of a deteriorated constitution or of internal disease; but sometimes great pain or profuse and exhausting discharge from an external tumor may justify its removal, as a palliative measure, even under these unfavorable circumstances.

REVISED BY WILLARD PARKER.

Cancer, the Latin name of a crab. In astronomy, it is the fourth sign of the Zodiac, and is denoted by the figure ♋. The sun enters this sign about the 21st of June. The first point of Cancer is 90° distant from the first point of Aries, and is called the summer solstice. Cancer is also the name of a constellation of the Zodiac, which does not coincide with the sign just described. (See PRECESSION OF THE EQUINOXES, by GEN. J. G. BARNARD, U. S. Army.)

Cancer Root, or **Beech Drops,** a name given to the *Epiphegus Virginiana*, a parasitic plant of the natural order Orobanchaceæ. It is a native of the U. S., and grows on the roots of beech. The plant is astringent, and the root has been reputed a remedy for cancer, but it has no favorable effect upon that disease.

Cancer, Tropic of, in geography, one of the lesser circles of the earth, a parallel about 23° 27′ N. of the equator. At the summer solstice (June 21st) the sun is vertical over this line. There is a corresponding circle on the astronomical globe. This circle touches the ecliptic in the first point of the sign Cancer. Hence the name.

Cancrin' (GEORG), COUNT, a German financier, born at Hanau Dec. 8, 1774. He entered the service of Russia in 1796, became a councillor of state in 1811, and lieutenant-general in 1815. He was Russian minister of finance for twenty-one years (1823–44), and performed the duties of that office with ability and success. Died Sept. 22, 1845.

Can'crinite, a silicate of alumina and soda with carbonate of lime, is found in Norway and at Litchfield, Me. It is remarkable as an instance of a silicate containing carbonic acid.

Can'crum O'ris (synonyms, *noma, aqueous cancer*), a mortification of the cheek, mostly in children who have long suffered from poverty, moist or close air, or fever. The proximate cause is generally found in an imprudent administration of mercury, or in the inanition and dissolution of the blood from measles, typhoid fever, hooping-cough, or dysentery. It is almost always fatal. Usually but one cheek is affected. A small vesicle shows itself half an inch or an inch from the angle (mostly the left) of the mouth; it soon bursts and gives way to a yellow hardening surface. The surrounding parts swell and exhibit a waxy color. A day or two after a hard spot is felt in the cheek which extends rapidly. The skin become black and fetid, and the whole cheek is perforated. The destruction spreads rapidly over the cheek, nose, upper lip to the median line, eyelids, neck, and jaw-bones. The teeth fall out, the stench is intolerable. Hæmorrhages are rare. While in this manner half of the face is being destroyed, the patient may be without fever, inclined to play and to eat. After about a week has elapsed fever will set in, depression will take the place of indifference; pneumonia or diarrhœa, with swelling of the feet, will make its appearance and accelerate the fatal termination. Recoveries have been observed, but are rare. Amongst the best preventives early attendance in cases of the common forms of ulcerous inflammations of the mouth, restriction in the use of mercurial medicines, and the improvement in the condition of the poor, take prominent places. When the malady is developed the diseased portion must be disinfected by hypermanganate of potassa or carbolic acid, or destroyed by concentrated mineral acids, chloride of zinc, arsenic paste, or the red-hot iron. The general condition of the patient requires a generous diet, and the administration of stimulants and iron, or quinia, or both combined. ABRAHAM JACOBI.

Candahar′, or **Kandahar,** called by the Afghans **Ahmed Shahee,** the capital of Central Afghanistan, is situated in a fertile plain, 220 miles S. W. of Cabool. It is well supplied with water by two canals. The houses are mostly mean and built of wood. Candahar has an extensive trade and some manufactures. About 2 miles N. of this town is a precipitous rock which is crowned by a strong fortress or citadel. Candahar is supposed to have been founded by Alexander the Great. It was captured by Tamerlane in 1384, and by Shah Abbâs of Persia in 1620. The British army occupied it in 1839–42. It was again occupied by the British in 1880, and several severe engagements took place in the vicinity. Pop. 30,000.

Candela′brum [Lat., plu. *candelabra*], a "candlestick," a support for lamps. There were perhaps few articles in which the ancients so combined the beautiful with the useful as in their candlesticks and lamps. Candelabra usually were of wood, but marble and metals were used for their construction, and sometimes they were adorned with gems. The candelabra found at Herculaneum and Pompeii are mostly of bronze; they were also frequently of marble. The base in many instances consists of three feet of a lion, goat, or other animal, real or imaginary. In addition to the various kinds of candelabra which seem to have stood on the floor, the ancients had others intended to be placed on a table. These consisted either of a pillar or of a tree, and from the capital in the former case, or from the branches in the latter, lamps were suspended.

Can′dia, or **Meg′alo-Cas′tro,** a fortified seaport and capital of the island of Crete, is on the N. coast; lat. 35° 21′ N., lon. 25° 8′ E. It contains several mosques, a cathedral, a pasha's palace, and an arsenal. Its massive fortifications and its cathedral were erected by the Venetians, who owned the island until it was captured by the Turks in 1669. Pop. 15,000.

Candia. See CRETE.

Can′didate [Lat. *candidatus*], the name given by the Romans to a person soliciting the office of quæstor, consul, etc., from his appearing in public dressed in a white (*candida*) toga. Among the early Christians converts newly baptized were called candidates, on account of the white robes worn by them eight days after baptism. In Germany, at the present time, a theological student who has been approved before the highest authorities in the Church is called a candidate, and the term is generally given to any applicant for office, religious or secular.

Can′dle [Lat. *candela* (from *candeo*, to "shine"); Fr. *chandelle*], a cylinder of wax or fat with a central wick, intended for giving light, and used in various religious ceremonies. Candles are made of tallow, of stearine, bleached wax, spermaceti, and paraffine. They are either dipped, moulded, or rolled. "Dips" are made by hanging wicks upon a frame, at a distance from each other equal to about double the intended thickness of the candle; these are then dipped in melted tallow, and hung upon a rack until cooled, then dipped again and again, until the required thickness is obtained. Mould candles are cast by pouring the tallow down a tube, along the axis of which the wick has been previously adjusted. These tubes are smooth inside, and several are fitted in a frame, the upper part of which forms a trough into which the moulds all open; and by pouring into the trough all the moulds are filled at once. Wax candles are not moulded, on account of the contraction which wax undergoes in cooling, and the difficulty of drawing it from the moulds. The wicks are warmed, and melted wax is poured over them until they acquire the proper thickness; they are then rolled between flat pieces of wet hard wood.

Certain fatty acids are also used in making the best candles. Lime is used to separate the glycerine from the fatty acid of tallow, palm oil, etc. The lime forms an insoluble soap by combining with the fatty acid, and the glycerine remains in solution with the water. This lime-soap is then reduced to powder, and the fatty acid separated by means of sulphuric acid, which combines with the lime. The whole being heated, the fatty acid is skimmed off, and the candles moulded from it. These are called star or composite candles; they give a purer light than ordinary tallow. Stearic acid, the principal fatty acid of tallow, is a hard crystalline substance, perfectly dry and free from any greasiness, with a somewhat pearly lustre. Its crystalline structure presents a difficulty in the manufacture of candles, for when cast in moulds it contracts on cooling and leaves small spaces between the crystals. This is obviated by mixing the "stearine" with a little wax.

Various ingenious arrangements have been introduced to obviate the necessity of snuffing candles; in nearly all of them the object is effected by causing the wick to bend over and its end to fall outside of the flame, and thus, by coming in contact with the oxygen of the air, to be completely burned, for such combustion cannot take place within the flame. This bending over is variously brought about. One method is by braiding the wick with one strand shorter than the rest. Another process loads the wick with metallic bismuth, which fuses to a bead in the flame, and the weight of the bead bends the wick.

REVISED BY C. W. GREENE.

Candle-Fish. See OULACHAN.

Can′dlemas, a festival to commemorate the purification of the Virgin Mary, is observed by the Roman Catholics on the 2d of February, when they form a procession with many lighted candles. On this day all the church candles for the year are blessed. The institution dates back to the reign of Justinian, 542, and probably originated from various pagan festivals.

Candle-Nut (*Aleurites triloba*), a tree of the order Euphorbiaceæ, a native of Java, the Moluccas, and the Pacific islands. It bears a nut as large as a walnut, having a hard shell and a kernel which is edible when roasted. It yields an excellent bland oil, which is used for food and is burned in lamps. The natives of the Society Islands arrange the perforated kernels on a string or rush and use them as torches.

Candler (MILTON A.). See APPENDIX.

Cand′lish (ROBERT SMITH), D. D., a Scottish preacher, born in Glasgow Mar. 23, 1807. He was licensed as a minister in 1831, and began to preach in Edinburgh in 1834. He was one of the prominent leaders of the popular party, and co-operated with Dr. Chalmers in organizing the Free Church after the disruption which occurred in 1843. He acquired much distinction as a pulpit-orator and a debater in religious assemblies. He published several religious works. Died Oct. 19, 1873.

Candolle. See DE CANDOLLE.

Candy, a town of Ceylon. See KANDY.

Can′dytuft (*Iberis*), a genus of plants of the natural order Cruciferæ, are indigenous in the countries bordering on the Mediterranean. The flowers have unequal petals and grow in dense corymbs. Some of the species are cultivated in gardens for the beauty of their flowers.

Cane [Lat. *canna*], a name given to several species of plants, and to the stems of the smaller palms and the larger grasses. The canes or rattans of commerce, which are used in making cane-seats of chairs, etc., are the product of the palmaceous plants *Calamus Rotang* and *Calamus viminalis*. The term cane is also applied to the *Arundinaria macrosperma*, an arborescent grass which grows in the Southern U. S. on the alluvial banks of rivers, and forms thickets called canebrakes which are almost impenetrable. This plant often grows to the height of fifteen or twenty feet. (See RATTAN and SUGAR-CANE.)

Cane′a, or **Can′na,** called **Khani′a** by the modern Greeks, a seaport-town of Candia or Crete, is on the N. coast, about 70 miles W. of Candia. It occupies the site of the ancient *Cydonia*. It is the most commercial town in the island, and has a safe but shallow harbor, which will admit vessels of 300 tons. It has a lighthouse, an arsenal, and a fort. Oil, soap, wax, etc. are the chief articles of export. Pop. about 7000.

Canel'la Al'ba, a large tree which grows in Florida and the West Indies, and is called wild cinnamon. It has fragrant flowers and an aromatic bark, which is exported in quilled pieces of a pale buff color and a pungent taste. This is sometimes used in medicine as a stimulant tonic. The genus *Canella* belongs to the order Clusiaceæ.

Ca'nes Venat'ici (*i. e.* the "Hunting Dogs"), the Latin name of a constellation of the northern hemisphere. It is represented on the celestial globe by the figures of two dogs named Asterion and Chara, which are held in leash by Boötes, and appear as if pursuing Ursa Major.

Can'field, on R. R., Mahoning co., O. (see map of Ohio, ref. 3–J, for location of county), 69 miles S. E. of Cleveland, has one large leather-belt factory and a machine-shop. Pop. in 1870, 640; in 1880, 650.

Can'gas de Tine'o, a town of Spain, in the province of Oviedo, 37 miles S. W. of Oviedo, on the Narcea. Pop. 22,212.

Canicat'i, a town of Sicily, in the province of Girgenti, on the river Naro, 15 miles E. N. E. of Girgenti. It is well built, and has sulphur-mines in the vicinity. Its principal business, however, is the cultivation of orange, fig, and almond trees and grape-vines. It dates back to the reign of the Saracens. Pop. 20,908.

Canic'ula, a name formerly given to Sirius, the dog-star, a star in the constellation Canis Major. This name signifies in Latin "little dog."

Canic'ular Year, the ancient year of the Egyptians, so called because its commencement was determined by the heliacal rising of Sirius (or Canicula). Their reason for computing time from the rising of that star was perhaps because it occurred about the same date as the annual inundation of the Nile. The common year of the Egyptians consisted of 365 days, and every fourth year of 366.

Can'idæ [from the Lat. *canis*, a "dog"], a family of the digitigrade carnivorous Mammalia, to which belong the dog, fox, wolf, etc. The hyænas are sometimes referred to this family, and sometimes to the Viverridæ (civets, ichneumons, etc.). These families are closely connected, and hyænas may be said to form a connecting link between them. The Canidæ have two flat tuberculous molar teeth on each side behind the great cheek tooth of the upper jaw, a dentition resembling that of the bear family, or Ursidæ, to which they exhibit a further resemblance in their power of adapting themselves to the use of vegetable food. They have generally three incisors or cutting teeth, with one large canine tooth, and four præmolars on each side in each jaw, two true molars on each side in the upper jaw, and three in the lower.

Cani'na (Luigi), Cavaliere, an Italian architect and antiquary, born at Casal Oct. 23, 1795. He was professor of architecture at Turin, led the excavations of Tusculum in 1830 and of the Via Appia in 1833, and published, besides other works, "Ancient Architecture Described and Illustrated by Monuments" (9 vols., 1844). Died Oct. 17, 1856.

Canini (Giovanni Agnolo), born in 1617, died in 1666, was a native of Rome and a pupil of Domenichino, painted some altar-pieces in Rome, but became more famous as a designer and engraver. Having accompanied Cardinal Chigi to France, he was by Colbert encouraged to begin his "Iconographia," containing 150 engravings, finished and published by his brother (1677), and reprinted at Amsterdam in 1791.

Ca'nines, or **Canine Teeth** [Lat. *dentes canini*, from *canis*, a "dog"], a name given to four teeth which are pointed and are placed between the incisors and bicuspidate teeth. Each jaw has two of these, which are sometimes called eye-teeth or stomach-teeth. In the Carnivora they are very large and adapted to tearing flesh.

Canis'ius (Petrus), Saint, a Dutch Jesuit, born at Nimeguen May 8, 1521. His proper name was Pieter de Hondt. He was educated at Cologne, and entered the Jesuit order in 1543, the first German member of the society. He afterward founded two Jesuit schools in Bavaria, at Dillingen and Augsburg, and contributed much to stop the progress of the Reformation in Southern Germany. As court-preacher to Ferdinand I. he labored with still greater success for the suppression of the Reformation in Austria; indeed, Ferdinand allowed him to go to any length he wanted and to use any means he chose. He became so hated that the friends of the Reformation in Germany called him "the Austrian dog," alluding to his name Canisius, de Hondt, "The Hound." He became in 1549 professor and rector of the University of Ingolstadt, and was also a prominent member of the Council of Trent in 1545. He wrote, besides other works, "Summa Doctrinæ Christianæ." Died Dec. 21, 1597. He was canonized by Pope Pius IX. in 1864.

Ca'nis Ma'jor (*i. e.* the "Greater Dog"), a constellation which appears in the celestial globe under the feet of Orion. It comprises Sirius, the dog-star, which surpasses all the stars of the firmament in splendor and apparent magnitude.

Ca'nis Mi'nor (the "Lesser Dog"), a constellation adjacent to Canis Major and to Gemini. It comprises Procyon, a star of the first magnitude, which is nearly in a direct line between Sirius and Pollux.

Caniste'o, Steuben co., N. Y. (see map of New York, ref. 6–E, for location of county), on R. R. and the Canisteo River, 55 miles W. N. W. of Elmira. It has some manufactures. Pop. of Canisteo township in 1870, 2435; in 1880, 3694, including 1907 in village.

Canister Shot. See Case Shot.

Cank'er [from the same root as *cancer*]. Canker in plants is especially injurious to fruit trees. It is a kind of gangrene, usually beginning in the young branches and gradually descending to the trunk. Wet subsoils appear to cause canker in some cases. Varieties of fruit trees which have been long propagated by grafting and budding are most liable to this disease. (For the diseases of the human mouth known as canker, see Stomatitis and Aphthæ.)

Canker-Worm (*Anisopteryx*), a genus of destructive insects, of the order Lepidoptera and family Phalænidæ or Geometridæ. The common American species (*Anisopteryx vernata*) is rather smaller than the European, and with darker wings. The female is wingless. The male has four thin, silky wings, which have an extent of about an inch and a quarter when expanded. The moths come out of the ground principally in the spring, sometimes also in the autumn. The female lays from sixty to one hundred eggs, glued in clusters to branches of trees; they hatch in the early part of May. The larvæ then feed upon the leaves, especially of apple and elm trees, which they pierce with multitudes of holes. When fully grown the larva is nearly or quite an inch in length. After about four weeks of feeding, the larvæ descend, by crawling or hanging down by their threads, to the ground, burrowing generally to the depth of a few inches. Within twenty-four hours afterwards they are changed to light-brown chrysalids. From these the moths emerge after a variable time. As the female canker-worms are wingless, trees may be protected from them by leaden troughs containing tar or fish oil being placed around their trunks. It is also desirable, however, to destroy as many of the caterpillars as possible. Shaking the trees will often dislodge them. (See Harris, "On Insects Destructive to Vegetation," Boston, 1862.)

Can'na [a Latin word signifying a "cane" or "reed"], the name of a genus of plants of the order Marantaceæ. The fruit is a capsule containing hard black seeds, which are called Indian shot. The flower has one fertile petal-like stamen, and a petaloid style. One or more species are extensively cultivated as ornamental plants. The starch of *Canna coccinea* is used sometimes instead of arrow-root, under the name *tous-les-mois*. The *Canna flaccida* is a native of the Southern U. S., near the coast.

Cannabina'ceæ [from *Cannabis*, "hemp"], a small natural order of exogenous plants which most botanists include in the order Urticaceæ. They are distinguished by solitary suspended ovules and a hooked or spiral embryo. This order comprises only two genera of plants, the hemp (*Cannabis*) and the hop (*Humulus*).

Can'nabis [Gr. κάνναβις], the typical genus of plants of the order Cannabinaceæ. The only known species of it is *Cannabis sativa*, or hemp, a tall diœcious annual with elegant palmate leaves, which grows wild in India, and is cultivated for its fibre, etc. (See Hemp, by M. C. Weld, Ph. B.)

The intoxicating drug called *hasheesh* by the Arabs and *bhang* by the Hindoos is procured from a variety called *Cannabis Indica*. Under the name of *gunjah* the dried female flowering hemp-plants are sold in bundles for smoking. The resinous extract called *churrus* is swallowed for intoxicating effect. Several native African tribes use it. There appears to be more of the active resinoid (*cannabin*) in the Indian than in the European variety, owing probably to the difference of climate. It has been proved by the experiments of Dr. H. C. Wood, Jr., of Philadelphia, that the extract of American hemp has the same kind of influence on the brain and nervous system as that from India. Transportation must induce some change in the latter, as the medicinal dose found to be safe by physicians in England is about ten times as large as that used by Dr. O'Shaughnessy and others in Bengal. The effects of Indian hemp vary considerably with different persons. Mostly, they are agreeably exciting, the plant being known in India as the "increaser of pleasure," the "cementer of friendship," and the "laughter-mover." Some persons become violent under its use. The word *assassin* is said to be derived from the Arabic *hashishin*, one who drinks or smokes hasheesh. With many there is an exaggeration of ordinary impressions, so that slight sounds are taken for thunder, one's head seems as large as a house, etc. Others have their sensibility diminished or suspended by it. The pupil of the eye is dilated under its internal use. It does not, like opium, affect the secretions, and seldom produces nausea. As with other stimulants, the habit of taking it becomes a pernicious slavery.

The ancients possessed some knowledge of the narcotic powers of hemp. Dioscorides and Galen mention its juice as a remedy for earache. The Scythians made a vapor-bath of its fumes by throwing the seeds on red-hot stones. Dr. Royle suggests that it may have been the nepenthes (*φάρμακον νηπενθές*) which, according to Homer, Helen received from an Egyptian woman and gave to Telemachus in the house of Menelaus.

Extract of hemp (*Extractum cannabis Indicæ*) is now used as a medicine for neuralgia and some other nervous affections. The variability of its effects, however, has hitherto interfered with its extensive employment. (See Pereira, "Materia Medica and Therapeutics," Philada. ed., 1866.) Revised by Willard Parker.

Can′næ, an ancient Roman town in Apulia, on the river Aufidus (Ofanto), near its entrance into the Adriatic Sea. Here, on Aug. 2, 216 B. C., Hannibal gained a decisive victory over the Roman army commanded by C. Terentius Varro. According to Livy, the Romans on this day lost about 45,000 infantry and 3000 cavalry. The site of Cannæ is occupied by a village called *Canne*, about 10 miles W. S. W. of Barletta.

Can′nel Coal [originally *candle* coal, because its bright flame was a substitute for candle-light], a variety of bituminous coal which is very dense and compact, and breaks with an uneven or largely conchoidal fracture. It sometimes exhibits a brilliant waxy lustre, and is generally of a brown or black color. It burns with a bright flame, and during the process of combustion splits and crackles without melting. This coal, which is found in England and the U. S., is used for fuel and is valuable for making gas. (See Coal, by Prof. J. S. Newberry, M. D., LL.D.)

Can′nelton, the capital and principal town of Perry co., Ind. (see map of Indiana, ref. 11–D, for location of county), is situated on the Ohio River, about 68 miles above Evansville. It has a large cotton factory, built of sandstone, about 300 feet long and five stories high, which employs over 400 operatives; also manufactories of draining-tiles, pottery, chairs, flour, etc. Bituminous coal abounds in the adjacent hills, and is supplied in large quantities to steamboats. Pop. in 1870, 2481; in 1880, 1834.

Cannes, a seaport-town of France, in the department of Alpes-Maritimes, on the Mediterranean Sea, 25 miles S. E. of Draguignan. It has an old Gothic castle and a good quay. The mildness and salubrity of the climate render this a favorite winter resort for English families. Napoleon landed at Fréjus, near Cannes, after his escape from Elba on Mar. 1, 1815, and Lord Brougham died here in 1868. Pop. in 1881, 14,086.

Can′nibal [etymology doubtful], a person who feeds on human flesh. The practice appears to have prevailed in ancient as well as in modern times. Facts show that the people addicted to the eating of human flesh are not always the most degraded of the human race. For instance, in Australia, where the large animals are scarce, there are tribes of an extremely degraded type, who have only been known in exceptional conditions to feed on human flesh. The New Zealanders, on the other hand, who are one of the most highly developed aboriginal races with which civilization has had to compete, were, down to a late period, habitual cannibals. Cannibalism is chiefly found in the islands of the Pacific and in Africa. Among certain tribes of aborigines of America cannibalism is said to have formerly prevailed. It is also believed by some archæologists that the inhabitants of Europe in the prehistoric stone-period were to some extent cannibals.

Can′ning (Charles John), Earl, an English statesman, a son of George Canning, noticed below, was born Dec. 14, 1812. He succeeded to the peerage on the death of his mother in 1837, and began his public life as a conservative. In 1852 he became postmaster-general in the ministry of Lord Aberdeen. He was appointed governor-general of India in 1855. During his administration occurred the great Sepoy mutiny (1857–58). Died in England June 17, 1862.

Canning (George), an eminent English statesman and orator, born in London April 11, 1770. He was educated at Christ's Church College, Oxford, where he distinguished himself as a classical scholar. In 1793 he entered Parliament as a supporter of Pitt, who was then primo minister, and he became an under secretary of state in 1796. About 1797, Canning, Ellis, and others began to publish the witty and famous political satires called "The Anti-Jacobin." He married a daughter of General John Scott. After the resignation of Mr. Pitt, in 1801, Canning joined the opposition against the ministry of Addington. In April, 1807, he became minister of foreign affairs in the Tory cabinet formed by the duke of Portland. He fought a duel in 1809 with Lord Castlereagh, who was the favorite leader of the Tories. Soon after this duel he ceased to be a cabinet minister. He advocated Catholic emancipation in 1812, was returned to Parliament for Liverpool in that year, and was appointed president of the board of control in 1816. In the latter part of his life Canning and Lord Brougham were considered the most eloquent and powerful orators in the House of Commons. On the death of Lord Castlereagh, in 1822, Canning succeeded him as secretary of foreign affairs in the cabinet of Lord Liverpool. He infused a more liberal spirit into the cabinet, and rendered an important service to his country by pursuing a foreign policy that was not subservient to the interests and designs of the Holy Alliance. In April, 1827, he became first lord of the treasury as the successor of Lord Liverpool, who was disabled by paralysis. He formed a cabinet partly of Tories and partly of Whigs. Died Aug. 8, 1827. (See Robert Bell, "Life of George Canning," 1846; A. G. Stapleton, "The Political Life of G. Canning," 1859; Rueder, "G. Canning, seine Leben, etc.," 1827.)

Canning (Stratford). See Stratford de Redcliffe.

Cannon. See Artillery, by Gen. John C. Tidball, U. S. Army.

Cannon (Charles James), born Nov. 4, 1800, died Nov. 9, 1860, was a native of New York, spent most of his time there, and acquired some reputation as a poet, dramatist, and novelist. His principal works are "Facts, Feelings, and Fancies," "The Poet's Quest," "Mora Carmody," "Oath of Office," "Father Felix," "Tighe Lifford," etc. He also compiled a speller and a series of readers, which were extensively used in the schools and much liked. (See "Brownson's Quarterly" for October, 1857, and "Historical Magazine," vol. v., p. 30.)

Cannon (James Spencer), born in the island of Curaçoa Jan. 28, 1776, died at New Brunswick, N. J., July 25, 1852. In the latter place he was professor of pastoral theology and church history at the theological seminary of the Reformed Church 1826–52, and after his death his "Lectures on Pastoral Theology" were published in New York (1853), and very favorably received, as he was well remembered by many of his pupils and hearers on account of his elaborate and exhaustive lectures and the pithy manner in which he delivered them.

Cannon (Newton), born in Guilford co., N. C., about 1781, served in the Tennessee mounted riflemen as colonel at Tallahatchie (Nov. 3, 1813), was a member of Congress from Tennessee (1814–17 and 1819–23), and was governor (1835–39). Died Sept. 29, 1841.

Cannon (William), born at Bridgeville, Del., in 1809, was governor of Delaware in 1864–65. Died Mar. 1, 1865.

Cannonade, in general, is the discharge of balls or shells from cannon or great guns; the act of firing artillery in a battle or a siege. As a technical term it is sometimes used to denote an action between two armies in which the artillery is employed almost exclusively.

Cannon-ball Tree (*Couroupita Guianensis*), a large tree of the order Lecythidaceæ, a native of Guiana. It bears racemes of white and rose-colored flowers, and a fruit which has a hard woody shell and is nearly round. This fruit is about the size of a thirty-six pound cannon-ball.

Cannonsburg, Pa. See Canonsburg.

Cann′stadt, a town of Würtemberg, is situated in a beautiful and fertile valley, on the river Neckar, 2¼ miles by rail N. E. of Stuttgart. It is connected by railways with Carlsruhe, Heilbronn, and other cities. It has manufactures of cotton and woollen fabrics and an active trade, for which the navigable Neckar affords facilities. Here are many mineral springs, which are much frequented in the summer. In 1796 a battle was fought near the town between the archduke Charles and General Moreau. Pop. in 1880, 16,020.

Cano (Alonzo), a celebrated Spanish painter, sculptor, and architect, was born at Granada Mar. 19, 1601. He studied painting under Pacheco and Juan de Castillo, and became the founder of the school of Granada. In 1638 he was appointed court-painter by Philip IV. Among his chief works is a "Conception of the Virgin." Died Oct. 5, 1665.

Canoe [etymology uncertain], a rude boat made of the trunk of a single tree hollowed out. Canoes are generally open boats, propelled by paddles and steered by oars. The length and other dimensions vary greatly. On sea-coasts canoes are sometimes made of light wooden frames covered with seal skins, which are drawn across as a deck, with only a hole large enough for one man to sit in. The name is also applied to boats made of birch bark, and to other rude craft, and of late to a pleasure-boat designed for long excursions by a single person.

Can'on [Gr. *κανών*, a "rule"], a term of various significations in theology, science, and art, means, in general, a law, rule, or standard. In ecclesiastical language it is applied to a law or rule of doctrine or discipline, or the decree of a general council; also to the genuine books of the Holy Scripture, called the *Sacred Canon*. The Roman Catholic Church recognizes as parts of the canon of Scripture the apocryphal books, which Protestants reject. In the canon of the New Testament the agreement of the Christian churches may be said to be unanimous. (See Bible, The, by Prof. W. G. Sumner.)

Can'on [Lat. *canonicus*], the name of a dignitary of the Roman Catholic and Anglican churches. In each cathedral and collegiate church there are canons, who perform some parts of the services and receive a portion of the revenue of the church. In a collective capacity the canons are called a chapter, and form the council of the bishop. Canons (in England) must reside at the cathedral for three months in each year. Canons were originally monks or priests who lived in a community or monastery. They are historically known as Canons Regular, and followed the rule of Saint Augustine, Saint Benedict, Saint Anthony, etc. They were once the most numerous of the religious orders. They are still found in some parts of Europe.

Can'on, in music, a perpetual fugue; a kind of fugue in which not merely a certain period or phrase is to be imitated or answered, but the whole of the first part with which the canon begins is imitated throughout by all the other parts. The canon is composed for two, three, four, or more voices.

Canon (Sacred). See Bible, The, by Prof. W. G. Sumner.

Cañon, a Spanish word, pronounced cányon, meaning a tube, and applied by the American Spaniards to long and narrow mountain-gorges, or deep ravines with precipitous slopes assuming almost a tubular form. The Rocky Mountains, the Sierra Nevada, and the great Western plateaus of North America furnish numerous and striking examples. The Great Cañon of the Colorado, in the middle course of the river, above its last great bend, between 111° and 115° W. lon., is the most remarkable of its kind, and may serve as a type. It is hollowed out below the general surface of a vast plateau to the depth of 3000 to 5000 feet, opening to view, in its perpendicular walls, all the series of geological strata down to their granite foundation. At the bottom of this vertiginous chasm, occupying its whole width, roll the waters of the stream, now foaming through wild rapids, now flowing peacefully in its deep and narrow channel. Its tributaries, Grand River, the Little Colorado, and others, are hardly less remarkable.

The Snake River, or Lewis branch of the Columbia, runs through a deep valley full a thousand feet below the surface of the surrounding country. The nature of these chasms, their winding course, the disposition of their affluents, seem to force us to ascribe their origin to the erosive action of the flowing waters, and these wonderful structures prove the enormous power of the agent which was capable of scooping out such channels. In the far West the name of cañon has been extended to almost every narrow mountain-gorge, whatever be its origin and character.

Arnold Guyot.

Cañon City, capital of Fremont co., Col. (see map of Colorado, ref. 4–D, for location of county), situated on R. R. and the Arkansas River where it emerges from the Rocky Mountains. It is a resort for invalids, having both cold and warm mineral springs and a healthful climate. In this vicinity is fine scenery. It has unlimited water-power, and in the neighborhood are coal, iron, oil-wells, marble and limestone quarries, and rich copper and silver mines. It contains a seminary and the Colorado penitentiary. The city is 5280 feet above the sea-level. Pop. in 1870, 229; in 1880, 1501; in 1885, 1579.

Cañon, or **Canyon, City,** capital of Grant co., Or. (see map of Oregon, ref. 7–D, for location of county), about 150 miles S. E. of Dalles City. It contains several fine fireproof buildings. Gold-mines have been opened in the adjacent hills. Pop. in 1880, 393.

Can'oness [Lat. *canonissa*]. The canonesses were members of certain religious orders of the Roman Catholic Church, who often took no monastic vows, though they lived in common and usually observed the rule of Saint Augustine. Many noblemen sought well-endowed canonical livings for their daughters, who were at liberty to marry when they chose. The custom prevailed in Germany even after the Reformation, and there were many houses (*Stifter*) of Protestant canonesses, especially in Westphalia and Mecklenburg.

Canon'ical, according to the canon or rule. The canonical books of Scripture are those which are admitted to be genuine and of divine origin. (See Bible, The.)

Canonical Hours, in the Roman Catholic Church, are certain fixed times in the day for devotions. These hours are called nocturnes, matins, lauds, tierce, nones, vespers, and complines. The breviary has seven canonical hours, because the Psalter says "Seven times in the day will I praise Thee." In England the hours between 8 A. M. and 12 M. are canonical, and no marriage can take place in any church except in canonical time.

Canonical Virgins, in the early ages of the Church, were young women who, remaining in their homes, took upon themselves vows of perpetual virginity. They were enrolled in a list or canon, whence their name.

Canon'icus, an American Indian, chief of the Narragansetts, who, though at first hostile to the Pilgrims who landed at Plymouth in 1620, subsequently became friendly to the whites, and especially to the inhabitants of the colony of Roger Williams. Died June 4, 1647.

Canon'icut, or **Conanicut,** a beautiful island in Narragansett Bay, nearly 8 miles long and 1 mile wide. The island constitutes the township of Jamestown, in Newport co., R. I. Pop. in 1880, 459; in 1885, 486.

Canoniza'tion, the act of declaring a person a saint; a ceremony in the Roman Catholic and Greek churches by which deceased beatified persons are enrolled in the catalogue or canon of saints. In the Roman Catholic Church the pope has exclusive authority to canonize since the year 1181, but before that date other bishops had the same right or power, and, as they continued to beatify and canonize in their dioceses in spite of the bull of Alexander III., Urban VIII. issued new and more emphatic bulls (1625 and 1634), prescribing in detail the whole manner of proceeding. When it is proposed to canonize a person, a formal process is instituted by which his merits and character are investigated. The process is, indeed, double—first for his beatification, and then for his canonization. If it can be proved with valid testimonies that he has lived a holy life and worked miracles, he will, in a consistory presided over by the pope himself, be declared *beatus*—that is, entitled to be commemorated by the Church and to have altars erected in his name. If he then continue to work miracles, his canonization will follow, entitling him to be worshipped by the Church. After it has been proved that he died in the odor of sanctity, the ceremony is performed in St. Peter's church, Rome. The day of his death is annually celebrated by the Church.

Canon Law, a system of rules for the discipline of the Church. The name is especially applied to the rules of the Roman Catholic Church, which are also in force to some extent in the churches of England, Scotland, and Germany. This system of laws is based largely upon decisions of ancient councils, and also shows marks of the influence of the Bible and of the Roman jurisprudence. It received frequent additions and other modifications from the decretals, bulls, and extravagants of the popes. In England, the kings and parliaments were always jealous of the introduction of foreign canons, but permitted to some extent their introduction in cases where they did not interfere with the statutes of the land. In this way the common law came to receive the influence of the papal decretals; which are sometimes cited as of authority in matters of marriage, divorce, inheritance, etc., since these affairs were under the control of the ecclesiastical courts. In Scottish jurisprudence the influence of canon law is very great, it having been originally received as of equal force with the statutes of the realm. (See Law, by Prof. T. W. Dwight, LL.D.)

Can'onsburg, on R. R., Washington co., Pa. (see map of Pennsylvania, ref. 5–A, for location of county), 22 miles S. W. of Pittsburg. It is the seat of Jefferson College, and has a planing mill and a woollen factory. The Pennsylvania Reform School is near by. Pop. in 1870, 641; in 1880, 699.

Cano'pus, or **Cano'bus** [Gr. *Κάνωπος*], a very brilliant star of the first magnitude in Argo, a constellation of the southern hemisphere. It is never visible in the Northern or Middle U. S., being only 37½° from the South Pole.

Canopus, or **Canobus,** an ancient city of Lower Egypt, was situated on the Mediterranean, near the western mouth of the Nile, 15 miles E. of Alexandria. Before the foundation of Alexandria it was the principal seaport of the Delta. Here was a famous shrine and oracle of Serapis. Canopus was notorious for the dissolute morals of its people and the number of its religious festivals. Its ruins are still visible about three miles from Aboukir.

Can′opy [Gr. *κωνωπεῖον*, from *κώνωψ*, a "gnat," because canopies were used to keep off gnats, like our mosquito-curtains; Lat. *canopeum*], an ornamental covering over a throne or bed; also a covering which is carried over the heads of kings on journeys, and over the holy sacrament in Roman Catholic processions. The latter is called BALDACHIN (which see). In architecture and sculpture, canopy is a magnificent decoration which covers an altar, throne, pulpit, or tribunal. In Gothic architecture, the term is applied to the rich coverings over niches and tombs.

Cano′sa (anc. *Canusium*), a town of Italy, in the province of Bari, is situated on the declivity of a steep hill 14 miles S. W. of Barletta. It has an ancient cathedral. Here are interesting ruins of the ancient *Canusium*, an important city of Apulia. In the subterranean tombs of this place were found painted vases and magnificent funereal furniture, with precious stones and jewels. Pop. 14,900.

Canossa. See APPENDIX.

Cano′va (ANTONIO), a celebrated Italian sculptor, born at Possagno, in Venetia, Nov. 1, 1757. He studied art in Venice and Rome, and aspired to restore the pure and classic style of the antique. Among his early works were a statue of Apollo and a group of "Dædalus and Icarus." He settled in Rome in 1782, and acquired celebrity by his "Theseus and the Minotaur." He did not adhere strictly to the severe simplicity of the antique, but modified it by a peculiar grace, which is apparent in his "Cupid and Psyche" and his "Venus and Adonis." Having been invited by Napoleon, he went to Paris in 1802, and executed an admirable statue of that emperor. Among his other works are a "Venus Victorious," a monument to Clement XIII., erected in St. Peter's church, a statue of Washington, and a "Perseus with the Head of Medusa." In 1816 he received the title of marquis of Ischia. He was the founder of a new school of sculpture, and was reputed the greatest sculptor of his age. Died at Venice Oct. 13, 1822.

Canrobert (FRANÇOIS CERTAIN), a French general, born at St. Ceré, Lot, June 27, 1809. Having served many campaigns in Algeria, he became a general of brigade in 1850, and a general of division in 1853. He commanded a division in the Crimea in 1854, and was wounded at Alma. In Sept., 1854, he succeeded Marshal St.-Arnaud as commander-in-chief of the French army, and he began the siege of Sebastopol. He resigned the command to General Pelissier in May, 1855, and was made a marshal of France in 1856. In June, 1859, he commanded a corps at Solferino. On the outbreak of hostilities in 1870, the Sixth corps, under Canrobert at Châlons, was, immediately after the disaster of Forbach and Reichshofen, summoned to Metz to reinforce Bazaine. As its commander, Canrobert took a prominent part in all the battles and events preceding and attending the investiture and capitulation of Metz (see BAZAINE); and at the trial of Bazaine the bearing and evidence of this veteran soldier excited popular admiration.

Can′so, Gut of, a strait which separates Nova Scotia from the island of Cape Breton, and connects the Atlantic with the Gulf of St. Lawrence. It is 17 miles long, and has an average width of 2½ miles.

Cant, a term used in architecture to express the sides of a polygon turned from the spectator, or an angular deflection of a straight line which is neither in the same direction to the horizontal nor to the perpendicular line of the base.

CANT, on shipboard, is a term applied to timbers which lie obliquely to the line of the keel, and are near the bow or stern. It is also applied to anything sloping or inclined.

CANT also signifies an impulse with a sudden jerk; obliquity of position; a whining or affected tone; a whining pretension to goodness; the peculiar words and phrases of professional men; any barbarous jargon in speech.

Canta′bri, a rude race of ancient mountaineers who lived in Cantabria, the northern part of Spain, near the Bay of Biscay. Their chief towns were Juliobrigas, Concana, and Vellica. They made a brave resistance to the Romans in the Cantabrian war (25–19 B. C.). They are said to have been of Iberian origin.

Canta′brian Moun′tains, a general name of several ranges in the N. part of Spain. They are connected with the Pyrenees, from which they extend westward to Cape Finisterre. The highest summits are estimated at 10,000 feet high. Several portions of these mountains receive the local names of Salvada, Ordunte, Peña, Anaña, Mellara, etc.

Cantacuze′nus, Anglicised as **Cantacuzene** [Gr. Καντακουζηνός], (JOHN), a Byzantine emperor and historian. He was prime minister under Andronicus III. (who died in 1341), and he became emperor in 1342. He was involved in a civil war with Anna, the wife of Andronicus III., and abdicated in 1355. He wrote a work on Byzantine history from 1320 to 1357.

Cantagallo, a town of Brazil, 80 miles N.E. of the city of Rio Janeiro, stands on a small tributary of the Parahyba. Its gold-mines were formerly of great importance, but seem to have become exhausted. Its inhabitants are now principally engaged in agriculture.

Cantal, a central department of France, formed of the S. part of the old province of Auvergne. It is bounded on the N. by Puy de Dôme, on the E. by Haute-Loire, on the S. E. by Lozère, on the S. by Aveyron, and on the W. by Lot and Corrèze. Area, 2217 square miles. It is drained by the sources of the Dordogne. The surface is mountainous, and mostly occupied by the *débris* of extinct volcanoes. The soil is mostly sterile. Among the staple products are cattle, butter, cheese, and chestnuts. Capital, Aurillac. It is divided into 4 arrondissements, 23 cantons, and 267 communes. Pop. in 1881, 236,190.

Can′taloupe (commonly pronounced kan′ta-lōp) **Melon,** or **Muskmelon,** named from Cantalupo, in Italy, the *Cucumis melo* of botanists, is of the same genus with the cucumber, family Cucurbitaceæ. It has round, heart-shaped leaves, a creeping stem, yellowish flowers, and fleshy fruit, which is much esteemed. It is largely cultivated in New Jersey.

Canta′ta [Fr. *cantate*], an Italian musical term, derived from *cantare*, "to sing." It is the name of a local composition, not easily defined, which consists of choruses, arias, and recitatives with instrumental accompaniment. Later forms of it are much simpler.

Cantavius, Simone, also called **Simone da Pesaro,** born at Oropezza, near Pesaro, in 1612, died at Verona in 1648, was a pupil of Guido and a fellow-student with Domenichino. Pictures by him are found in Milan (a "Transfiguration"), Bologna (a portrait of Guido), Pesaro, and other places.

Canteen′ [Fr. *cantine*], a military term used in several senses: 1, a small tin or wooden vessel, which each soldier carries and uses for holding water; 2, a small wooden or leathern chest or coffer containing the table equipage and utensils of an officer when he is in active service; 3, a public-house licensed in British garrisons and barracks for the sale of malt liquor, ardent spirits, and groceries, in order that the soldiers may obtain such articles without going beyond the precincts of the barracks.

Cantemir′ (DEMETRIUS), an historian, was born in 1673. He was appointed vaivode of Moldavia by the sultan of Turkey in 1710. Having become an ally of Peter the Great, he was expelled from Moldavia by the Turks in 1711. He wrote in Latin a "History of the Origin and Decay of the Ottoman Empire." Died in 1723.

Can′terbury, a city and county of England, in Kent, on the river Stour, 56 miles E. S. E. of London, with which it is connected by railway. It is the metropolitan see of England, being the seat of the archbishop of Canterbury, who is primate of all England and the first peer of the realm. It stands in a vale or level space between hills of moderate height. It contains fourteen old churches, mostly built of flint; also remains of St. Augustine's Benedictine abbey, and the ruins of a Norman castle. Among its institutions are several hospitals, a museum, and a theatre. Canterbury returns two members to Parliament. It has manufactures of linen damask, and is noted for its brawn. St. Augustine became the first archbishop of Canterbury in 597 A. D. About this time the town was the capital of the kingdom of Kent, and was called *Caer Cant* (*i. e.* "city of Kent"). Archbishop Cuthbert built here, about 740 A. D., a church which received numerous additions in succeeding ages. The choir having been destroyed by fire in 1174, it was soon rebuilt by William of Sens. This restored choir is probably one of the oldest parts of the cathedral, which presents a magnificent union of almost every style of Christian architecture. The central tower is 234 feet high, and the total exterior length of the cathedral is 545 feet. Immense numbers of pilgrims came here to worship at the shrine of Thomas à Becket, who was killed here in 1170. Pop. in 1881, 21,701.

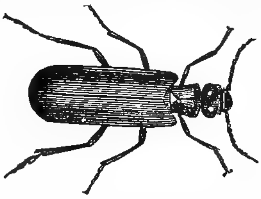
Canterbury, a settlement of about 2400 square miles on the E. coast of the N. island of the New Zealand group.

Capital, Christchurch; Lyttleton is its chief port. The products are potatoes, oil, whalebone, gold-dust, and hides.

Canterbury, VISCOUNTS (United Kingdom, 1835).—JOHN HENRY THOMAS MANNERS-SUTTON, third viscount, K. C. B., governer of Victoria colony, born May 27, 1814, was member of Parliament for Cambridge borough 1841–47, under-secretary for the home department 1841–46, has been lieut.-gov. of New Brunswick and gov. of Trinidad, and succeeded his brother Nov. 13, 1869. D. Apr. 24, 1877.

Canterbury Bell. See CAMPANULA.

Can′tharis [Gr. *κανθαρίς*], plu. **Canthar′ides,** a genus of insects of the order Coleoptera and family Meloidæ. The Spanish fly, or blister beetle (*Cantharis* or *Lytta vesicatoria*), the most important of the genus, is about an inch long; has a large head and long antennæ, and soft wing-covers concealing the abdomen. It is of a bright green. Its brilliancy is of use in detecting cases of poisoning by cantharides, golden-green particles being always seen in powders made of these insects, and these particles remaining long unchanged. The common blister fly is found in the south of Europe and in Asia. It is rare in England. They are imported from Spain, France, Italy, Russia, and the Levant. The perfect insect is taken by beating the branches of trees in the morning or evening, when it is comparatively lethargic, a cloth being spread below to receive the insects as they fall. Those who collect them wear gloves and veils. Unpleasant effects have been experienced from even sitting under trees on the leaves of which cantharides were numerous. They are killed with the vapor of vinegar, sulphurous acid, or oil of turpentine. Unless kept with great care, they lose their active properties. They are liable to be injured by mites. Some of the species of the genera *Meloe* and *Mylabris* are occasionally used as vesicants. The American *Lytta vittata* (potato-fly) and other native species have very similar properties.


Cantharis, or Spanish Fly.

The active principle of the flies is cantharidin, of which $\frac{1}{100}$ of a grain placed on the lip rapidly causes the rise of blisters. Internally, the flies cause heat in the throat, stomach, kidneys, etc., and in large doses they give rise to inflammation of a serious nature. There are various preparations of blistering flies, such as tincture of cantharides, cantharidal collodion, etc., but that most commonly employed is blistering plaster, made by mixing powdered flies, yellow wax, resin, and lard.

Can′ticle [in the Vulgate, *Canticum Canticorum*, the "Song of Songs"], called in the common English version of the Bible **Solomon's Song,** the Hebrew שיר השירים (*i. e.* "Song of the Songs"), is a collection of poems, perhaps with a dramatic arrangement, whose subject is chaste love. The rabbis first began to interpret it allegorically of God and His people, and this interpretation was so established before the time of the Massoretes that they did not hesitate to recognize the book as canonical. The same method of interpretation passed into the Christian Church, only that the allegory was there accepted as referring to Christ and the Church. The more crass forms of this method of interpretation have been abandoned, but the effort is still made by types or symbols or other devices to give to the book another significance than that which it bears on its face. Not a syllable appears in the book to suggest any such hidden significance, and this interpretation rests on the assumption that, since the book is in the canon, it *must* be something more than it appears to be. Niebuhr is said to have replied to a young man, who regretted its place in the canon, that he would not consider the Bible complete as "the book of humanity," if it contained no representation of pure and faithful love. The book probably belongs to the time of Solomon, though there are no satisfactory data for deciding as to its date and author.

Can′tilever Bridge, The (so called from the balancing or cantilever principle on which it is constructed), marks a new era in bridge-building, and is destined to work a revolution in the bridging of deep chasms. The essential principle is that of a trussed beam supported at or near its centre upon an iron or steel tower, the landward end of the truss or cantilever being anchored, while the other end is built out section by section until it reaches a corresponding truss projected from the opposite bank. Where the span is very long the outer ends of the trusses are extended only partly over the distance, and are then connected by a simple truss bridge. The first bridge built on this plan was that of the Michigan Central R. R. across Niagara River. This bridge was completed Dec. 1, 1883, within 7½ months from the date of its commencement. The total length of the Niagara bridge proper is 895 feet; length of the two cantilevers, respectively, 375 and 395 feet; length of the fixed span connecting the river-ends of the two cantilevers, 125 feet. The clear span across the river from tower to tower is 500 feet, while its height above the surface of the river is 245 feet. The bridge throughout is built of steel, and rests on two steel towers 130 feet high built on stone abutments 50 feet high. The total weight resting on the steel columns is 1600 tons. It is situated south of and very near the suspension bridge, just at the head of the Whirlpool Rapids, below and in front of the Falls, the finest view of which is here attainable. The total cost of the bridge was $600,000, and that of the approaches was about $150,000.

Cantire, kan-tīr′, or **Kintyre,** a long narrow peninsula of Scotland, forms the S. end of the county of Argyle. It is bounded on the E. by the Frith of Clyde or Kilbrannan Sound, and on the W. by the Atlantic Ocean. Its length is 40 miles, and its average width 6½ miles. It contains a large portion of arable land. A lighthouse stands at the S. W. extremity, which is called the Mull of Cantire.

Can′to Fer′mo, in music, the subject-song or theme. Every part that is the subject of counterpoint, whether plain or figured, is called canto fermo by the Italians. In church music this term means plain song or choral song in unison, and in notes all of equal length.

Can′ton [from the It. *canto*, a "corner"], a small piece of territory; the name of each of the states or independent provinces which united form the federal republic of Switzerland, each retaining its autonomy in matters of internal administration.

Canton, in heraldry, occupies a corner of the shield, either dexter or sinister, and in size is the third of the chief. It is one of the nine honorable ordinaries.

Canton′ [a corruption of *Quang-Tong*, the name of the province; Chinese *Sang-Ching*], a populous city, the greatest commercial emporium of China, and the capital of the province of Quang-Tong, is on the left (N.) bank of the Canton or Pearl River, about 70 miles from its entrance into the China Sea; lat. 23° 7′ N., lon. 113° 14′ E. The mean annual temperature is 69° F. The city is enclosed by a brick wall about seven miles in extent, and is entered by twelve gates. It is also defended by four strong forts, erected on the hills which rise on its northern side. Several islands in the river below Canton are also fortified. The city is divided into the old and new town, the former of which is occupied by Tartars, and the latter by the Chinese.

The streets are crooked and narrow, having an average width of about eight feet. The houses are built of brick, stone, or wood, and are seldom more than two stories high. Many thousands of people called Tankia, having no homes on the land, live on boats and rafts, and gain a subsistence by fishing and rearing poultry. Canton contains several many-storied pagodas, a Mohammedan mosque, and about 120 joss-houses or Booddhist temples. The most remarkable of these is on the island of Honam, opposite the city. This temple covers about seven acres. Canton has extensive manufactures of silk, cotton, brass, iron, and wood.

Since the late war between France and England on the one side, and China on the other (1857–61), the foreign merchants settled in Canton occupy the so-called *Sha-mien* or "Sand-Flats," an artificial island 2850 feet long and 950 feet broad, surrounded with a substantial embankment of granite, and separated from the Chinese city by a canal 100 feet broad. The location is very advantageous, cool, healthy, and convenient for trade. The opposite suburb of the Chinese city is the seat of the entire wholesale trade, and the great facility with which Chinamen learn so much English—the so-called "Pigeon-English"—as is necessary to transact business makes commercial intercourse free and easy.

The city has an advantageous position for foreign and internal trade, and has access to the rich provinces of Quang-See and Quang-Tong by its large navigable river. The chief articles of export are tea and silk goods. Sugar, porcelain, and precious metals are also exported. All the legitimate foreign trade of China was confined to Canton before 1843, when the more northern ports of Amoy, Foochoo, Ningpo, and Shanghai were opened to foreigners, since when the importance of Canton has declined. The position, however, which it holds in the commerce of the world is still considerable, as may be seen from the table below, which also indicates the effect produced by the opening of the northern ports:

Year.	Value of Imports.	Value of Exports.
1871	$15,661,889	$23,612,439
1872	16,802,553	25,691,712
1881	5,914,500	19,252,200
1882	6,414,500	17,658,200

Canton is supposed to be the oldest city of China. Portuguese vessels visited it in 1517; English, in 1596. But the port was not formally opened to foreign trade until the close of the seventeenth century, and more than once the European powers have been compelled to use force in order to overcome the prejudices of the natives. In May, 1841, the British forces captured the defences of Canton, but before they entered the city they were induced to retire by the payment of £6,000,000. The city was again occupied by the British and French armies 1857–1861. Pop. about 1,600,000. A. J. Schem.

Canton, R. R. junction, capital of Lincoln co., Dak. (see map of Dakota, ref. 5–J, for location of county), on the Sioux River. It has good water-power. Pop. in 1880, 675.

Canton, on R. R., capital of Cherokee co., Ga. (see map of Georgia, ref. 2–G, for location of county), on the Etowah River, about 37 miles N. of Atlanta. Gold is found in this county. Pop. in 1870, 214; in 1880, 363.

Canton, R. R. junction, a city of Fulton co., Ill. (see map of Illinois, ref. 5–C, for location of county), 28 miles W. S. W. of Peoria, 12 miles W. of Illinois River, is situated in a coal-region with mines within the city. It has iron foundries, large agricultural implement and wagon manufactories, cigar manufactories, and a large meat-packing house. There is a good library and high school. Pop. in 1870, 3308; in 1880, 3762.

Canton, on R. R., Norfolk co., Mass. (see map of Massachusetts, ref. 5–I, for location of county), 14 miles S. of Boston. Canton township has manufactures of cotton and woollen goods, sewing silk, machinery, etc. Pop. of township in 1870, 3879; in 1880, 4516; in 1885, 4380.

Canton, city and R. R. junction, capital of Madison co., Miss. (see map of Mississippi, ref. 6–F, for location of county). Pop. in 1870, 1963; in 1880, 2083.

Canton, Lewis co., Mo. (see map of Missouri, ref. 1–H, for location of county), on R. R. and the Mississippi River, about 185 miles above St. Louis. It is one of the chief shipping-points of the county, and contains Christian University, of the Christian Connection. There are various manufactures. Pop. in 1870, 2363; in 1880, 2632.

Canton, capital of St. Lawrence co., N. Y. (see map of New York, ref. 1–H, for location of county), on R. R., 60 miles N. E. of Watertown, and on Grass River, which affords valuable water-power, used in manufacturing lumber, flour, machinery, leather, castings, etc. Canton contains a court-house, jail, almshouse, good graded schools, and is the seat of St. Lawrence University (Universalist), having law and theological schools connected with it. Pop. in 1870, 1681; in 1880, 2049.

Canton, city and R. R. centre, capital of Stark co., O. (see map of Ohio, ref. 3–H, for location of county), at the confluence of the East and West branches of Nimishillen Creek. It contains an academy, St. Vincent's College (Roman Catholic), woollen and flouring mills, and manufactures of mowers and reapers, printing-presses, safes, saws and springs, ploughs, etc. The city has water-works, and derives its prosperity chiefly from its manufactures, though the surrounding country is a very rich agricultural one. Pop. in 1870, 8660; in 1880, 12,258.

Canton, Pa. See Appendix.

Canton, capital of Van Zandt co., Tex. (see map of Texas, ref. 2–J, for location of county), about 200 miles N. N. E. of Austin City. Pop. in 1870, 183; in 1880, 331.

Canton (John), F. R. S., an English natural philosopher, born at Stroud in 1718. He made some discoveries in electricity, and received from the Royal Society a gold medal in 1765 for his demonstration that water is compressible. Died in 1772.

Can′tonment* [Fr. *cantonnement*], a military term applied to temporary resting-places of European armies. When troops are detached and quartered in several adjacent towns or villages they are said to be in cantonments. In India the term is applied to permanent military stations of the British army, or to regular military towns at a considerable distance from any city. A cantonment on a large scale comprises, besides barracks for European soldiers and huts for native troops, magazines, public offices, and bungalows for the officers.

Cantù (Cesare), a popular Italian historian and poet, born near Milan Sept. 5, 1805. He wrote "Storia Universale" (20 vols., 1837–42), which has been translated into English and French, and "Della Indipendenza Italiana" (1872). He supported the liberal cause in 1848. D. Feb., 1881.

Canu′sium [Gr. Κανύσιον], an important and very ancient city of Apulia, in Italy, on the river Aufidus (Ofanto), about 15 miles from its mouth. It was probably founded by the Greeks. The inhabitants were called *bilingues* by Horace, because they spoke Greek and Latin. It was captured by the Romans in 318 B. C. Its site is occupied by the modern Canosa (which see). Here were found, about 1803, remarkable remains of ancient art, among which were painted vases, marble statues, and jewels of exquisite workmanship.

Canute, Knut, or **Knud,** king of Denmark and the conqueror of England, was the son and successor of Sweyn, king of Denmark, who died in 1014. After the death of Edmund Ironsides, in 1016, Canute reigned as sole monarch of all England, having completed by arms the subjugation of the Anglo-Saxons. He confirmed his power by mildness and prudent policy, and became the most powerful European monarch of his time. He founded monasteries, patronized minstrels, and wrote verses or ballads himself. He died Nov. 12, 1035, leaving three sons, Sweyn, Harold, and Hardicanute.

Can′vas [from the Lat. *cannabis*, "hemp"], a coarse hempen or linen cloth which is extensively used in the form of tents and the sails of ships. It is also the principal material on which artists paint oil-pictures. The word is sometimes employed as synonymous with sail. In Old English it meant also a straining-cloth or sieve.

Can′vas-back (*Aythya valisneria*), a species of North American duck, the flesh of which is highly prized. It is considered by some persons as the most delicious of all waterfowl. It is not found in Europe. It frequents the bays of the sea and the estuaries of rivers. The plumage is diversified with black, white, chestnut-brown, and slate-color. The length is about twenty inches. These birds, after breeding in the northern parts of the continent, migrate southward about November. During the winter many of them are shot on Chesapeake and Delaware bays. Those found on the Chesapeake are considered better than any others.

Canzo′ne, a form of Italian lyrical poem adopted, with some alteration, from the poetry of the Troubadours. The canzone is divided, like the Greek strophic ode, into stanzas, in which the number and place of rhymes and metre of verses respectively correspond. The last stanza, commonly shorter than the others, is called *congedo* or *ripressa*. This form of poetry was adapted by Petrarch to the expression of different veins of thought—elevated and heroic.

Caoutchouc, Gum Elastic, or **India-Rubber,** a valuable substance used in the arts for a great variety of purposes, is the inspissated juice or sap of several species of plants of the natural orders Euphorbiaceæ, Moraceæ, Artocarpaceæ, and Apocynaceæ. It is produced chiefly in tropical and sub-tropical countries, especially in the East Indies and South America. The milky juice of the tree is obtained by incisions in the bark, and is dried on clay moulds over smoky fires, which gives it its usual black color. Pure caoutchouc is a hydrocarbon, C_8H_{14}. It is extremely valuable in the arts on account of its elastic and waterproof properties. By combining it with less than 25 per cent. of sulphur, and exposing it to a temperature of about 270° F., it is converted into soft vulcanized rubber, a substance much more valuable than the original caoutchouc. By adding 50 per cent. or more of sulphur, and heating to 300° F., it forms hard vulcanized rubber or ebonite. (See elaborate article on the manufacture of caoutchouc products by Prof. C. F. Chandler, under India-Rubber.)

Cap, in shipbuilding, is a strong, thick block of wood fixed near the top of each mast. It has a hole to receive the upper end of the lower mast, and another to receive the lower end of the topmast, with eyebolts to aid in hoisting the topmast. When made of iron, as is often done, the cap is called a *crance*.

Capac′ity [from the Lat. *capax*, "capable"], in law, ability or power to do a particular thing, such as to take or to hold land, to sue and to be sued, and the like. Capacity may sometimes exist to do one of these acts, and not to do another. Thus, one may be able to take and hold land, and not have capacity to dispose of it, as in the case of an infant; or one may be able to take, and not have the power to hold against another, as in the case of an alien, who may at common law take land as between himself and his grantor, but cannot hold it as against the state. Capacity may be conveniently considered under two general heads—capacity to have rights, and capacity to act. Some rules as to incapacity depend upon natural disabilities; others rest upon arbitrary grounds. This subject is closely connected with the doctrine of *status*, as treated by writers on public law. This has been shown by Mr. Maine in his work on "Ancient Law" to have had its principal origin in the early idea of the family. The arbitrary rules of archaic law have been, to a considerable extent, gradually supplanted by the modern idea of fixing one's relations to another by contract, so that the movement of modern progressive society has been from *status* to contract. This doctrine is well illustrated in the case of master and servant. In ancient law the position of the servant was fixed by an arbitrary rule, so that he was a slave. In modern times the relation depends on contract. Still, there always will be a class of cases where legal capacity is denied, as where persons have not the mental power to enter into a contract, including infants, insane persons, and habitual drunkards, or where a supposed rule of public policy may intervene, as in the case of aliens. These are still in some of the American States denied the power to hold land by purchase, or even to take it at all by descent. In fact, capacity to have rights largely depends on the general convictions of the people of a state, while the capacity to act is commonly determined by a desire to protect one who has rights from an improvident surrender of them. (See as to the relations of this subject to private international law, WESTLAKE's or SAVIGNY's treatises on that topic, and PHILLIMORE or WHEATON on international law.) T. W. DWIGHT.

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* Frequently pronounced kan-too′ment in the British army.

Capanno'ri, a city of Italy, in the province of Lucca, and 5 miles E. of Lucca. It is situated in a fertile plain on the railway from Florence to Pisa, and has considerable trade. Pop. in 1881, 43,673.

Cape Ann, the eastern point of Essex co., Mass., is 31 miles N. E. of Boston. Here is a rocky headland, in which, at Rockport, valuable quarries of syenite are worked. Lat. 42° 38′ 3″ N., lon. 70° 34′ 2″ W. Two stone lighthouses stand on Thatcher's Island, ¾ of a mile distant, each 112½ feet high, showing fixed white dioptric lights of the first class, 165½ feet above the sea.

Cape Ar'ago, or **Greg'ory,** is a point at the S. side of the entrance to Coos Bay, in Coos co., Or. Its lighthouse stands on a small island, lat. 43° 20′ 38″ N., lon. 124° 22′ 11″ W., and shows a flashing light 75 feet above the sea.

Cape Bab-el-Man'deb, on the Arabian side of the strait of that name, lat. 12° 40′ N., lon. 43° 31′ E., is a rock of basalt 865 feet high.

Cape Béarn, a promontory of France, in the Mediterranean; lat. 42° 31′ N., lon. 3° 7′ 30″ E. Here is a lighthouse of the first class, 751 feet above the sea.

Cape Bianco, lat. 37° 20′ N., lon. 9° 48′ E. This is the most northern point of Africa.

Cape Blan'co (*i. e.* "White Cape"), on the Atlantic, is, next to Cape Verde, the westernmost point of Africa; lat. 20° 47′ N., lon. 17° 4′ W.

Cape Blanco, or **Orford,** on the Pacific, is the most western point of Oregon; lat. 42° 50′ N., lon. 124° 32′ 29″ W. Its lighthouse shows a fixed white dioptric light of the first order, 256 feet above the sea.

Cape Boe'o (anc. *Lilybæum Promontorium*) is the most western point of Sicily. It was in ancient times an important naval station, near which the Romans gained a great naval victory in the First Punic war. Lat. 37° 48′ N., lon. 12° 25′ E.

Cape Boj'ador', a bold headland of Western Africa, is the termination of a range of Mount Atlas, in lat. 26° 7′ N., lon. 14° 29′ W.

Cape Bon, or **Ras Adder,** on the N. coast of Africa, 58 miles N. E. of Tunis; lat. 37° 6′ N., lon. 11° 3′ E.

Cape Breton (brit'tn), an island of North America, belonging to Great Britain, and forming a part of the province of Nova Scotia, is in the Atlantic Ocean, and is separated from the north-eastern extremity of Nova Scotia by a narrow strait called the Gut of Canso. It is a rocky island of a very irregular shape, nearly divided into two by the lakes of Bras d'Or, which to the N. E. communicate with the sea, and with a surface much broken by various ranges of hills and covered with dense forests. It has an area of about 3120 square miles, but only about 200,000 acres are under cultivation. The chief articles of export are fish, coal, and lumber. It is noted for its fisheries of cod and mackerel. It is divided into four counties, Cape Breton, Inverness, Richmond, and Victoria. The climate is severe. Pop. in 1881, 84,500.

Cape Canav'eral, on the E. coast of Florida, in Volusia co., lat. 28° 27′ N., lon. 80° 33′ W., is nearly surrounded by dangerous shoals, and has on its N. E. pitch a revolving light of the first order, 139 feet above the sea.

Cape Canso, the most easterly point of Nova Scotia, has a lighthouse on Cranberry Island; lat. 45° 19.5′ N., lon. 60° 55′ 3″ W. It is also a port of entry in Wilmot township, Guysborough co., having active trade and fishing interests. It has a U. S. consul. Gold has been found here. Pop. in 1881, 1451.

Cape Cato'che, the north-eastern extremity of Yucatan, is on the Gulf of Mexico. This was the part of the American continent on which the Spaniards first landed; lat. 21° 34′ N., lon. 86° 57′ 51″ W.

Cape Charles, Va., is the southern point of the "Eastern Shore," a peninsula which separates Chesapeake Bay from the Atlantic Ocean. A lighthouse stands on Smith's Island near this cape with a flashing light of the first order; lat. 37° 07′ 08″ N., lon. 75° 53′ 12″ W.

Cape Clear, the most southern point of Ireland, is in the county of Cork. Here is a lighthouse on a cliff 455 feet above the sea; lat. 51° 26′ N., lon. 9° 29′ W.

Cape Coast Castle, a British settlement and town on the W. coast of Africa, in Upper Guinea; lat. 5° 6′ N., lon. 1° 15′ W. This is the capital of the British colonies on the coast of Guinea. It is defended by several forts. The climate is unhealthy. The chief articles of export are palm oil, gold-dust, and tortoise-shell. Pop. about 10,000.

Cape Cod, Mass., is a long and narrow sandy peninsula, which nearly coincides with Barnstable county. It is about 65 miles long, and from 1 to 20 miles wide. The form of it is similar to a man's arm bent at the elbow. On the northern extremity, Race Point, is a revolving light 47 feet above the sea; lat. 42° 03.7′ N., lon. 70° 14.3′ W.

Cape Cod Ship-Canal. See SHIP-CANALS.

Cape Colon'na (anc. *Sunium Promontorium*), the most southern point of Attica, on the Mediterranean; lat. 37° 39′ N., lon. 24° 2′ E. Its summit is crowned by the ruins of a marble temple 269 feet above the sea.

Cape Col'ony, or **Cape of Good Hope,** a British territory which forms the southern extremity of Africa, is bounded on the N. by the Orange River, on the E. and S. by the Indian Ocean, and on the W. by the Atlantic. Area, 240,110 square miles. The interior of this region is described as a succession of plateaus and mountain-ranges, which increase in elevation as they recede from the coast. The highest mountains are estimated at nearly 10,000 feet above the level of the sea. The sea-coast presents several comparatively safe and commodious harbors, among which the most frequented are Table Bay and Algoa Bay. Cape Colony has no rivers that are of much value for navigation. The climate is healthy, but the extremes of temperature have a wide range. But little rain falls in the interior. The vegetation of this region is peculiar, and rich in beautiful flowers, among which are the ixia, gladiolus, tritonia, strelitzia, pelargonium or Cape geranium, and xeranthemum. The characteristic vegetation of the vicinity of Cape Town consists of Ericaceæ (heaths), Stapeliæ or carrion flowers, and Proteaceæ. Here are about 400 species of Ericaceæ. Among the indigenous animals of Cape Colony are the elephant, giraffe, rhinoceros, lion, buffalo, panther, wild-boar, hyæna, antelope, quagga, springbok, and ostrich. Many cattle and sheep are raised here. The soil in some parts is fertile, but a large portion of it is arid and barren without irrigation. Wheat and other cereals are cultivated extensively. The chief articles of export are wool, wine, copper, hides, horses, flour, aloes, fish, fruits, and maize. The value of the exports in 1880 amounted to £4,341,017, and that of the imports to £7,648,863. Wool is one of the principal articles of export.

The colony is divided into two provinces—E. and W., the respective capitals of which are Graham's Town and Cape Town. The pop. in 1881 was 1,249,824—viz. 98,821 Hottentots, 337,136 Kaffers, and 250,426 Europeans.

History.—The Dutch were the first Europeans who colonized this region. They founded Cape Town in 1652. The colony was captured in 1806 by the British, to whom it was formally ceded in 1815. The European colonists have been often disturbed by the hostility of the Kaffers, a warlike race of negroes. In 1836 the BOERS (which see) left the country in great numbers, and founded the independent Transvaal Republic and Orange Free State. In 1866 British Kaffraria, in 1868 a part of the Basuto country, and in 1880 the province of Griqualand West, were annexed to the colony. A. J. SCHEM.

Cape Com'orin, in the Indian Ocean, is the southern extremity of Hindostan; lat. 8° 5′ N., lon. 77° 30′ E.

Cape Di'amond, in Canada, is at the confluence of the St. Charles River with the St. Lawrence. It is 333 feet above the river, to which it presents a precipitous bluff. On this point stands the citadel of Quebec.

Cape Disappointment, or **Cape Hancock,** the S. W. point of Washington Territory and of Pacific co., at the mouth of the Columbia; lat. 46° 16′ 33″ N., lon. 124° 02′ 13″ W., has a lighthouse 40 feet high, showing a fixed white light of the first order 232 feet above the sea.

Cape Duca'to, or the **Leuca'dian Prom'ontory,** sometimes called **The Lover's Leap,** is the S. point of the Greek island of Leucadia or Santa Maura; lat. 38° 34′ N., lon. 20° 32′ 45″ E. It is a perpendicular white cliff over

2000 feet high, whence Sappho is said to have cast herself for love of Phaon. From this precipice the ancients once a year cast a criminal, first tying a great number of birds to him. If the flight of the birds was strong enough, so that the man was alive when he reached the sea, he was taken up in a boat and set at liberty. Mariners have always regarded this cape with dread.

Cape Eliz'abeth, a township of Cumberland co., Me. (see map of Maine, ref. 10–B, for location of county), 1 mile from Portland, contains a rolling-mill, oil-refinery, a dry-dock, manufactures, is a summer resort and the seat of a State reform school. The township takes its name from the cape, in lat. 43° 33′ 56″ N., lon. 70° 11′ 41″ W. It has two stone lighthouses, one with a fixed and one with a flashing light. Pop. of township in 1870, 5106; in 1880, 5302.

Cape Farewell', the southern extremity of Greenland, is in lat. 59° 49′ N., lon. 43° 54′ W.

Cape Fear, on the Atlantic, is the southern extremity of Smith's Island, N. C., and is the most southern point of the State; lat. 33° 52.3′ N., lon. 77° 59.8′ W.

Cape Fear River is formed by the Haw and Deep rivers, which unite at Haywood in Chatham co., N. C. It flows south-eastward, passes Fayetteville and Wilmington, and enters the Atlantic near Cape Fear. The length, excluding the branches above named, is estimated at 200 miles. Steamboats can ascend it to Fayetteville, 120 miles.

Capefigue (BAPTISTE HONORÉ RAYMOND), a French historian, born at Marseilles in 1802. He studied law in Paris, joined the reconciliatory party, which came into power with M. de Martignac in 1827, and took a very active part in the political discussion of the day as editor of various papers and historical writer. Among his numerous works on French history are "Europe during the Consulate and the Empire" (1839–41), a "History of the Restoration" (1842), and (his best work) a "History of Philippe Auguste" (1831–34, 4 vols.). Died Dec. 23, 1872.

Cape Flat'tery, the N. W. point of Washington Territory and of Clallam co. On Tatoosh Island, half a mile distant, is a small lighthouse, in lat. 48° 23′ 20″ N., lon. 124° 43′ 48″ W. This is the most western point of the U. S., exclusive of Alaska.

Cape Flor'ida, the S. point of Key Biscayne, off the S. E. point of Florida, has a lighthouse standing in a grove of cocoanut trees; lat. 25° 39′ 56″ N., lon. 80° 09′ 24″ W., with a fixed white light.

Cape Foulweath'er, or **Yaqui'na Head,** the westernmost point of Tullamook co., Or., has a brick lighthouse 81 feet high, showing a fixed white light of the first order 150 feet above the sea; lat. 44° 16′ 33″ N., lon. 124° 05′ W.

Cape Gas'pe, the point of land at the N. side of the entrance to Gaspe Bay, Quebec (Canada). It is in lat. 48° 45′ N., lon. 64° 12′ W.

Cape Girardeau, a city, Cape Girardeau co., Mo. (see map of Missouri, ref. 6–K, for location of county), on R. R. and the W. bank of the Mississippi, 150 miles S. of St. Louis, is the seat of St. Vincent's College, and contains also a normal school, a female academy, and a public school. Its exports are cotton, ploughs, and mineral paints. Pop. in 1870, 3585; in 1880, 3889.

Cape Guar'dafui, or **Gardafui,** the easternmost point of Africa, is in lat. 11° 50′ N., lon. 51° 21′ E.

Cape Hancock. See CAPE DISAPPOINTMENT.

Cape Hat'teras, the eastern extremity of North Carolina, is a point of a low sandy island, separated from the mainland by Pamlico Sound. The navigation is dangerous in this vicinity, on account of shoals which extend far out into the sea; lat. 35° 15.2′ N., lon. 75° 30.9′ W. Two miles N. of the extremity stands the lighthouse, 190 feet in height, showing a flashing dioptric light of the first order.

Cape Hay'tien, or **Cap Français,** often in every-day conversation called **Le Cap,** while its original Indian name was **Guarico,** is a seaport-town of the republic of Hayti, on the northern coast of the island of San Domingo, in lat. 19° 46′ N., and lon. 72° 14′ W. Its present population is estimated at 10,000, but in the middle of last century, while under French rule, it was a flourishing city with over 30,000 inhabitants, a university, an academy of music, etc. In 1791 it was burnt by Toussaint l'Ouverture; in 1842 it was destroyed by an earthquake. Its trade is principally with the U. S.

Cape Henlo'pen, Del., is at the entrance of Delaware Bay, 13 miles S. S. W. of Cape May; lat. 38° 46.6′ N., lon. 75° 04.7′ W. It has a stone lighthouse, showing a fixed white dioptric light of the first order, 128 feet above the sea.

Cape Henry, Va., is at the entrance of Chesapeake Bay, 12 miles S. of Cape Charles. Here is a fixed light 129 feet above the level of the sea; lat. 36° 55.5′ N., lon. 76° 0.2′ W.

Cape Horn, the southernmost point of America, is an island of the archipelago of Terra del Fuego; lat. 55° 59′ S., lon. 67° 16′ W. It received its name from the Dutch navigator Horn, or Hoorn, who discovered it nearly a century after Magellan had discovered the strait which bears his name. It is an exceedingly dismal place, the last, rugged, barren outpost of the Andes, with a perpetual antarctic climate. Nevertheless, vessels which pass from the Atlantic to the Pacific, or the reverse, usually double this cape, rather than pass through the Strait of Magellan.

Cape la Hague, a headland of France, in Normandy, on the English Channel, is the N. W. extremity of the peninsula of Cotentin, and about 16 miles N. N. W. of Cherbourg. On the E. side of Cotentin is Cape la Hogue, near which the English and Dutch fleets defeated the French in 1692. Lat. 49° 44′ N., lon. 1° 56′ W.

Capel (THOMAS JOHN). See APPENDIX.

Ca'pelin, or **Caplin,** a little marine fish of the salmon family (the *Mallotus Grœnlandicus*), which visits the coasts of Labrador and Newfoundland in vast shoals, furnishing bait for the cod-fishermen. Capelins are also taken and dried for the European market, and are very good eating. They are about the size of the smelt.

Cap'ell (EDWARD), an English Shakspearian critic, born at Troston in 1713. He published the works of Shakspeare in 10 vols. 8vo, 1767, "Notes and Various Readings of Shakspeare" (1775), and the "School of Shakspeare," 3 vols. 4to (1783). Died Feb. 24, 1781.

Capel'la (*i. e.* the "Kid"), a bright star of the first magnitude in the constellation of Auriga, is also called α *Aurigæ*. It is a double star.

Cape Lookout', the S. E. extremity of the islands off Carteret co., N. C., has a lighthouse 150 feet high near its extremity, in lat. 34° 37′ 16″ N., lon. 76° 31′ 07″ W., with a fixed white light of the first order.

Cape May, or **Cape Island,** a celebrated watering-place of Cape May co., N. J. (see map of New Jersey, ref. 8–C, for location of county), is on a small island in the Atlantic Ocean, 81 miles by railroad S. of Philadelphia. The distance from that city by water is nearly 100 miles. This place has daily communication with Philadelphia by steamboats in summer, is one of the most fashionable summer-resorts in the U. S., and contains numerous hotels. Pop. in 1870, 1248; in 1880, 1699.

Cape May, the southern extremity of New Jersey, is at the entrance of Delaware Bay. Here is a revolving light elevated 152 feet above the sea, in lat. 38° 55.8′ N., lon. 74° 57.3′ W.

Cape May Court-house, capital of Cape May co., N. J. (see map of New Jersey, ref. 8–C, for location of county), is on R. R., 68 miles S. of Camden. P. in 1880, 570.

Cape Mendoci'no, a lofty headland of Humboldt co., Cal., is the westernmost point of that State. It has a wrought-iron lighthouse, with a flashing white light of the first order, 428 feet above the sea; lat. 40° 26′ 24″ N., lon. 124° 23′ 27″ W.

Capen (ELMER HEWITT). See APPENDIX.

Cape North, a promontory in the Arctic Ocean, is the northernmost point of Europe. It is the N. extremity of the island of Magerö, separated by a narrow channel from the mainland of Norway; lat. 71° 10′ 12″ N., lon. 25° 46′ E.

Cape of Good Hope, a promontory near the southern extremity of Africa, is the termination of Table Mountain, rising about 1000 feet above the level of the sea; lat. 34° 22′ S., lon. 18° 30′ E. It is about 30 miles S. of Cape Town, but, though it is nearly half a degree to the N. of Cape Aguillas, the southernmost point of the African continent, it is in reality this point at which the course is changed from S. to E. on the voyage from Europe to India. This cape was discovered by Bartholomew Diaz in 1486, and was first doubled by Vasco da Gama in 1497.

Cape Pal'mas, the S. extremity of Liberia, lat. 4° 22′ N., lon. 7° 44′ W., is a high point with a lighthouse. It is also the popular name of that part of the country. It is included in the Liberian state of Maryland. Cape Palmas is the diocese of a bishop of the Protestant Episcopal Church.

Cape Pine, Newfoundland, lat. 46° 37′ 4″ N., lon. 53° 31′ 45″ W., has an iron lighthouse with a fixed catoptric white light of the first order, 314 feet above the sea.

Cape Poge, the N. E. point of Chappequiddick Island, in Edgartown, Dukes co., Mass., lat. 41° 25′ 14″ N., lon. 70° 26′ 44″ W., has a wooden lighthouse 36 feet high, with a fixed white light of the fourth order.

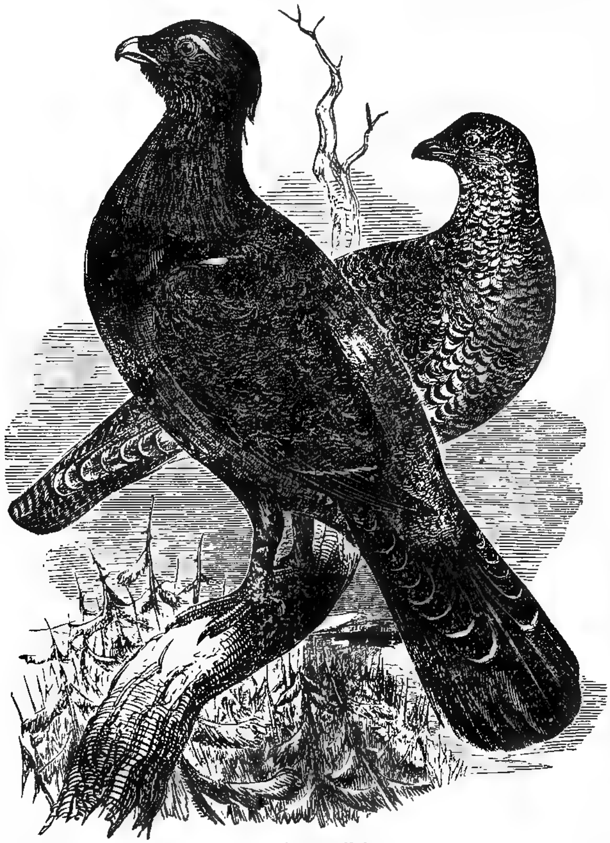
Cape Prince of Wales, the westernmost point of the

American continent, on the E. side of Behring Strait; lat. 65° 45′ N., lon. 168° 17′ W. It is a lofty headland, with dangerous shoals in the vicinity.

Ca′per, the common name of the pickled flower-buds of the *Capparis spinosa*, of Southern Europe and Barbary. Several other species yield buds which are similarly used. It is a trailing shrub of the order Capparidaceæ, growing on rocks and walls, and extensively cultivated in Sicily and the south of France. The flowers are large and beautiful. Capers have an agreeable pungency of taste, and are used as a condiment and ingredient of sauces. They have medicinal properties, being anti-scorbutic, stimulant, and laxative. The buds are gathered every morning, and immediately put into vinegar. They are sorted, and the best are sent to market in jars. Florida has two native species of the caper tree, which are erect and not trailing. The plant called "caper" in England is the caper spurge, a *Euphorbia*.

Cape Race, near the S. E. extremity of Newfoundland, lat. 46° 39′ 30″ N., lon. 53° 4′ 30″ W., is a point very dangerous to ships sailing in foggy weather between the U. S. and Europe. It has a revolving light 180 feet above the sea. It was established by the British government, and (with Cape Pine light) is sustained by a tax upon all ships sailing from or to Great Britain to or from Canada and the North-eastern U. S.

Capercail′zie, Capercail′lie, Wood Grouse, or **Cock of the Woods** (*Tetrao urogallus*), a large gallinaceous bird, a native of Europe, is a species of grouse. The male sometimes weighs fifteen pounds or more. The plumage of the male is variegated with black, brown, and white, and the chest is dark green. Above the eye is a scarlet patch of naked skin. The legs and feet are feathered to the toes. This bird is found in the pine-covered mountains of several countries of Europe and Northern Asia, and feeds on berries, seeds, insects, and young shoots of the fir and pine. It builds on the ground. The flesh is highly esteemed for food.



The Capercailzie.

Caper′naum, an ancient city of Palestine, situated on the N. W. coast of the Sea of Galilee. Some authorities identify it with the modern Tel-Hûm.

Cape Romain′, on Raccoon Key, Charleston co., S. C., has a brick lighthouse 150 feet high, with a flashing light of the first order; lat. 33° 01′ 08″ N., lon. 79° 22′ 12″ W.

Ca′pers (Samuel Wragg). See Appendix.

Capers (William), D. D., an eloquent preacher and bishop of the Methodist Episcopal Church South, born in St. Thomas parish, S. C., Jan. 26, 1790, educated at South Carolina College, studied law, entered the Methodist ministry in 1809, was sent as delegate from his denomination to the Wesleyan Conference, in England, in 1828, professor of evidences of Christianity in Columbia College 1835, editor of the "Southern Christian Advocate" 1836–40, missionary secretary of the M. E. Church 1840–44, and superintendent of colored missions in the Southern States 1844. He took an active part in the proceedings of the Methodist General Conference of 1844, which resulted in the division of the Church, and was elected bishop by the Southern division in 1846. Died in Anderson, S. C., Jan. 29, 1855. He was author of an "Autobiography" (in Wightman's "Life of Capers"), "Catechisms for the Negro Missions," and "Short Sermons and True Tales for Children." He was an able and highly venerated man.

Cape Sa′ble, the S. W. point of Nova Scotia, is in lat, 43° 26′ N., lon. 65° 38′ W. It has a lighthouse, and is on Cape Sable Island, in Barrington township, Shelburne co. The island had, in 1881, 1991 inhabitants, mostly fishermen, descended from loyalists who left the U. S. during the Revolution. A ferry connects it with the mainland. The name Cape Sable Island is also given to Sable Island.

Cape Sable is the most southern point of the peninsula of Florida; lat. 25° 06′ N., lon. 81° 09′ W. It is sandy and low, and is the site of Fort Poinsett.

Cape San Blas, the S. extremity of Calhoun co., Fla., has a brick lighthouse 96 feet high, with a flashing white light of the third order 102 feet above the sea, in lat. 29° 39′ 46″ N., lon. 85° 21′ 38″ W.

Cape San Lucas, the southernmost point of the peninsula of Old California; lat. 22° 44′ N., lon. 109° 54′ W.

Cape Spear, Newfoundland, lat. 47° 31′ 11″ N., lon. 52° 36′ 59″ W., has a colonial lighthouse, showing a revolving catoptric light of the first order, 264 feet above the sea.

Cape St. George, the S. point of St. George's Island, Franklin co., Fla.; lat 29° 35′ 15″ N., lon. 85° 02′ 40″ W., has a brick lighthouse 68 feet high, with a fixed white light of the third order 73 feet above the sea.

Cape St. Mary's, Newfoundland, lat. 46° 49′ 30″ N., lon. 54° 11′ 34″ W., has a brick (colonial) lighthouse, with a flashing red and white catodioptric light of the first order, 300 feet above the sea.

Cape St. Roque, a promontory on the coast of Brazil; lat. 5° 28′ S., lon. 35° 16′ W.

Cape St. Vin′cent (anc. *Promontorium Sacrum*), the S. W. extremity of Portugal; lat. 37° 3′ N., lon. 9° W. Near this cape the British admiral Jervis defeated the Spanish fleet on Feb. 14, 1797.

Capet (Hugh), king of France, was the founder of the Capetian dynasty. He was a son of Hugh the Great, count of Paris, and was born about 940 A. D. The throne having become vacant by the death of Louis V., the last Carlovingian king, in 987, Hugh assumed the royal power with the consent of many of the barons. He ruled with moderation, and selected Paris as the capital of France. He died in 996, and was succeeded by his son Robert.

Cape′tian Dy′nasty, the third dynasty of French kings, was founded by Hugh Capet, who ascended the throne in 987 A. D. (see Capet), and is said to have been the ancestor of thirty-two kings of France. According to some authorities, the last of the direct line of Capetian kings was Charles IV., who died in 1328, without male issue. He was succeeded by his cousin Philippe, who founded the house of Valois. The Bourbon line, from Henry IV. onward, were descendants of the youngest son of Saint Louis, or Louis IX., and so of Capet.

Cape Tit′mouse (*Anthoscopus Capensis*), a small bird belonging to the order Insessores, family Paridæ, found at Cape of Good Hope. It is remarkable for the ingenuity it displays in constructing its nest, which is made chiefly of cotton, and is shaped like a bottle, as shown in the accompanying illustration. Whilst the female is hatching inside, the male, a most watchful sentinel, remains outside, resting in a pouch made for the purpose fixed to one side of the neck of the nest. But when his mate moves off, and he wishes to follow her, he beats the opening of the nest violently with his wing, and succeeds in closing it, in order to protect his young from enemies.

Cape Titmouse.

Cape Town, a seaport of South Africa, the capital of Cape Colony, is on the S. W. shore of Table Bay, and between that bay and Table Mountain; lat. of observatory 33° 56′ 3.2″ S., lon. 18° 28′ 45″ E. It is intersected by several canals, is built on a regular plan, and lighted with gas. Close behind rise the perpendicular rocks of Table Mountain. The town contains an exchange, a college, an observatory, a public library, and a botanic garden. It is the see of a bishop of the Church of England. This port is visited by a large number of vessels, and is a convenient place for mariners to stop for rest and provisions in the voyage between Europe and India. The Constantia wine is produced in this vicinity. Cape Town was founded by the Dutch in 1652, and ceded to Great Britain in 1815. Pop. 57,319.

Cape Trafalgar′, a headland of Spain, on the Atlantic Ocean, between Cadiz and Gibraltar; lat. 36° 10′ N., lon. 6° E. Near this cape, on Oct. 21, 1805, the English fleet gained a great victory over the French, and Lord Nelson, who commanded the former, was killed.

Cape Verd, or **Verde** ("Green Cape"), the most western point of Africa, projects into the Atlantic Ocean between the rivers Senegal and Gambia; lat. 14° 44′ N., lon. 17° 33′ W.

Cape Verd, or **Verde** (called also **Cape de Verd**) **Islands** [Port. *Ilhas Verdes*], a group belonging to Portugal, in the Atlantic, 320 miles W. of Cape Verd. They are between lat. 14° 47′ and 17° 12′ N., and between lon. 22° 45′ and 25° 25′ W. Area, 1650 square miles. The group consists of fourteen islands, nine of which are inhabited—namely, Sal, Boavista, Mayo, Fogo, Brava, São Nicolão, São Thiago, São Antão, and São Vicente. They are all mountainous and of volcanic formation, and the highest point is the peak of Fogo, which rises 9157 feet, and is an active volcano. The climate is hot. They have mostly a fertile soil, and are covered with luxuriant vegetation. Sugar, cotton, coffee, maize, indigo, salt, and tobacco are the staples. The majority of the inhabitants are negroes. The principal occupations are cattle-breeding and the making of salt from sea-water. The most important articles of exportation are coral, salt, physic-nuts, hides, and coffee; and of importation, cotton cloths, timber, glass, crockery, hardware, and wine. Pop. 99,317.

Cape Vin′cent, a port of entry of Jefferson co., N. Y. (see map of New York, ref. 2–G, for location of county), on R. R. and the St. Lawrence River, 25 miles W. N. W. of Watertown. Extensive shingle manufactories and flouring mills are located here. In the vicinity is good fishing, and it is a favorite resort for summer tourists. Pop. in 1870, 1269; in 1880, 1361.

Cape Wrath, the north-western extremity of Scotland, projects from Sutherland into the Atlantic Ocean. It is a pyramid of gneiss about 600 feet high, and is remarkable for the wildness and grandeur of its scenery. Here is a lighthouse 400 feet above the sea, in lat. 58° 37′ N., lon. 4° 58′ W.

Ca′pias [Lat. "you may take"], in law, a writ to take a person into custody. It assumes a number of forms, still designated by the leading words in the old writs, which were framed in Latin, such as (1) *Capias ad audiendum*, or (2) *ad respondendum*, (3) *ad satisfaciendum*, (4) *in withernam*, (5) *utlagatum*. The first of these writs is issued to bring up for judgment a defendant who has been found guilty of a misdemeanor or minor crime; the second is resorted to as a mode of commencing an action. This was originally the most important of all these writs, and is frequently called a "capias," without additional words. It has been much modified in England, and altogether abolished in some of the American States. The third writ designates an execution against the person, and commands the sheriff to take the person named, and to have his body before the court on a specified day to *satisfy* the claim of the party resorting to it. The result is that the party is retained in custody until discharged by due course of law. The writ is frequently called, by way of abbreviation, *ca. sa.* The fourth writ (*in withernam*) is used in an action of replevin where the goods in question cannot be found by the sheriff. By means of it he seizes other goods belonging to the party who has removed them, and detains them until restitution is made. These goods cannot be replevied until those which are the subject of the action are restored. The writ *utlagatum* is used to arrest an outlaw.

Capillaire, a name given to simple syrup flavored with orange flowers or orange-flower water; also to a medicinal syrup which is used as a pectoral in chronic catarrhs, and is prepared by adding sugar and orange-flower water to an infusion of the European fern called maiden-hair (*Adiantum capillus-veneris*), the French name of which fern is capillaire. This species also grows in the Southern U. S. Its virtues are said to be shared by the common maiden-hair (*Adiantum pedatum*), and by several European species.

Cap′illaries [from the Lat. *capillus*, a "hair"], the minute blood-vessels intermediate between arteries and veins. They have but a single coat, which is elastic, but not muscular. In size they vary considerably, most of them being too small to admit the passage of more than one or two blood-corpuscles at a time. Their arrangement differs very much in the different tissues and organs. They can be examined only by the aid of the microscope after their injection with colored fluid; hence their existence was not known to the ancients. During life the capillary movement of the blood may be seen in the web of the frog, the tail of the tadpole, or the wing of a bat. The use of the capillaries is to subdivide and distribute the blood among all the organs and tissues of the body. Their importance in nutrition and in the performance of all the organic functions is very great. (See CIRCULATION OF THE BLOOD, by PROF. HENRY HARTSHORNE.)

Cap′illary Ac′tion in its primary signification denotes the elevation or depression of liquids in fine hair-like tubes, as compared with the level of liquids in equilibrium in vessels or in wide tubes. If a clean wide open tube be plunged into water, nice observation will show an elevation of the fluid both within and without the tube; but if the tube be very fine the water within rises very considerably above its level outside, and the finer the bore the higher the rise. Careful examination will show that the upper surface of the water in the capillary tube is concave. The concavity, or "meniscus," is greatest in the finest tubes. If two glass plates are united at one edge, the opposite edges being slightly separated, and the plates are placed in water with the united edges vertical, the water will rise between the plates, forming a curve which assumes the form of a right-angled hyperbola, of which the asymptotes are the common vertical edge and a line at right angles to this edge so drawn as to be equidistant from the two panes of glass. If mercury be substituted for water, the capillary action is reversed; the mercury not rising in the tube or between the plates, but being depressed. The meniscus, too, is convex in this case, and the hyperbola is likewise reversed. In the barometer and eudiometer it is necessary to make corrections for this capillarity.

The cause of capillarity is well understood, and its results can be mathematically explained. It depends on the adhesion which exists between the fluid and the material of the tube; while the degree of cohesion between the particles of the fluid itself must affect the result. As the size of tubes increases, the column within increases with the square of the diameter, while the attracting surface increases only with the diameter. Attraction is therefore relatively much greater in fine tubes.

The following table exhibits the relative capillary elevation of certain fluids in glass tubes two millimètres in diameter at zero C., according to Frankenheim:

Liquid.	Height of cap. column in millimetres.
Water	15.336
Acetic acid	8.510
Sulphuric acid	8.40
Oil of lemons	7.23
" " turpentine	6.76
Alcohol	6.05
Ether	5.40
Carbon disulphide	5.10

The temperature of the tubes and the liquid exercises an important influence upon capillarity. Heat diminishes the cohesion of the particles of the liquid among themselves, and hence greatly decreases capillary action.

Capillarity is, however, not confined to tubes, but is seen in pounded glass, sand, sponge, bread, and other porous substances. The principle in these cases is obviously the same as in the case of fine tubes. It has been proved that the principle of capillarity exercises a most important influence upon the circulation of nutritive fluids in both plants and animals.

Cap′ita [Lat. "heads"], in law, is principally used to denote the mode of taking either real or personal property from an intestate in case of several claimants. Personal property is taken under the provisions of statute law, based on a well-known English act termed the "statute of distributions," the provisions of which were derived from the civil or Roman law. Primogeniture having disappeared in the main in the U. S. as to the inheritance of land, the laws of descent also recognize division *per capita*. These words are contrasted with "*per stirpes*." Persons are said to take in the former manner (*per capita*) when, standing in an equal degree of relationship to the intestate, they receive equal shares, as if he had left four children. They take in the latter manner, or *per stirpes*, when the claimants, not being in equal relationship to the intestate, some of them represent one who if he had lived would have stood on an equality with others of nearer relationship to the intestate than themselves. Thus, if the claimants were A, a son, and C, D, E, and F, children of B, a deceased son of the intestate, these children representing B would take his share and no more.

Cap′ital [Lat. *capitalis* (from *caput*, "head"); Fr. *capitale*], pertaining to the head or life; important, principal, chief; affecting life, as capital punishment; large, as capital letters. Capital crimes are those which are punishable with death.

Capital, in geography, the chief city or town of a state, empire, province, or county; the seat of government or residence of the court.

Capital [Lat. *capitulum;* Fr. *chapiteau*], in architecture, is a term applied to the head or uppermost part of a column or pilaster. Each of the orders of ancient classic architecture—viz., Doric, Ionic, Corinthian, Tuscan, and Composite—had a peculiar form of capital. The capitals were the prominent characteristic features of the Corinthian and Ionic orders. They became more ornate in proportion to the development of art, the Doric, the most ancient, being very plain and simple compared with the Corinthian capital. (See Corinthian, Doric, Ionic, etc., respectively.)

Capital, in political economy, is that portion of wealth which is employed in production. More specifically, it is the sum-total of the products of former labor employed to provide *materials* and *instruments* for the processes of production, and *support* for the laborers during the process. The term is often loosely employed as synonymous with *money*, but, strictly, capital, in some or all of the three forms named, is only represented by money as an instrument of exchange. In the discussion of questions in political economy the term should be held to its technical meaning. In all the operations of productive industry capital and labor must unite as partners—co-operators for a common end, sharers in a joint result. The antagonism between the two, which appears in combinations of capitalists on the one hand and in trades-unions and strikes on the other, is unnatural, and must work ruinous results to both parties. An important problem of political economy is to guard the rights of both, so that their common interest shall bind them in harmonious union; and its solution will come through a better knowledge on the part of all respecting the elementary principles involved. (See Interest, and Political Economy.) A. L. Chapin.

Capital Account, a term used especially in connection with railroad or other stock companies, as distinguished from the revenue account. It includes the money obtained for shares of stock and that borrowed upon mortgages (debentures) or the property of the company, and begins with the first preparatory operations of the company; whereas the revenue account commences with the returns from actual traffic or other productive business.

Cap′italist, a person who owns or possesses capital, usually applied to a rich man or one who has a large capital employed in trade or manufactures.

Cap′ital Pun′ishment, the punishment of death (so called from the Latin *caput*, "head," also "life"). As the penalty for murder it has prevailed from the earliest times in all parts of the world. In most nations treason or rebellion against lawful government has also been thus punished; and in England and elsewhere, down to a very recent period, the same has been true of counterfeiting, forgery, mail-robbery, and several other crimes. The manner of execution varies greatly. Military criminals, in modern times, are usually shot. In civil administration the modes most prevalent have been decapitation upon the "block," used for political criminals of rank in Great Britain; the Guillotine (which see) in France; in Spanish countries the Garrote (which see); and hanging. In Japan, for some offences, the criminal is condemned to take his own life in the presence of officials. (See Hari-kiri.)

In Christendom the tendency has been in the present century to limit capital punishment to the greatest crimes only, and many intelligent persons believe that it should be abolished altogether. The grounds upon which the question is argued are chiefly—1, common right; 2, Scripture; 3, expediency. The marquis of Beccaría ("Essay on Crimes and Punishments," 1775) denies the right of governments to take human life, under any circumstances, in punishment of crime. It appears to be evident, however, on any theory of society, that such a right exists in all cases in which the safety of the community requires it. As to Scripture, the Old Testament, in accordance with the words, "Whoso sheddeth man's blood, by man shall his blood be shed" (Gen. ix. 6), affords very numerous examples of its enforcement under Divine authority; and the New Testament contains no prohibition of it. It is urged, nevertheless, that the benevolence of Christianity and its high regard for human life oppose the continuance of the death-penalty. In William Penn's code of laws for Pennsylvania it was prescribed for two crimes only—murder and treason. The chief reason for its retention in Christendom is, perhaps, its biblical injunction, especially as this injunction (as above) was given to Noah when he represented the whole human race, and is not therefore merely a Mosaic or Jewish statute, which might be supposed to be superseded, like the Mosaic system generally, by Christianity. It has been plausibly replied, however, that the Noachic law may reasonably be supposed to be subject to modification by the progress of the race, like the Mosaic; and that Christendom has practically recognized this fact by abolishing the capital punishment of *brutes*, which was enjoined in the same Noachic law that enjoins it for man, and without any discriminative qualification whatever. In the early training of the race such means of teaching the value of human life, it is argued, might be necessary; but as one part of the law is now deemed unnecessary, and its execution would be esteemed preposterous, it is inferable that the other is equally subject to change. Beccaría and many others deny the expediency of capital punishment, asserting that it does not lessen the amount of crime. It is well known that in the crowds often assembled in England to witness a public execution, manslaughter has been several times committed. There is no doubt reasonable objection to publicity on such occasions, but this is not necessary. Other objections to capital punishment are the occasional uncertainty of evidence, and the frequent unwillingness of juries to convict in cases where it will follow. On the whole, while the death-penalty would seem to be needful, at least in all imperfectly-settled countries not provided with secure prisons, it may be regarded as an open question whether imprisonment for life might not, with advantage, be substituted for it in the great centres of advanced civilization. This experiment has been tried for a number of years in one or two European countries and in some of the U. S., but the time has not yet been sufficient to afford decisive results. (See Basil Montagu, "On the Punishment of Death," 1809–13; "Memoirs of Sir S. Romilly," 1840; Jeremy Bentham, "Rationale of Punishment," 1830; E. G. Wakefield, "Facts Relating to the Punishment of Death in the Metropolis," 1831; F. Hill, "Crime: its Amount, Causes, and Remedies," 1853; Bovee, "Reasons against Capital Punishment.") (See Punishment, by J. N. Pomeroy, LL.D.) Abel Stevens.

Cap′itals, or **Capital Letters** [Lat. *majuscula*], a term applied in typography and chirography to letters which are larger than the others, and also different in form, except in a few cases, as O, S, V, and W. Every sentence and every proper name should begin with a capital, which is a modern invention. No distinction of capitals and small letters was made by the writers and scribes of the Middle Ages or by the ancients, but distinction existed between uncial and cursive writing. In German books every substantive (or noun) begins with a capital.

Cap'itol [Lat. *Capitolium*], a term originally applied to the magnificent temple of Jupiter Capitolinus, and the citadel or fortress which occupied the Capitoline Hill (*Mons Capitolinus*), in ancient Rome. These edifices were founded by the Tarquins about 600 B. C., and dedicated in 507 B. C. The temple was burned in the time of Sulla, in 83 B. C., but was soon rebuilt. Here was also the *Tabularium*, containing the public archives. The site of the Capitol is now occupied by the palace called Palazzo del Campidoglio, built by Michael Angelo. The term Capitol is also applied to the magnificent edifice in which the Congress of the U. S. holds its sessions at Washington, and to the State-houses which are erected at the capitals of the several States.

Cap'itoline Hill (*Mons Capitolinus* or *Mons Tarpeius*), one of the seven hills of ancient Rome, was very near the left bank of the Tiber, and adjacent to the Campus Martius. It was occupied by the great temple of Jupiter and the citadel, or Capitol, with some other public buildings. The steepness of its sides rendered it a natural fortress. On one side of it was the Tarpeian Rock, from which traitors and state criminals were thrown. This hill is now occupied by the church Ara Cœli and the Palazzo del Campidoglio. (See Capitol.)

Capitoli'nus (Julius), a Latin biographer, one of the authors of the "Historia Augusta," lived about 300 A. D. The biographies of the emperors Antoninus Pius, Marcus Aurelius, Pertinax, Opilius Macrinus, the two Maximins, and others, are ascribed to him.

Capit'ularies [Lat. *capitularia*], a name applied to the laws enacted by the Frankish kings from the time of Childebert. These laws were general for all the states of the kingdom, while those called *leges* were issued for the several states. The most celebrated capitularies were those of Charlemagne and St. Louis. After Charles the Simple, in 922, they were no longer issued. The best collections of them are those of Baluze (Paris, 1677 and 1780), and of Pertz, in the "Monumenta Germaniæ."

Capitula'tion [from the Lat. *capitula*, "heads or chapters"], the act of capitulating or surrendering to an enemy upon stipulated terms; a treaty of surrender to an enemy, which is concluded when the garrison or besieged force does not surrender at discretion or unconditionally. The treaty often consists of several specified conditions or articles, and those who surrender are sometimes permitted to retain their arms and to march out with the honors of war.

Ca'po d'Is'tria (anc. *Ægida*), a fortified seaport-town of Austria, in Trieste, is situated on a rocky island in the Gulf of Trieste, 8 miles S. W. of Trieste. It was formerly the capital of Istria. It is connected with the mainland by a bridge about half a mile long. It is the seat of a bishop, has a cathedral and other churches; also manufactures of soap and leather. Pop. 10,834.

Capodistrias (John Anthony), Count, born in Corfu in 1780, died at Nauplia Oct. 9, 1831. His father practised as a physician, and he began himself to study medicine, but entered afterward upon a political career and held a high position in the government of the republic of the Seven United Islands, when, in 1807, by the Peace of Tilsit, that republic was incorporated with France. He obtained an appointment in the Russian diplomacy, and was finally made secretary of foreign affairs. The diplomatic aid he thus was able to give his countrymen in their exertions for the establishment of an independent Greece induced them to elect him president of the Greek republic in 1827. But he was utterly unable to keep his course straight through the tempest of the moment, and while prosecuting Mauromichali for some criminal offence he was assassinated by two of Mauromichali's cousins, an incident deeply deplored by all friends of the great cause he served.

Caponiere, kap-o-neer' [Fr. *caponnière*], in fortification, is a parapet eight or ten feet in height, with a superior slope extending to the ground like a glacis. It is placed in the ditch of a fortified place, to screen its defenders while passing from one part of the works to another. If there is a passage between two such parapets, it is a *full* caponiere—if on one side only, a *half* caponiere. Another kind, the *casemated* caponiere, constitutes one of the most essential features in the modern German (or polygonal) system of fortification. It is a large casemated structure in the main ditch, and usually opposite the middle of the curtain, by which the entire *front* is defended by flanking artillery fires.

Capon Springs, Hampshire co., West Va., 17 miles E. of Romney and 22 N. W. of Winchester, has celebrated and very valuable warm springs, alterative, and useful in a very wide range of diseases. The scenery is fine and the trout-fishing excellent. The hotels and bathing-houses are extensive.

Cappado'cia [Gr. Καππαδοκία], an ancient province of Asia Minor, was bounded on the N. by Pontus and Galatia, on the E. by Armenia, on the S. by Mount Taurus (which separated it from Syria and Cilicia), and on the W. by Lycaonia. It was traversed by the river Halys. Among its chief towns were Comana, Ariarathia, and Tyana. It was conquered by Cyrus the Great of Persia, and was ruled by independent kings from the time of Alexander the Great until 17 A. D., when Tiberius reduced it to a Roman province. The greater part of it is included in the modern Karamania.

Capparida'ceæ [from *Capparis*, the typical genus], a natural order of exogenous plants akin to the Cruciferæ, mostly of tropical and sub-tropical countries, and having four-parted flowers, which are generally very beautiful. The leaves are mostly alternate, and undivided or palmate. The order comprises about 350 species, herbaceous plants, shrubs, and trees. They have a strong pungent or acrid taste, and some species are poisonous. They have long silken stamens, which are in some cases gayly colored, as in the Caper (which see). Among the interesting species of this order is the *Capparis sodata*, or siwák, a bush or small tree which is a characteristic feature of the vegetation of Africa. It bears pungent berries, which are used as a condiment by the natives. Several species of the caper-bush grow in Florida and the West Indies, and a number of herbaceous plants of the order are found in the U. S.

Capre'ra (literally, "Goat Island"), one of the Buccinarian Islands, in the Mediterranean, 4 or 5 miles from the N. E. coast of Sardinia, belongs to Italy. It is nearly 6 miles long, and abounds in goats and rabbits. The patriot Garibaldi after reaching middle life often resided here. He built a house here about 1854.

Ca'pri (anc. *Capreæ*), a charming island of Italy, in the Mediterranean, at the entrance of the Bay of Naples and 20 miles S. of the city of Naples. It is about 4½ miles long and 3 miles wide. The shores of the island are steep and inaccessible. The town of Capri is the seat of a bishop. Upon this island is a remarkable cavern called the "Grotto of the Nymphs" or the "Blue Grotto." The emperor Tiberius passed the last ten years of his life here, and built twelve villas or palaces, of which the ruins are still visible. Pop. 3911.

Capri'ccio, an Italian word signifying "caprice," "whim," or "fancy," is a musical term applied to a species of free composition which is not subject to rule as to form or measure.

Capriccio, in art, is a picture or other work which intentionally violates the ordinary rules of composition.

Cap'ricorn [Lat. *Capricornus*], the "Goat," the name of the tenth sign of the Zodiac, which the sun enters at the winter solstice, about the 21st of December. It is denoted by this figure, ♑. Capricorn is also the name of a constellation.

Capricorn, Tropic of, in geography, one of the lesser circles of the earth, a parallel nearly 23° 27′ S. of the equator. At the winter solstice (Dec. 21st) the sun is vertical over this line. There is a corresponding circle on the astronomical sphere. This circle touches the ecliptic in the first point of the sign Capricorn, which therefore gives name to this tropic.

Cap'ridæ [from *capra*, a "goat"], a family of ruminant quadrupeds which, according to some naturalists, consists of the two genera *Ovis* (sheep) and *Capra* (goat). Other naturalists extend the term so as to include the antelope.

Caprifolia'ceæ (see Caprifolium), a natural order of exogenous plants which have opposite leaves without stipules, epipetalous stamens, and monopetalous flowers. The fruit is generally a berry, sometimes dry, but not splitting open when ripe. This order is nearly allied to Rubiaceæ, and comprises more than 200 species, mostly natives of temperate and cold climates. Among those that are indigenous in the U. S. are the *Sambucus* (elder), several species of *Viburnum*, and many species of *Lonicera*, called woodbine, honeysuckle, etc.

Caprifo'lium [from *capra*, a "goat;" also a "branch with tendrils" (from the fancied resemblance of the tendrils to a goat's horns), and *folium*, a "leaf"], a genus of plants (twining shrubs) which are natives of Europe and other parts of the northern hemisphere. They mostly have fragrant tubular flowers. The honeysuckle is an example.

Caprimul'gidæ [named from the *Caprimuglus*, or "goatsucker"], a family of insectivorous birds of the order Insessores and tribe Fissirostres. They have long wings, short legs, and toes united at the base by a membrane. The base of the bill is furnished with long stiff bristles. This family includes the goatsucker (*Caprimulgus*) and the American whippoorwill, as well as the night-hawk, the chuck-will's-widow, the poor-will of the Western States, and other native species.

Capri'no, a town of Italy, in the province of Verona, 15 miles N. W. of Verona. It has a beautiful church and many fine country-seats. Pop. 5111.

Caps and **Hats,** the name applied to the political parties in Sweden which were formed under the reign of Frederick of Hesse, 1718–51. After the death of Charles XII. his sister Ulrikke and her husband, Frederick of Hesse-Cassel, were elected king and queen of Sweden. The Swedish crown, however, had no real power. The power was in the hands of the nobility, of which one party, the Hats, leaned toward France, and the other, the Caps, toward Russia. It was this party division which afterward enabled Gustavus III. to break the power of the nobility.

Cap'sicin, an exceedingly acrid, soft, resinous alkaloid of a reddish color, obtained from the seed-pods of the *Capsicum annuum* or Cayenne pepper, of which it is the active principle.

Cap'sicum, a genus of plants of the order Solanaceæ, natives of the warm parts of America, Africa, and Asia. They are mostly annual or biennial plants, with more or less woody stems, and have a wheel-shaped corolla, with five convergent protruding anthers. The fruits of *Capsicum annuum, frutescens, fastigiatum, baccatum, grossum,* and *cerasiforme,* with perhaps those of other species, form, when pulverized, the Cayenne pepper which is extensively used as a condiment. It is extremely pungent, and is often employed with excellent results in medicine as a derivative and stimulant. The *Capsicum annuum* is a hardy plant, cultivated in the U. S., where pickles are made of its unripe fruit. It is stated that the fruit of *Capsicum toxicarium* of tropical America is a narcotic poison. The *Capsicum frutescens* grows wild in Florida, as well as in most warm countries. It is the true Cayenne pepper.

Cap'stan [Fr. *cabestan*], a strong, massive column of timber, shaped somewhat like a truncated cone, and having its upper part pierced to receive bars or levers for the purpose of winding a rope round it, to raise heavy weights or otherwise exert great power. It is chiefly used in vessels for drawing in cables in order to raise anchors, etc. There are several improved forms in use on ships.

Cap'sule [Lat. *capsula*, dimin. of *capsa*, "a box or case"], in botany, a dry, syncarpous, dehiscent fruit or seed-vessel. The term is applied to all dry fruits which are dehiscent, whether simple or compound, one-celled or many-celled, and whether they open by valves or by pores. The capsule or pod is a general name of dry seed-vessels which split or burst open at maturity. The capsule is the pod of a compound pistil. The poppy, lobelia, iris, and snapdragon afford examples of it.

Cap'tain [Low Lat. *capitaneus* or *capitanus*, a "headman" (from *caput*, the "head"); Fr. *capitaine*], a military term which in a general sense signifies a commander, a man skilled in war or the military art. In some countries the commander-in-chief is called captain-general. In a more limited and technical sense, captain is the title of an officer who commands a troop of cavalry, a company of infantry, or a battery of artillery. He is the next in rank below a major. In the U. S. army a captain is responsible for the camp-and-garrison equipage, the arms, ammunition, and clothing of his company. A captain of the U. S. marines is of a rank corresponding with that of a captain in the army, and that of a lieutenant in the navy.

CAPTAIN (of the navy) is an officer of higher rank and holds a more responsible position than a captain of the land forces. He has the command of a ship, and is responsible for everything on board—all that relates to the *personnel* or the *matériel* of the vessel. The commanders of all British vessels, from first-rates down to ship-rigged sloops, are captains. A captain in the royal navy is the next in rank above a commander. A captain in the U. S. navy takes rank with a colonel in the army, and next below a flag-officer. He rises by regular succession to the rank of rear-admiral, but he cannot attain that rank unless he has first served for six years in a sea-going vessel with the rank of captain. Before the civil war (1861–65) there was no definite rank in the U. S. navy higher than that of captain. (See COMMODORE.) The term captain is also applied to the master of a merchant-vessel.

Cap'tion [Lat. *captio*, a "taking"], in law, is that part of a legal document, such as an indictment or commission, which shows the time and place where, and the authority by which, it was made or executed. It is of considerable consequence in the case of indictments. While a caption is not strictly a part of an indictment, its absence or imperfection may be of serious import. Its office in this case is to state the style of the court, and the time and the place of its meeting, and the time and place where the indictment was found, and the number of the jurors who found it, though their names need not be mentioned. Care that it be properly drawn is particularly requisite where the indictment is removed into a higher court (see CERTIORARI), in which case it is said that there must be enough in the caption to show that the inferior court has jurisdiction in the case. (The details of the subject will be found in WHARTON'S "Criminal Law" and in ARCHBOLD'S "Criminal Pleading and Practice," where useful forms of captions are given.)

Capture. See INTERNATIONAL LAW, by PRES. THEO. D. WOOLSEY, S. T. D., LL.D.

Cap'ua [Gr. Καπύη], an important city of ancient Italy, the capital of Campania, was situated on a plain about 2 miles from the river Vulturnus, and about 18 miles N. of Naples. It is supposed to have been founded by the Etruscans, who called it *Vulturnum.* It was probably nearly as ancient as Rome itself. Capua was the greatest and most opulent city of Italy about 350 B. C. It was conquered by the Romans in 340 B. C., but it continued to prosper under the Roman power, and in the time of the second Punic war was scarcely inferior to the great cities of Rome and Carthage. Capua was noted for its luxury and refinement. After Hannibal had defeated the Roman army at Cannæ in 216 B. C., the popular party of Capua, in hopes of rendering their city independent of Rome, opened their gates to the Carthaginians, who spent the winter in Capua and became enervated by its luxury. The Romans, having besieged the city and captured it in 211, punished its revolt with severity, nullified its political importance, and reduced it to the condition of a provincial town of the most degraded class. It continued, however, to be a popular city for several centuries, but it was taken and ruined in 456 A. D. by Genseric the Vandal. The site is now partly occupied by a large village called Santa Maria di Capua, with 9733 inhabitants. Here are visible the remains of a grand amphitheatre.

Capua (anc. *Casilinum*), a fortified city of Italy, in the province of Caserta, is beautifully situated on the river Volturno, 27 miles by rail N. of Naples. It is on the railway which connects Naples with Rome, and is a military station of the first class. It was considered one of the keys of the former kingdom of Naples. Capua contains a remarkable old cathedral, a college, and several convents. It was founded on the site of *Casilinum*, 2 or 3 miles E. of the ancient Capua, in 856 A. D. Pop. 12,548.

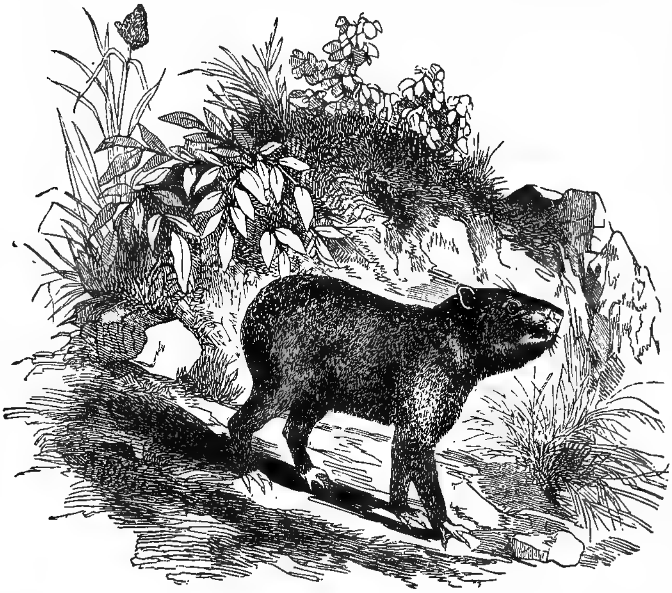
Capuchin' [Fr. *Cappucin;* It. *Cappuccino*] **Friars,** a branch of the order of Franciscan monks which originated in Italy in 1525. They derived their name from a hood or head-dress (in Italian *cappuccio*). They are a branch of the Minorites of the strictest observance. In 1859 they numbered about 11,300. They are found in most countries of Christendom, and are said to be increasing in numbers. They have a few convents in the U. S. The Capuchins are remarkable for their austere discipline. They have never cultivated learning, and have produced few eminent men. One of the best known of its recent members was the late Father Matthew, the distinguished advocate of total abstinence. There is also an order of Capuchin nuns who are also Franciscans of the strictest observance.

Capuchin Monkey, a species of South American monkeys, *Cebus capucinus*, which receives its specific name from the cowl-like appearance of the hairy covering of its head. Other species of the genus receive the same name.

Capudan' Pasha (*i. e.* "captain-pasha," *capudan* being a corruption of the It. *capitano*), the high admiral or commander-in-chief of the Turkish navy. He has the control of all naval affairs, appoints all the officers of the navy, and is governor of the Turkish islands in the Archipelago.

Ca'put Mor'tuum [Lat.], *i. e.* literally, "dead head," the inert residue of distillation and sublimation. When sulphate of iron is distilled at a red heat, it leaves a residue of red oxide of iron, which the alchemists called *caput mortuum vitrioli.* Its symbol was a death's head and cross-bones; hence *caput mortuum* signified also a "bugbear," a source of groundless terror.

Capyba'ra, or **Capiba'ra** (*Hydrochœrus Capybara*), is the largest known quadruped of the order Rodentia, and belongs to the family Cavidæ. It is an aquatic animal, a native of South America, and feeds on vegetable food exclusively. Its dentition resembles that of the cavy, except that the grinding teeth are formed of many transverse plates, the number of plates increasing as the animal advances in age. It is inoffensive and easily tamed. The flesh is esteemed good food. It is somewhat smaller than the common hog.



Capybara.

Car. See Railroad Equipment.

Carab'idæ, a family of coleopterous or beetle-like insects, equivalent to the Linnæan genus *Carabus*. Its species are very numerous and of various habits. Most of them are voracious devourers of other insects and of worms; the larvæ have similar propensities. Some of them are more than an inch in length, and with rather long legs, used in pursuing their prey. A few species have only rudimentary wings. Several have considerable beauty of color and lustre.

Carabo'bo, a province of Venezuela, is bounded on the N. by the Caribbean Sea, on the E. by Caracas, Aragua, and Guarico, on the S. by Portugueza, and on the W. by Barinas, Barquisimeto, and Coro. The province of Cojedes has lately been detached from this province, but nothing definite being known of the boundaries of Cojedes, we treat of the two as one. Area, 7300 square miles. The northern part of the province is mountainous, while it is level in the S. The country around Lake Valencia is one of the most fertile districts of the republic. The climate is very warm, but is only unhealthy on the seashore. The chief products are coffee, cacao, and sugar. Chief town, Valencia. Pop. 159,851.

Car'acal (*Felis Caracàl*), a species of lynx found in the warm parts of Asia and in Africa, supposed to be the same animal as that which the ancients called lynx. It is larger than a fox, and is powerful enough to kill a hound with ease. The fur of the upper part is of a deep brown or wine-red, its ears being tufted with long black hair. It is naturally fierce, but is capable of being tamed, and has been employed in hunting.

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Caracal.

Caracal'la (Marcus Aurelius Antoninus Bassianus), a Roman emperor, a son of Septimius Severus, was born at Lyons in 188 A. D. On the death of his father, in 211 A. D., he ascended the throne, and caused his brother Geta to be murdered. He also massacred several thousand friends of Geta, including Papinian, the great jurist. His reign was disgraced by many acts of cruelty and infamy. He was assassinated near Edessa in 217 A. D., at the instigation of Macrinus, who became his successor. The Baths of Caracalla are among the most striking ruins of Rome.

Caraca'ra, or **Caracara Eagle** (*Polyborus*), a genus of rapacious birds peculiar to America, and regarded as a connecting link between the eagle and the vulture. They feed on carrion, like the vulture. The *Polyborus Braziliensis*, which is found in Brazil and other parts of America, has fine plumage, and measures about four feet from tip to tip of the wings. Other species are known.

Carac'as, the federal dist. of Venezuela, South America, is bounded on the N. by the Caribbean Sea, on the E. by Barcelona, on the S. by Guaraco, and on the W. by Aragua and Carabobo. Area, 6038 square miles. The surface is mostly mountainous, with fertile valleys in the interior. This dist. contains the best cultivated parts of the republic. Capital, Caracas. Pop. 69,394.

Caracas, a city, the capital of the above district and of the republic of Venezuela, is situated 12 miles S. of La Guayra, and nearly 3000 feet above the level of the sea; lat. 10° 30′ 50″ N., lon. 67° 5′ W. It is separated from La Guayra, its seaport, by a high mountain-ridge. It is liberally supplied with water by several streams which run through or near the city. The streets are narrow, straight, and well paved. Among the principal edifices are the cathedral and the church of Alta Gracia. Caracas is the seat of a Roman Catholic archbishop, and contains a college and several hospitals. The climate is healthy, but the place is subject to earthquakes, one of which in 1812 destroyed about 12,000 people. The chief articles of export are cacao, cotton, indigo, coffee, hides, etc. Pop. in 1881, 55,638.

Cara'cci, or **Carracci** (Annibal or Annibale), an excellent painter, was born in Bologna in 1560. He was a pupil of his uncle, Ludovico Caracci, with whom he was associated as a founder of the Bolognese school of painting. The pictures which he painted in the Farnese Gallery in Rome, on which he expended eight years, are considered his best works. He is generally regarded as the greatest painter of the Caracci family. Died at Rome in 1609. (See Kugler's "Schools of Painting in Italy.")

Caracci, or **Carracci** (Ludovico), the founder of the Bolognese school of painting, the son of a butcher of Bologna, was born in 1555. He was noted for his fidelity to nature. Among his works are a "Transfiguration" and "The Preaching of John the Baptist." He had several eminent pupils, including Domenichino and Guido Reni. Died in 1619.

Caraccio'li (Francesco), Prince, an Italian admiral, born at Naples about 1748. He entered the service of the Parthenopian Republic formed at Naples in 1798, and obtained the command of a small fleet. He repulsed the Anglo-Sicilian fleet in 1799. After Naples had surrendered to the royalists he was arrested and hung by the order of Lord Nelson in 1799.

Car'acole [Sp. *caracol*], a French term used in horsemanship or the manège to denote a semi-round or half-turn. When cavalry advance to charge in battle they sometimes perform caracoles in order to perplex the enemy, and excite a doubt whether they will attack the flank or the front.

Carac'tacus, or **Cara'doc,** a brave king of the Silures, a tribe of ancient Britons who lived in Wales. He resisted the Roman invading armies for nine years, but was at length defeated, and was carried a captive to Rome in 51 A. D. His deportment in the presence of the emperor Claudius was admired by the Romans, who treated him with clemency.

Cara'doc Sand'stone, a deposit originally described by Murchison as one of the principal members of his lower Silurian series. It is found at Caer Caradoc, in Shropshire, and is remarkably rich in trilobites. Among the other fossils of this deposit are Brachiopoda and Graptolites. The thickness of the beds in some places reaches 9000 feet.

Cara'fa de Colobra'no (Michele), an Italian musician and composer, born at Naples Nov. 28, 1785. He became a resident of Paris about 1821. Among his works are operas entitled "Il Sonnambulo" and "Massaniello." Died July 28, 1872.

Caraites. See Karaites, by Rev. S. Adler, Ph. D.

Car'alis, or **Cal'aris,** the capital or chief town of ancient Sardinia, is said to have been founded by the Carthaginians before the Second Punic war. It had a good port, and was for many centuries an important place. The site of it is now occupied by Cagliari.

Carambo'la, an East India fruit produced by the *Averrhoa Carambola,* a small evergreen tree of the natural order Oxalidaceæ. The fruit is about as large as a duck's egg, and has five longitudinal ribs, with a thin, smooth, yellow rind. The pulp has an agreeable flavor (sweet or acid), and is used in making sherbets, tarts, etc. It is one of the most generally-cultivated fruits in India, and is sometimes called Coromandel gooseberry. The tree has irritable or sensitive leaves, and exhibits in a remarkable degree the phenomenon called sleep of plants. The acid fruit called *bilimbi* grows on another species of *Averrhoa.*

Car'amel [said to be from Lat. *canna,* "cane," and *mel,* "honey" or "sugar," *i. e.* "cane-sugar"], a name given to the dark-brown substance produced by burning sugar or exposing it to a great heat. It is also formed in the process of roasting coffee and malt. It is used to color wine and to adulterate coffee. Caramel is also a sort of confectionery.

Cara'na Resin, or **Gum-Cara'na,** the product of an unknown South American tree. It is soluble in alcohol, and melts at a low temperature.

Cara'pa, a genus of plants of the order Meliaceæ, natives of warm climates. *Carapa Guianensis* is a large tree called anderaba, which grows in Guiana, and has large pinnate leaves. Its bark is reputed a valuable febrifuge, and is used in tanning. Masts of ships are made of the trunks. Lamp oil is obtained from the seeds of this tree and from those of the *Carapa Guineensis,* which is a native of Guinea. Its oil is used to protect the bodies of the natives from the bites of insects.

Car'apace, the upper shell or dorsal shield of chelonian reptiles (turtles and tortoises) and of the Crustacea Malacostraca (crabs and lobsters). In the Chelonia it is chiefly an expansion of the ribs covered by a thick layer of horny substance. The latter is most peculiar in the hawk's-bill turtle, furnishing the tortoise-shell of commerce.

Caraquette, Lower, a port of entry in Gloucester co., New Brunswick, has a good harbor and extensive fisheries.—The settlement of Upper Caraquette is in the same parish. Pop. of sub-district in 1881, 3837.

Carasco'sa (Michele), born in Sicily; was an officer successively in the armies of King Ferdinand, the Neapolitan republic, King Joseph, and Joachim Murat; signed the convention of Casalanza; was made minister of war; placed himself at the head of the revolution; was defeated; fled to London, and fell there in a duel. His "Mémoires sur la Révolution de Naples en 1821" appeared in London in 1823.

Car'at [from the Gr. *κεράτιον*, a "little horn;" a "pod" of the locust tree; also a minute weight], a term used by jewellers in weighing gold and precious stones. For diamonds a carat is three and one-sixth troy grains, a "carat grain" being one-fourth of this. In assaying gold, either the pound, ounce, or any other weight is divided into twenty-four parts, in order to designate the proportion of pure gold in an alloy with another metal or metals. That which contains $\frac{22}{24}$ of gold is said to be "twenty-two carats fine." There is here no absolute designation of weight.

Carava'ca, a town of Spain, in the province of Murcia, is on the slope of a hill 40 miles N. W. of Murcia. It has an old castle, a college, and a fine church. Excellent wine is produced in the neighborhood. Pop. 15,017.

Carava'ggio, a walled town of Italy, in the province of Bergamo, 38 miles by rail E. of Milan. Here are two handsome churches. The melons of this place are noted throughout Italy. Pop. 5535.

Caravaggio, da (Michael Angelo), an Italian painter, born at Caravaggio in 1569. His proper name was Michael Angelo Amerighi (or Morigi). He imitated no model except nature, and formed an original style. He excelled in chiaroscuro and coloring. His wild and gloomy character is reflected in his works. Among his masterpieces are a "Supper at Emmaus" and "The Fraudulent Gamblers." His temper was quarrelsome. Died in 1609.

Car'avan [Arabic and Persian *karawân*], a company of merchants or pilgrims who associate together in order to traverse with greater security the deserts of Africa and Asia. The commercial intercourse of those regions has been from the remotest ages carried on chiefly by caravans of camels. In Mohammedan countries large caravans of pilgrims are annually assembled to perform the journey to Mecca. The most important regular caravans are those which annually travel to Mecca from the three following points—Damascus, Cairo, and Babylon. The caravan of Damascus is said to consist of more than 30,000 pilgrims and merchants, many of whom are Europeans. Each caravan is under the command of a chief.

Caravan'serai', or **Caravan'sary** [Arabic *karawân,* a "caravan," and *serâi,* a "palace" or "inn"], also called **Khan,** an Oriental public-house or unfurnished inn for the shelter and lodging of travellers in Asia and Africa. The travellers in those regions usually carry their own food with them. Each of these inns is commonly a square building of four wings built round a courtyard, in which the beasts of burden are confined. There is always a well or spring of water in it. The wings are divided into small lodging-rooms, in which the traveller finds no bed or furniture but that which he carries with him. In many caravanserais the hospitality is gratuitous. It was in the stable of one of them (called *inns* in the Bible) that our Saviour was born.

Car'away (*Carum Carui*), a plant of the order Umbelliferæ, grows wild in Southern Europe and in some parts of Asia. It is cultivated in Europe and America for its aromatic seeds (carpels), which are used in medicine as a carminative and tonic. They are also used as a condiment by confectioners, pastry-cooks, and perfumers. Their aromatic principles depend on a volatile oil called oil of caraway, which is obtained by distilling the crushed seeds with water. It is administered by physicians to correct the nauseating and griping tendencies of some cathartic medicines.

Carbazotic Acid. See Picric Acid.

Car'bides, formerly called **Carburets,** are chemical compounds of carbon with a metal. None of them occur in a natural state.

Car'bine, or **Car'abine** [It. *carabino,* probably from *carabin,* a light-horseman among the Arabs], a light musket, a firearm used by cavalry and artillery, is shorter in the barrel than the infantry musket or rifle. The best carbines are now rifled. The American breech-loading carbine has usually a barrel about twenty-two inches long, has a long range, and may be fired with rapidity. (See Small-Arms, by Gen. P. V. Hagner, U. S. Army.)

Car'bo (Cneius Papirius), a Roman general who was elected consul in 86 B. C., and was a partisan of Marius in the civil war that ensued. He commanded in a battle against Sulla at Clusium, and soon after that event was defeated by Metellus at Faventia. Having fled to Africa, he was taken prisoner and put to death in 82 B. C.

Carbohydrogens. See Hydrocarbons.

Carbolic Acid, also called **Phenic Acid, Phenol,** and **Carbol.** See Phenol.

Car'bon [Lat. *carbo*, "a coal"], symbol C, an important chemical element or simple substance which is abundant in the mineral, vegetable, and animal kingdoms. It occurs in a great variety of forms and combinations, being the combustible base of charcoal and fossil coal. It also occurs uncombined in the diamond, which is pure crystallized carbon, and in graphite or plumbago. Its atomic weight is 6, or, according to the new notation, 12. It is remarkable for its allotropic character, and is extremely infusible and unalterable at ordinary temperatures. It is the only element that is always present in animal and vegetable substances. In its ordinary forms it is a good conductor of electricity, but the diamond is a non-conductor. United with oxygen, it forms carbonic acid (CO_2), which occurs in the atmosphere, in limestone, marble, dolomite, etc. (See Carbonic Acid.) With nitrogen it forms an important compound called cyanogen. In plants and animals it occurs as one of the principal constituents of wood, gum, starch, sugar, oil, gelatin, fibrin, etc., in which it is combined with hydrogen and oxygen. The various forms of carbon are combustible, but they are not affected by any degree of heat except in the presence of air or oxygen. Carbon resists the action of many reagents which alter other simple substances. It is insoluble in all known liquids. In the classification of the elements it is arranged with sulphur, phosphorus, and boron, which are called tetratomic metaloids, or non-metallic substances. A compound of carbon with a metal is called a carbide or carburet. Coke and lampblack are more or less impure artificial forms of carbon.

Carbona'ri is the name of a secret political society, founded during the French rule in Naples in the beginning of the present century. After the restoration of the Bourbons in Naples the society rapidly increased. In 1820 they organized branches in France, and after the defeat of the revolutionary party in Naples and Piedmont, Paris became their head-quarters. After the revolution of 1830 the society disappeared, although as late as 1841 a society of Carbonari was found to exist in Southern France. In the revolution of 1848 they took no part.

Car'bonated (or **Acid'ulous**) **Wa'ters** are those which contain a large proportion of carbonic acid gas. The term is applied to mineral springs, as those of Seltzer, Vichy, Pyrmont, Salzbrunn, Reinerz, Saratoga, etc. Such waters sparkle much when poured from one vessel to another. They are refreshing and exhilarating, and are useful in some disordered states of the stomach. (See Water.)

Car'bonates, salts containing carbonic acid. They may be easily identified by the effervescence which results when they are brought into contact with dilute hydrochloric or nitric acid. Of this numerous class of salts the most important are carbonate of lime, which occurs in the form of limestone, marble, etc., carbonate of potash, and carbonate of soda. (See Potash and Soda, by Prof. C. F. Chandler). Crystallized carbonate of lime is called Calcareous Spar (which see).

Carbon Bisulphide, or **Disulphide,** is a heavy, clear liquid compound of carbon and sulphur, very volatile and very inflammable. It is composed of one atom of carbon and two of sulphur, and is obtained by passing the vapor of sulphur over red-hot charcoal. Its symbol is CS_2. It has great solvent power, and is largely used in chemistry and the arts as a solvent of caoutchouc and other organic matters, particularly for extracting oils from seeds and other substances. It has recently been used in boilers as a substitute for water in working engines. In contact with alcohol and potassic hydrate it produces potassic xanthate, which has been extensively used to destroy Phylloxera. This compound is a sulphur acid, and when combined with sulphur bases it produces compounds of the class known as sulpho-carbonates.

Car'bondale, a city and R. R. junction of Jackson co., Ill. (see map of Illinois, ref. 10–E, for location of county), 27 miles E. of the Mississippi, is the seat of the Southern Illinois Normal University. It has an active trade in cotton, tobacco, fruit, lumber, building-stone, and farm produce. Pop. in 1880, 2213.

Carbondale, a city and R. R. junction, Osage co., Kan. (see map of Kansas, ref. 6–I, for location of county), 67 miles S. W. from Atchison. It has extensive mines of coal. Pop. in 1880, 710; in 1885, 1230.

Carbondale, a city and R. R. centre of Lackawanna co., Pa. (see map of Pennsylvania, ref. 3–I, for location of county), on the Lackawanna River, and at the head or north-eastern end of the Lackawanna Valley, 16 miles N. E. of Scranton. Large quantities of anthracite coal are mined in this vicinity. Pop. in 1870, 6393; in 1880, 7714.

Carbonear', a port of entry of Newfoundland, on the N. side of Conception Bay, 31 miles from St. John's. It has an extensive trade in fish, a commercial and a grammar school. Pop. about 2000.

Carbon'ic Acid is the popular and former scientific name of a compound of carbon and oxygen, in the proportion of one atom of carbon to two of oxygen. It is called in the new chemical nomenclature Carbonic oxide, Carbon dioxide, or Carbonic anhydride. It is easily prepared by putting marble-dust or chalk into dilute sulphuric or hydrochloric acid. The latter acid, combining with the lime, sets free the carbonic acid as a colorless, slightly pungent gas of the specific gravity 1.524. When this gas is submitted to a pressure of thirty-six atmospheres at 32° F., it becomes a light limpid liquid, without acid properties, readily miscible with alcohol and ether, but not with water or fixed oils. When this liquid is allowed to evaporate in the open air, it produces cold so intense that the unevaporated residue of the liquid solidifies into a snow-like substance, below 100° F. in temperature. By evaporating this substance in a vacuum the spirit-thermometer can be made to fall to —166° F. Carbonic acid gas is regarded by many authorities as poisonous, while others assert that it destroys life by exclusion of oxygen, like water in drowning. These last authorities state that the narcotic effects attributed to this gas are really due to the presence of carbonous oxide (CO), which is an undoubted poison. (See article next below.) The choke-damp of coal-mines contains both these gases. Carbonic acid is a constant result of ordinary combustion and fermentation, and of the respiration of animals. It furnishes to plants, through their leaves, a very important part of their nourishment.

Carbon'ic Ox'ide, called in the new nomenclature **Carbonous Oxide** or **Carbon Monoxide** (symbol CO), a compound of one atom of carbon with one atom of oxygen, has the atomic weight of 14 or (new) 28. It is fatally deleterious to animals if they inhale it, and extinguishes flame, but it burns with a blue flame in contact with air, and thus forms carbonic acid. It is a colorless and insipid gas. Specific gravity, .967. It does not occur naturally, but may be obtained by the action of sulphuric acid on oxalic acid, by passing carbonic acid over red-hot charcoal, or by heating to redness chalk or pounded marble with iron-filings or zinc. Even when largely diluted with air, it acts as a narcotic poison to those who inhale it. It is produced in anthracite stoves and furnaces, and is often the cause of death in sleeping-rooms when the fire is checked by closing the damper between the fire and the chimney. It is a large constituent of Water Gas (which see). This gas does not perform any active part in natural phenomena, but in the reduction of ores, as in the blast furnace, it is of the greatest importance.

Carbonic oxide, in the new nomenclature, is a name for Carbonic Acid (which see).

Carbonif'erous [from the Lat. *carbo*, "coal," and *fero*, to "bear"], producing or containing carbon or coal, a geological term applied to the strata of rocks which are connected with the coal-beds and are interstratified with them. The period which followed the Devonian age is called by some geologists the carboniferous age. It was the third and last age of the palæozoic era.

Carboniferous Formation, the series of rocks (sandstones, shales, limestones, etc.) which occur in connection and alternation with the coal-beds, and were deposited during the carboniferous age. (See Coal and Anthracite, by Prof. J. S. Newberry, M. D. LL.D.)

Carboniferous Limestone, sometimes called **Sub-Carboniferous** or **Mountain Limestone,** is one of the lower and older rocks of the carboniferous system. It mostly contains magnesia, is of coralline formation, and is rich in organic remains, among which are many encrinites or Crinoidea and marine shells. This limestone is largely developed in Yorkshire and Derbyshire in England, in Russia, Germany, Illinois, Missouri, and other parts of the U. S. Some varieties of it are valuable for building-stone.

Carboniferous System, the name given to the strata which were deposited during the carboniferous age of geology, and which are interposed between the Devonian system and the Permian strata. Most of the great coal-fields of the world belong to this system of formation, which is largely developed in Pennsylvania, Ohio, Illinois, and other States of the Union.

The chief characteristic of the lower and older member of the carboniferous system in England and Western Europe generally, as well as in North America, is a vast deposit of coralline limestone, crystalline for the most part, and abounding in shells, encrinites, and corals. It has long been known as the mountain limestone, from its large development in the mountain districts of Yorkshire, Derbyshire, and Lancashire, where it is the source of much picturesque beauty. (See Carboniferous Limestone.) Among the limestones are many bands of coal, some thick enough and good enough to pay for working. In other parts of England, and in Russia, very poor and imperfect coal-measures represent the carboniferous limestone. In Ireland there is a peculiar sandy deposit of the same age.

Over the carboniferous limestone lies the millstone grit, a rock occasionally represented by bituminous shales and covered by pebbly grits. Here come in some of those valuable deposits of iron more common among the coal-measures, but helping to give value to the middle part of the carboniferous system. Here also are valuable building-stones.

The natural divisions between the beds of limestone and its numerous crevices and caverns are often filled, more or less completely, with ores of lead and zinc. Rich masses of galena occupy the fissures, large deposits of calamine fill the interspaces between the beds, and where none of these valuable minerals exist, large bodies of water accumulate, and occasionally make their way out in springs or are available when tapped by accident or intention.

Much of the carboniferous limestone is of organic origin, and appears to have been deposited in a coral sea, not far from islands covered with luxuriant vegetation. The almost perfect identity of species observable when fossils obtained from the quarries in Central Europe are compared with others from high northern districts either in Europe or North America renders it highly probable that a remarkable uniformity of climate prevailed at that time over the whole northern hemisphere. The nature of the prevailing fossils points to conditions different from any that have since affected the same districts.

Over the millstone grit come the sandstones and shales that contain the coal-measures, the lower part of which in England is most prolific in coal. At least a quarter of a million of square miles of the earth's surface in the various tracts of land now above the water are covered with sandstones and shales of the carboniferous period, among which coal is buried; and this coal is for the most part accessible. As in each square mile of country there are upwards of three millions of square yards of surface, and a cubic yard of coal weighs nearly a ton, while in many coal-fields there is an average of workable coal from ten to twenty yards thick, the reader may obtain for himself a rough but sufficient estimate of the possible extent of supply of this mineral. (See COAL.)

The coal-measures abound in the remains of plants of extinct species, which mostly grow in marshes or low places. The principal fossil plants found in this system are Coniferæ, Equisetaceæ, the Lepidodendra, the Sigillariæ, Calamites, and ferns. REVISED BY J. S. NEWBERRY.

Car'boy, a large globular bottle of green glass protected by basket-work or enclosed in a wooden box. Carboys are used to contain acids and other corrosive liquids. A carboy of sulphuric acid (oil of vitriol) usually contains about 160 pounds of that acid.

Car'buncle [Lat. *carbunculus*], a name given by lapidaries to a beautiful mineral which mineralogists call pyrope. The carbuncle of the ancients appears to have been either pyrope or a deep-red variety of precious garnet which is very similar to pyrope.

Carbuncle [Lat. *carbunculus*, a "small coal"], the *anthrax* of surgical writers, is a violent and painful inflammation, larger than a boil, on any part of the skin, most frequently on the back. The part swells and hardens, and, as the disease advances, assumes a livid redness. The cuticle often rises in blisters, and a number of small openings may occur, through which matter escapes. The origin of carbuncle seems to be constitutional, and it is usually attended by great suffering and considerable prostration. It is sometimes fatal, especially to old people. In its treatment, besides supporting the patient's strength and softening the skin by warm poultices, it is usual to divide the skin early and freely with a knife, or to destroy its surface with caustic.

Car'buret [Fr. *carbure*], the generic term formerly applied to compounds of carbon with the simple elements. (See CARBIDES.)

Car'buretted Hy'drogen, a chemical term applied to two gaseous compounds of carbon and hydrogen. The light carburetted hydrogen or methane is known by the popular names of marsh-gas and fire-damp. It is a nearly odorless gas, evolved abundantly in some coal-mines, where it has caused tremendous and fatal explosions. When pure it is not poisonous. Its symbol is CH_4. A mixture of one volume of this with three volumes of oxygen explodes with great violence when inflamed. It is one of the principal constituents of the coal-gas which is used for illuminating houses and streets. The bicarburetted hydrogen or ethene (C_2H_4) is the same as OLEFIANT GAS (which see).

Carcajen'te, a town of Spain, in the province of Valencia, 22 miles by rail S. S. W. of Valencia. It is on a fertile plain near the river Juncar, and is well built. Here are manufactures of linen and woollen fabrics. P. 12,102.

Carcassonne (anc. *Carcaso*), a city in the S. of France, capital of the department of Aude, is on the river Aude and the Canal du Midi, 56 miles by rail E. S. E. of Toulouse. The river is here crossed by a bridge of ten arches, and separates the old from the new town. The old town, which stands on high ground, is enclosed by walls of great solidity, has an ancient castle, and retains in a remarkable degree the aspect of a fortress of the Middle Ages. Carcassonne is the seat of a bishop, and has a cathedral, a town-hall, a theatre, a public library with about 22,000 volumes, and a college. Here are extensive manufactures of fine woollen cloth which have long been celebrated. This city suffered much in the crusades against the Albigenses. Pop. in 1881, 27,512.

Car'cel Lamp, one in which oil is pumped up by internal machinery, so as to be constantly overflowing the wick. The invention originated in France.

Carcinoma. See CANCER.

Car'damom [Lat. *Cardamomum*], a name of the capsule and seed of several species of plants of the genera *Amomum* and *Elettaria* and natural order Zingiberaceæ. The capsules are three-celled, and contain numerous seeds, which are aromatic and pungent, with a peculiar and agreeable taste. They are used as a condiment in Asia and Germany. Having mild cordial and stimulant properties, they are used in medicine and in combination with cathartics. The officinal cardamom of the U. S. and British Pharmacopœias is the seed of the *Elettaria Cardamomum*, a native of India. The cardamoms of commerce are produced in India, Ceylon, Madagascar, and the Malayan Archipelago.

Car'dan [It. *Cardano*], (JEROME), a celebrated Italian philosopher, author, and physician, was born at Pavía Sept. 24, 1501, graduated as M. D. at Padua in 1525, and became professor of mathematics at Milan. He also practised medicine, and acquired a wide reputation as a physician. In 1552 he visited Scotland and cured the primate of that country of asthma. He afterwards resided successively at Pavía, Bologna, and Rome. He was an astrologer, and professed to be an adept in magical arts. In 1545 he published in his "Ars Magna" a formula for the solution of cubic equations, which is called "Cardan's Formula." He wrote numerous works on physics, astrology, medicine, astronomy, etc. Among them are "De Rerum Subtilitate" ("On the Subtilty of Things") and "De Rerum Varietate" ("On the Variety of Things"). He died at Rome Sept. 20, 1576. (See his autobiography, entitled "De Vita Propria," 1643; H. MORLEY, "Life of Cardan," 1854.)

Card'board is made by pasting and pressing together a number of layers of paper, making either three-, four-, six-, or eight-sheet boards. Bristol board, used by artists, is entirely of white paper; common card-board is white on the outside only. Mill-board, employed in bookbinding, is composed of coarse brown paper, glued and pressed between iron rollers. The enamelling of cardboard is effected by brushing over it a mixture of white lead (China or Kremnitz white) with size. After drying, the surface is lightly rubbed with flannel which has been dipped in powdered talc; it is then polished with a hard, fine brush.

Car'denas, a seaport-town of Cuba, on the N. coast of the island, 120 miles E. by S. from Havana, with which it is connected by railroad. It has a good harbor. P. 7225.

Car'diac [Lat. *cardiacus*], belonging to the heart or connected with the heart. Stomachic and stimulating remedies or cordials are called cardiac medicines; the cardiac orifice is the superior opening of the stomach.

Cardi'adæ, a numerous family of lamellibranchiate bivalve mollusks, includes those species in which the mantle is open anteriorly for the foot, and has two orifices, one for respiration and the other for excretion, as the cockle (*Cardium edule*).

Cardial'gia, or **Car'dialgy** [from καρδία, the "heart," and ἄλγος, "pain"], literally, "pain in the heart." The term is commonly applied, however, to the uneasiness (heartburn) connected with indigestion, the seat of which is really in the stomach.

Car'diff, a seaport-town of South Wales, the capital of Glamorganshire, is on the river Taff, 171 miles by rail W. of London. It contains a town-hall, a fine old castle owned by the marquis of Bute, a theatre, and about thirty churches and chapels. Railways extend from this town to the mining districts of South Wales, the products of which are exported from Cardiff. It has a good harbor, improved by the construction of a magnificent basin and docks. Coal and iron are the chief articles of export. The population has increased rapidly since 1840. Cardiff Castle, built in the eleventh century, is partly in ruins. Robert, duke of Normandy, was confined in it about twenty-seven years by Henry I. Cromwell obtained possession of it in 1648 by stratagem, after bombarding it for three days. Pop. in 1881, 85,378.

Cardiff, a post-village of Lafayette township, Onondaga co., N. Y., on Onondaga Creek, is the place of the pretended discovery of the "Cardiff giant," a statue of a man ten and a half feet long, which was cut from a block of gypsum quarried at Fort Dodge, Ia., sculptured at Chicago, buried for some months at Cardiff, and "accidentally" discovered Oct. 16, 1869. It was exhibited for many months with great success as a petrified giant, but the fraud was finally confessed by its perpetrators. Pop. about 150.

Car′digan, a seaport of South Wales, the capital of Cardiganshire, is on the river Teify, 240 miles by rail W. by N. from London. It has an old and stately church, and the ruins of a castle which is supposed to have been founded in 1160. Romantic scenery occurs in the vicinity of Cardigan. Pop. in 1881, 3633.

Cardigan (James Thomas **Brudenell**), Earl of, an English general, born Oct. 16, 1797, was obliged to leave the service when a lieutenant-colonel on account of bullying conduct towards a brother officer, but was restored to his rank, became known as a daring dragoon officer, and rose in India to be a major-general. At the battle of Balaklava Lord Cardigan led the famous charge of the "six hundred." Died Mar. 27, 1868.

Car′diganshire, a maritime county of South Wales, is bounded on the N. by Merioneth, on the N. E. by Montgomery, on the E. by Radnor and Brecknock, on the S. by Carmarthen and Pembroke, and on the W. by Cardigan Bay. Area, 693 square miles. The surface is diversified with rugged hills, fertile valleys, and small lakes. The rocks which underlie this county are lower Silurian slates and shales, in which rich veins of copper, lead, and zinc occur. The chief articles of export are cattle, sheep, oats, barley, butter, slates, and pigs. Capital, Cardigan. Pop. in 1881, 70,226.

Car′dinal [Lat. *cardinalis*, from *cardo, cardinis*, a "hinge"], an epithet implying importance, and applied to the principal virtues, the four points of the compass, and other objects. The numbers 1, 2, 3, etc. are called "cardinal" numbers, to distinguish them from 1st, 2d, 3d, etc., which are called "ordinal" numbers.

Cardinal [It. *cardinale;* for etymology see above], the title of an ecclesiastic in the Roman Catholic Church. The cardinals are the highest dignitaries of the Church, except the pope, of whom they are the electors and the counsellors. They are distinguished by a scarlet hat and a short purple mantle worn over the rochet. Pope Urban VIII., in 1630, gave them the title of Eminence, which is still used. They are appointed by the pope, who often employs them as ambassadors, and a cardinal so employed is called a legate *a latere.* The body of cardinals is called the Sacred College. The total number of these prelates has been for several centuries limited to seventy, of whom six are bishops of certain Italian dioceses; fifty, styled cardinal-priests, hold their titles from parishes in Rome (many of them being at the same time bishops of foreign dioceses); and fourteen are cardinal-deacons. The actual number of cardinals is often less than seventy. When the pope dies, a successor is chosen by the cardinals, who are assembled in conclave at Rome, and who must elect one of their own number to the vacant pontificate. During the election, which is sometimes protracted several months by their inability to agree, they are confined in a certain building, formerly the Quirinal Palace, and debarred from intercourse with the public; even the door through which they enter the conclave is walled up, and only a small aperture is left, through which food is brought to them.

Cardinal Bird (*Cardinal* or *Cardinalis Virginianus*), called also **Red Bird, Cardinal Grosbeak, Cardinal Finch,** and **Virginia Nightingale,** a native of the U. S., is one of the finest of American song-birds, and is remarkable for the beauty of its form and plumage. The bill is thick and broad, but not long. It belongs to the family Fringillidæ. The back of the male is a dusky red, and the rest of the plumage is a bright, vivid scarlet. It has on the crown long feathers erected into a conical or pointed crest, which it is said to raise and lower at pleasure. The total length is about eight inches. It visits the Northern States as a summer bird of passage, and passes the winter in the Southern States, where some of them remain all the year. Many of them are taken to England and kept in cages.

Cardinal Flower [so called from its bright red flowers, in color like a cardinal's hat], the name of the *Lobelia cardinalis*, a perennial herbaceous plant of the order Lobeliaceæ, common in most parts of the U. S. in wet places, in the Atlantic region. There is a similar species or a new variety of it in Mexico. The color is a most intense red.

Cardinal Virtues, those regarded as of primary importance to character. Among the ancients they were justice, prudence, temperance, and fortitude.

Car′dington, Morrow co., O. (see map of Ohio, ref. 4–F, for location of county), on R. R. and E. branch of the Olentangy River, 41 miles N. by E. from Columbus. Pop. in 1870, 918; in 1880, 1365.

Cardin′ia, a genus of fossil Conchiferæ, comprising about eighty-five species, which extend from the Silurian formation to the lower oolite. They have an oval or oblong shell, attenuated posteriorly, and marked with lines of growth and an external ligament.

Cardi′tis, inflammation of the heart. (See Endocarditis and Pericarditis.)

Cardoon′ (*Cynara cardunculus*), a perennial plant of the same genus as the artichoke, is a native of Southern Europe. It is cultivated for the sake of the leaf-stalks and midribs of the leaves, which are blanched and used as a salad or as a boiled vegetable.

Cardo′zo (Isaac N.), born at Savannah, Ga., June 17, 1786, became in 1816 editor, and some years later proprietor, of the "Southern Patriot," a free-trade journal of his native town. In 1820 he published "Notes on Political Economy." He established the "Evening News" in 1845. He was active in commercial affairs, and, though opposed to the tariff of 1828, was not of the extreme nullification party. He was drowned in Virginia Aug. 26, 1850.

Cards. See Playing Cards.

Cards, a device for preparing the fibres of wool, cotton, or other textile material for the spinning process. The operation was formerly performed by hand-cards, but at present machines of surprising ingenuity are employed. The manufacture of cards is itself accomplished by wonderfully perfect mechanism. The subject is more fully discussed under Spinning (which see). Other forms of cards are employed for the purpose of currying or cleaning the hair of domestic animals. The operation of the common cards has often been compared to the combing and brushing of one's hair; and, indeed, the card combines the properties of the comb and the brush.

Carduus Benedictus. See Blessed Thistle.

Cardwell (Edward), an English statesman, born in Liverpool July 24, 1813, was elected to Parliament in 1842, joined the party called Peelites, and was president of the board of trade from 1852 to 1855. In the latter year he was returned to Parliament for Oxford. He became secretary for Ireland in 1859, and secretary of state for the colonies in April, 1864. Having resigned with his colleagues in June, 1866, he entered the cabinet of Gladstone as secretary of state for war in Dec., 1868. D. Feb. 15, 1886.

Career′ [Fr. *carrière*, literally, a "track or course for carriages or cars"], the ground on which a race is run; a course; a race; the entire course of one's public life. The term was often applied to the course which was run in a tournament or tilt by two mounted knights from the starting-place to the place where they encountered in the middle of the lists.

Ca′ret [from Lat. *careo*] signifies "it is lacking." It is the name of a character formed thus ^, and denotes that some word or letter has been omitted.

Carew′ (Thomas), an English poet and courtier, born in 1589. He was patronized by Charles I., in whose court he served as gentleman of the chamber. He wrote sonnets and short lyrical poems which are remarkable for elegance and ease. Died in 1639. (The name Carew is by some English families of the name pronounced like Carey.)

Ca′rex (gen. *caricis*), [a classical Latin word signifying "sedge"], is the botanical name of a vast genus of coarse grass-like plants of the order Cyperaceæ. They abound in temperate and cold climates, and are perennial herbs, often growing in dense tufts in swamps and wet places. The genus is characterized by male and female flowers, separated (mostly monœcious), with an ovary enclosed in an inflated sac called a *perigynium.* Stamens three, rarely two. More than 450 species of *Carex* are known, and 150 species are described in Gray's "Manual of Botany" as natives of the Northern U. S. The *Carex arenaria* is planted in Holland on the dikes for the purpose of binding the sandy shores with its spreading roots (rhizomes) and resisting the encroachments of the sea. Few of the species are good for pasture, but they tend to convert swamps gradually into fertile soil. In the U. S. they are harvested in large quantities from wet lands, but produce a poor quality of hay.

Ca'rey, R. R. junction in Crawford township, Wyandot co., O. (see map of Ohio, ref. 3-E, for location of county), 50 miles S. by W. of Sandusky. Pop. in 1870, 692; in 1880, 1148.

Carey (Henry Charles), a political economist and writer of distinction, was born in Philadelphia Dec. 15, 1793. He became in 1821 the head of the firm of Carey & Lea, publishers. He has advocated a protective tariff, and has written, besides other works, "The Principles of Political Economy" (3 vols., 1837–40), "The Past, the Present, and the Future" (1848), and "The Principles of Social Science" (3 vols., 1858–59). He was the founder of a school of political economy whose principles are considered more progressive and liberal than those of Malthus and Ricardo. He was distinguished especially for the zeal with which he urged the principle of protection as opposed to that of free trade. D. at Philadelphia, Pa., Oct. 13, 1879.

Carey (Matthew), a writer, born in Dublin, Ireland, Jan. 28, 1760, was the father of the preceding. He emigrated to Philadelphia in 1784, and became a bookseller. He published "The American Museum" (1787–93), wrote several political pamphlets and "Essays on Political Economy," and had much influence in public affairs. Died Sept. 16, 1839.

Carey (William), D. D., born in Northamptonshire, England, Aug. 17, 1761, was a shoemaker in early life, but becoming impressed with the duty of giving the gospel to the heathen, he went to India in 1794 and founded the Baptist mission at Serampore; became (1800) professor of Sanscrit, Bengalee, and Mahratta at the College of Fort William; published a Sanscrit grammar, a Bengalee-English dictionary, and other works, besides assuming the principal labor in the translation of the Scriptures into several Oriental languages. Died June 9, 1834. He takes rank among the most distinguished of modern missionaries for his fidelity, success, and learning. (See "Life," by J. C. Marshman, also by F. Carey.)

Car'go [Sp. *cargo*, *i. e.* "load"], a general name for all the merchandise carried by a merchant-vessel. It is nearly synonymous with freight. The master of every British coasting-vessel is required to keep a cargo-book.

Ca'ria [Gr. Καρία], an ancient province in the extreme S. W. part of Asia Minor, was bounded on the N. by Lydia, on the E. by Phrygia, on the S. by the Mediterranean, and on the W. by the Ægean Sea. The surface is mountainous. It was drained by the river Meander. The chief towns were Miletus, Halicarnassus, and Cnidus, which were founded by the Greeks, and were important places. The natives of Caria were called *Cares*.

Cariam'idæ, a South American family of birds referred to the order Alectorides or the Raptores, or intermediate between them. The chief characters are long tarsus and elevated hallux, short wings, long and graduated tail, nostrils vertically oval, and forehead with erect crest. It embraces only the one genus, *Cariama*, and its two species, *C. cristata* and *burmeisteri*.

Caribbe'an Sea, a grand inlet of the Atlantic Ocean, is between North and South America, and is separated from the Pacific by the Isthmus of Darien (or Panamá) and by Central America. It separates the West India Islands from South America, and communicates with the Gulf of Mexico by a passage about 120 miles wide, which divides Cuba from Yucatan, and is called the Channel of Yucatan. The water accumulated in the Caribbean Sea by an oceanic current flows continually into the Gulf of Mexico, from which it can only escape by the narrow passage between Florida and the Bahamas, thus forming the great Gulf Stream. The depth of this sea is generally more than 500 fathoms. Its navigation is not obstructed by reefs, rocks, or islands.

Car'ibbee Bark, or **Piton Bark,** is obtained from the *Exostemma Caribbæum*, a small tree of Mexico, Florida, and the West Indies. It belongs to the cinchona tribe, and, although possessing none of the active principles of cinchona, it resembles it so much as to be sometimes substituted for it. The flower differs from that of the cinchona in having its stamens exserted, instead of their being included in the corolla.

Caribou', or **Cariboo** (*Tarardus rangifer*), American reindeer, inhabits Maine, New Brunswick, and other cold regions of North America. The caribou is remarkable for the great development of the brow-antlers or branches, which extend in both sexes forward over the forehead. The color of its hair in summer is a rich reddish-brown. The average weight of this animal is about 250 or 300 pounds. Its flesh is much esteemed as food, and its skin is of value. The "barren ground caribou" (*Rangifer grœnlandicus*) is found farther N.

Caribs, a tribe of the red Indian race which inhabited the islands of the Caribbean Sea at the time of the discovery of America, and of which some remnants are still extant, settled in the republic of Honduras. The original Caribs were tall, strong, warlike, and cannibals; indeed, the word "cannibal" seems to be a corruption of their very name. The present Caribs are hardy and industrious, one of the best elements of the population of Honduras.

Ca'ries, a Latin term signifying "rottenness," applied to a disease of the bones analogous to the ulceration of the soft tissues; a term used to designate both open ulcer of bone and chronic ostitis or inflammation of the connective tissue of bone, with solution of the earthy part. It begins as an inflammation, accompanied by periostitis, followed by exudation of new materials and softening. Sometimes the bone-cells are filled with a reddish fluid, and there are masses of tubercle. After caries has existed for some time the abscess bursts; its aperture remains open, discharging a fluid which contains particles of bone. If a probe be passed through this opening, it will be felt to sink into a soft, gritty substance; this is carious bone. Pathologists give different names to the somewhat various forms of the disease. Thus we have "osteoplastic," "tuberculous," and "suppurative" caries, etc. It is molecular death of bone, while necrosis is death of a large mass of bone.

Caries usually selects the vertebræ, the bones of the wrist and foot, and the soft ends of long bones forming joints. Carious vertebræ yield under the weight of the trunk, and the spine curves forward or to one side. In joints the part enlarges, the cartilages become affected, matter forms, and amputation of the limb or excision of the joint is frequently necessary. The causes of caries are constitutional, such as bad nutrition, syphilis, old age, and other depressing conditions. It may be accidentally determined by any irritation, such as a blow or exposure to atmospheric changes. The treatment consists in supporting the patient by judicious change of air, by the use of tonics, such as cod-liver oil, which in scrofula appears to combat the constitutional predisposition. In

Cariama.

those parts where the diseased bone can be reached it may be carefully removed, so as to leave a healthy surface.

Caries of the teeth is a very common disease. It is believed to be caused by dyspepsia and the use of too hot food and drink, but especially by neglect to clean the teeth after eating. (For its treatment see Dentistry, by Dr. C. N. Pierce.) Revised by Willard Parker.

Carima′ta, a group of small islands in the passage between Borneo and Billiton.

Cari′na, a Latin word signifying the keel of a ship or boat; also a botanical term applied to the sharp thin ridge or keel of any organ, and to the two anterior petals of a papilionaceous flower, which adhere by their lower edges and form a body somewhat like the keel or prow of a boat.

Carina′ria [from the Lat. *carina*, a "keel"], a family of heteropodous gasteropods, characterized by having the heart, liver, generative organs, etc. protruded from the body, and encased in an extremely fragile and beautiful shell, which is sub-transparent, symmetrical, and compressed. The convexity of the shell is terminated by a single keel.

Cari′ni, a town of Sicily, in the province of Palermo, beautifully situated 10 miles W. N. W. of Palermo. It has a Gothic castle. Near it are the ruins of the ancient *Hyccara*. Pop. 12,539.

Carin′thia [Ger. *Kärnthen*], a division of the Austrian empire, is bounded on the N. by Salzburg and Styria, on the E. by Styria, on the S. by Carniola and Italy, and on the W. by the Tyrol. Area, 4006 square miles. It is intersected by the river Drave, the valley of which separates the Noric from the Carinthian Alps. It is mountainous, with the exception of the eastern portion, where the valley of the Drave opens out into a plain containing the two large lakes the Wörthersee and the Ossiochersee. Of the surface, one-half is covered with dense forest; of the other half, the larger portion is occupied by pastures, the minor by meadows, grain-fields, and gardens. The mineral production comprises iron, lead, zinc, graphite, and coal (71,264 tons in 1880). The population, numbering 348,730 souls according to the census of 1880, is partly German and partly Slavonic. The German language is used in 255 schools, the Slavonic in 24, and both in 70. There are about 19,000 Lutherans; the rest are Roman Catholics. The principal town is Klagenfurth. There are in all 10 towns, 28 market-villages, and 2911 hamlets. The name Carinthia is derived from the Cari, a Celtic people which inhabited the country when it was conquered by the Romans and incorporated with the province of Noricum. By Charlemagne it was made a margraviate, and by Louis the Bavarian the margraviate was bestowed on the dukes of Austria.

Cari′nus (Marcus Aurelius), a Roman emperor, was the son of the emperor Carus. On the death of Carus, in 284 A. D., Carinus and Diocletian became competitors for the throne. The former gained an advantage in Mœsia over Diocletian in 285, but was killed by his own soldiers, whom he had offended by his cruelty.

Caripe, or **Caribe,** a town of Venezuela, in lat. 10° 10′ N., 40 miles E. of the city of Cumana, is remarkable on account of the extensive caves in the neighborhood, stretching into the limestone rock for a distance of 2800 feet, and with a height of 70 or 80 feet. The caves, which have been described by Humboldt, are inhabited by a peculiar species of night-hawks, whose young ones are killed in great numbers for the sake of the oil they contain. Pop. estimated at 5000.

Caris′sa, a genus of plants of the family Apocynaceæ. *Carissa Carendas* is a thorny shrub much used for fences in India, and its fruit is eaten.

Carlén′ (Emilie Flygare), a popular Swedish novelist, born at Stockholm Aug. 8, 1807. She published in 1838 her first novel, "Waldemar Klein." She was married a second time in 1841 to a lawyer named Carlén. Translated into English, among her works, are "Home in the Valley," "The Lover's Stratagem," "The Professor," and "Woman's Life." They were much read when they first appeared, but have now fallen entirely into oblivion on account of their sentimentality.

Carleton, a thriving suburb of St. John, New Brunswick, and within the city limits, but separated from the main city by the St. John River. Carleton has extensive fisheries. (See St. John, N. B.)

Carleton, a small post-village and township of Bonaventure co., Quebec (Canada), on the Bay of Chaleurs. It is a port of refuge, has fine mountain-scenery, extensive herring-fisheries, a convent of Sisters of Charity, and is a place for holding the circuit courts. Pop. of township in 1881, 1033.

Carleton (Sir Guy), Lord Dorchester, a British general, born at Strabane, in Ireland, Sept. 3, 1724. He became governor of Quebec in 1772, which he defended against the American army in Dec., 1775. He invaded New York in 1776, and fought a battle against Arnold on Lake Champlain. In 1777 he was relieved of the command, but he succeeded Sir Henry Clinton as commander-in-chief in North America in 1781. Died Nov. 10, 1808.

Carleton (William), an Irish novelist, born in Tyrone county in 1798. His first work was "Traits and Stories of the Irish Peasantry" (1830), which was received with favor. In 1839 he published "Fardorougha the Miser," which was very successful. He described Irish life and manners with much vigor and accuracy in other works, among which are "Rody the Rover" (1846) and "Willie Reilly" (3 vols., 1855). Died Jan. 30, 1869.

Carleton Place, a post-village of Beckwith township, Lanark co., Ontario (Canada), at the junction of the Brockville and Ottawa and the Canada Central Railways, 28 miles from Ottawa, on a navigable stream called the Mississippi River. It has manufactures of woollen cloth and iron castings, and very extensive lumber-mills. It has one weekly paper. Pop. in 1881, 1975.

Car′li, or **Car′li Rub′bi** (Giovanni Rinaldo), Count, an Italian political economist, born at Capo d'Istria April 11, 1720. He acquired a high reputation by an important work entitled "Delle Monete e delle Instituzione delle Zecche d'Italia" ("On Italian Coins and the Institution of Mints in Italy," 4 vols., 1754–60). He was appointed president of the council of commerce and public economy at Milan. Among his other works is a treatise "On Italian Antiquities" (1788). Died Feb. 22, 1795.

Car′linville, city, on R. R., capital of Macoupin co., Ill. (see map of Illinois, ref. 8–D, for location of county), 57 miles N. N. E. of St. Louis, and 38 miles S. W. of Springfield. It is the seat of Blackburn University, connected with which is a theological seminary. Its court-house cost $1,800,000. Coal is mined here. Pop. in 1880, 3117.

Carlisle, kar-līl′ (anc. *Luguvallio* or *Luguvallum*), an ancient episcopal city of England, the capital of Cumberland county, is situated on an eminence at the confluence of the Eden and Caldew rivers, by which it is nearly surrounded. It is 301 miles by rail N. N. W. of London, 98¾ miles by rail S. of Edinburgh, and 12 miles E. of Solway Frith. Several railways converge to this point, which also has communication by steamboats with Liverpool and Belfast. It has a cathedral founded by William Rufus, dedicated in 1101, greatly damaged by fire in 1292, and restored about 1854. The choir, which is 138 feet long and 72 feet high, is one of the finest in England. Here is a castle founded in 1092. Carlisle sends two members to Parliament. It has manufactures of ginghams and cotton checks, print-works, iron-foundries, etc. It was the residence of the ancient kings of Cumbria, and was destroyed by the Danes in 900. During the wars between the English and Scotch it was an important fortified border-town, and was often besieged. Pop. in 1881, 35,866.

Carlisle, on R. R., capital of Nicholas co., Ky. (see map of Kentucky, ref. 2–I, for location of county), about 35 miles N. E. of Lexington. It has a normal school. Pop. in 1870, 606; in 1880, 909.

Carlisle, R. R. junction, capital of Cumberland co., Pa. (see map of Pennsylvania, ref. 6–F, for location of county), is situated in the fertile limestone valley between the Kittatinny and South Mountains, 18 miles W. by S. from Harrisburg and 125 miles W. of Philadelphia. It is well built, and has wide streets and a public square. It contains a car-factory and machine-shops. Carlisle is the seat of Dickinson College, founded in 1783. This town was shelled by the Confederates July 1, 1863. It contains also Carlisle (U. S. A.) Barracks. Pop. in 1870, 6650; in 1880, 6209.

Carlisle, Earls of, Viscounts Howard of Morpeth and Barons Dacre of Gillesland (England, 1661).—William George Howard, eighth earl, rector of Londesborough, born Feb. 23, 1808, succeeded his brother in 1864.

Carlisle (John Griffin), born in 1835 at Covington, Ky., where his father had a farm, began to teach school and read law in 1852; was admitted to the bar in 1858; practised with great success in the Covington district; was elected a member of the State House of Representatives in 1864, and of the State Senate in 1866, lieutenant-governor of Kentucky in 1871, and as member of the 46th, 47th, and 48th Congresses. Dec. 3, 1883, he was elected Speaker of the 48th Congress; was also Speaker of 49th Congress.

Carlisle Springs, a post-village of Cumberland co., Pa. It has good hotels and mild sulphurous waters.

Car'lists, a political party of Spain, consisting of the followers of Carlos of Bourbon and his descendants. (See Carlos of Bourbon.)

Car'loman, or **Karloman,** a French prince, was a son of Charles Martel, at whose death, in 741 A. D., he became king of Austrasia, Suabia, and Thuringia. He abdicated in favor of his brother, Pepin le Bref, in 747, and became a monk. Died in 755 A. D.

Carloman, a son of Pepin le Bref and a brother of Charlemagne, was born in 751 A. D. On the death of his father in 768 he began to rule over Neustria and Burgundy. He died in 771, and Charlemagne then obtained possession of Carloman's dominions.

Carlos, Don, infante of Spain, the son and heir-apparent of Philip II., was born July 8, 1545. He was a youth of violent temper and sickly constitution, and appears to have been deficient in intellect. He attacked or menaced the duke of Alva with a poniard in 1567. The king regarded him with suspicion, and ordered him to be tried by the Inquisition, which pronounced him guilty. He died in 1568, but the cause and manner of his death are involved in mystery. He is the subject of Schiller's tragedy of "Don Carlos." (See Prescott, "History of Philip II.")

Carlos of Bourbon, Don, count de Molina, born Mar. 29, 1788, was the second son of King Charles IV. of Spain. He was the heir-presumptive to the throne until the birth of Isabella in 1830. On the death of his brother, Ferdinand VII., in 1833, Don Carlos claimed the throne, and was supported by a party called Carlists, between whom and the partisans of Isabella a civil war ensued. The priests and absolutists mostly preferred Don Carlos, but his claim was rejected by the Cortes in 1836. The Carlist army was defeated in 1839, and Don Carlos fled to France. He abdicated in favor of his son, Don Carlos, count de Montemolin, in 1845. Died Mar. 10, 1855.

Carlos, Don, count de Montemolin, a son of the preceding, was born Jan. 31, 1818. After the death of his father he was a pretender to the throne of Spain, and was recognized as Charles VI. by the Carlists, who revolted in 1860 without success. Died in 1861.

Carlos, Don, duke of Madrid, a nephew of the preceding, son of Don Juan of Bourbon and grandson of Don Carlos, count of Molina, was born in 1848. His father, Don Juan, abdicated in his favor on Oct. 3, 1868, and from that time he was recognized by the Carlists as Charles VII. He made in 1870, and again in 1872, unsuccessful efforts to overthrow the government of King Amadeus, and in 1873 waged war against the republican government. His eldest son, Jayme, prince of Asturias, was born June 27, 1870.

Carlovin'gian [Fr. *Carlovingien*], the name of the second dynasty of French or Frankish kings. The origin of the family is traced to Arnulph, bishop of Metz, who died in 631. The dynasty derived its name from Charles Martel or his grandson Charlemagne. Charles Martel became in 714 A. D. mayor of the palace and king in reality, but he permitted Childeric to retain the name and form of royalty. The Merovingian dynasty ended in Childeric, a *roi fainéant*, who after a merely nominal reign was deposed in 752 by Pepin le Bref, a son of Charles Martel. Pepin usurped the throne, and was the first Carlovingian who took the title of king. He was succeeded by his son Charlemagne, who began to reign in 771, extended his dominions by conquest, was the most powerful European monarch of his time, and the founder of the Germanic empire. He was crowned as emperor of the West by Pope Leo III. in 800 A. D., and died in 814. Under his descendants the empire continually declined in power. His son and successor, Louis le Débonnaire, divided his dominion among his three sons, Lothaire, Pepin, and Louis. Louis le Débonnaire, who died in 840, had another son, Charles the Bald, who became king of France. He died in 877, and was followed by a succession of feeble princes. The last of the Carlovingian dynasty was Louis V., who died in 987. Hugh Capet then assumed the royal power. This house included a number of German and Italian monarchs.

Car'low, a county of Ireland, in Leinster, is bounded on the N. by Kildare and Wicklow, on the E. by Wicklow, on the S. E. by Wexford, on the W. by Queens county and Kilkenny. Area, 353 square miles. The surface is mostly level or undulating; the soil is fertile. The rocks found near the surface are granite and limestone. It contains many dairies, and exports grain, flour, and butter. Coal is mined near the western border of this county. Chief town, Carlow. Pop. in 1881, 46,568.

Carlow, a town of Ireland, capital of the above county, is on the navigable river Barrow, at the mouth of the Burren, 57 miles by rail S. S. W. of Dublin. It is well built, has two bridges, a Roman Catholic cathedral, a college for students of divinity, a lunatic asylum, and a handsome court-house; also extensive flour-mills. Here are the picturesque ruins of a large Anglo-Norman castle founded in 1180. This castle was taken and dismantled by the army of Gen. Ireton in 1650. Pop. 7773.

Car'lowitz, a town of Austria, on the right bank of the Danube, 8 miles S. E. of Peterwardein. It contains a Greek cathedral, and is the seat of the Greek archbishop of the Serbian nationality. It is noted for its excellent wine, the product of which sometimes amounts to 1,750,000 gallons in a year. An important treaty was concluded here in 1699, between Turkey on one side and Austria, Russia, and Venice on the other. Pop. 4419.

Carls'bad, or **Karlsbad** (*i. e.* "Charles's Bath"), a town in Bohemia famous for its hot springs, is on the right bank of the river Eger, about 76 miles W. N. W. of Prague. It belongs to the emperor of Austria, and is said to be the most aristocratic watering-place in Europe. It is in a narrow valley between steep granite mountains, and is surrounded by very beautiful scenery. It contains a theatre, several reading-rooms, and good hotels. The temperature of the waters varies from 117° to 165° F. They contain sulphate of soda and other salts, and about 2,000,000 gallons are discharged daily. The number of annual visitors here is from 12,000 to 15,000. Carlsbad was a favorite resort of Goethe. A congress of German powers was held here in 1819. Pop. in 1880, 10,579.

Carls'burg, or **Karlsburg,** a fortified town of Austria, in Transylvania, on the right bank of the Maros, 46 miles S. S. E. of Klausenburg. Saltpetre is manufactured here. It is the seat of a Roman Catholic bishop, and has a gymnasium, a theological seminary, a normal school, and several convents. Pop. in 1880, 7338.

Carlscro'na, or **Karlskro'na** (*i. e.* "Charles's Crown"), sometimes called in English **Carlscroon',** a seaport in the S. of Sweden, is situated on several small islands, which are connected by bridges with each other and with the mainland, 258 miles S. S. W. of Stockholm; lat. 56° 10′ N., lon. 15° 36′ E. It has an excellent and safe harbor, with sufficient depth of water to float the largest ships, and is the principal station of the Swedish navy. The entrance to the harbor is defended by two strong forts. Here are dry-docks blasted out of the granite rock, and a naval arsenal. It has manufactures of linen cloths, naval equipments, etc. Pop. in 1881, 18,413.

Carls'hamn, a seaport of Sweden, on the Baltic, 27 miles W. of Carlscrona. It has a small but secure harbor, and an active trade in iron, timber, etc.; also manufactures of sailcloth, hats, soap, and tobacco. Pop. in 1880, 6402.

Carls'ruhe, or **Karlsruhe** (*i. e.* "Charles's Rest"), a city of Germany, capital of the grand duchy of Baden, 46 miles by rail S. of Mannheim. It is connected by railways with all parts of Germany. The streets are arranged like the radii of a semicircle, converging towards a central point, which is occupied by the palace of the grand duke. Connected with this palace is a museum and a library of 134,400 volumes. The town also contains a large public library, a botanic garden, a mint, a theatre, an arsenal, and several hospitals. Here are manufactures of carpets, jewelry, chemical products, carriages, etc. Carlsruhe was founded in 1715 by Charles William, margrave of Baden. Pop. in 1880, 49,998.

Carl'stad, a town of Sweden, on the island of Tingvalla, in Lake Wener, about 141 miles W. of Stockholm. It is connected with the mainland by a large and handsome bridge. It has a cathedral, a college with an observatory, and a cabinet of natural history. Copper, iron, timber, and grain are exported from this town through Lake Wener and the Gotha Canal. Pop. 7772.

Carl'stadt, a fortified town of Croatia, in the county of Agram, 33 miles S. W. of Agram, has a large garrison and an active transit trade. Pop. 5175.

Carlstadt (Andreas Rodolphus Bodenstein), born at Carlstadt in Franconia probably a couple of years before Luther, died at Basel Dec. 25, 1541, played a singular part in the history of the Reformation. He studied theology at various Italian universities, and was in 1513 appointed professor at Wittenberg, where he expounded the Christian doctrines in the usual manner of the schoolmen. After an absence of some time on a visit to Rome, he found the whole theology of the university changed by Luther. He first offered some opposition, but then suddenly adopted the views of the Reformer and carried them into extremes. During Luther's stay at the Wartburg he caused great disturbance in Wittenberg by his violence and recklessness, and it cost Luther great exertions to restore order. Humiliated at his failure, Carlstadt began to attack Luther, and made himself the centre of a circle of ill-advised enthusiasts. In 1528 he was banished from Saxony, and in 1530 he settled at Strassburg. Siding with Zwingli in the controversy concerning the Lord's Supper, he was appointed pastor at Basel, where he continued his attacks on Luther. (See his "Life," by JÄGER, Stuttgardt, 1856.) A complete list of his works—mostly polemical, and often rather unsavory—has been given by ROTERMUND in his "Erneuertes Andenken" (Bremen, 1818).

Carlton (THOMAS), D.D., a clergyman of the Methodist Episcopal Church, was born at Derry, N. H., in 1809. He began his ministry in the Genesee (now Western New York) Conference in 1829, and occupied important pulpits in Rochester, Buffalo, and other places during some years. His superior administrative and financial abilities led to his appointment as agent, for three years, of the Genesee Wesleyan Seminary, as presiding elder of important districts for seven years, was twenty years principal agent or publisher of the "Methodist Book Concern" in New York, and treasurer of the Methodist Missionary Society. Died April 16, 1874.

Carludovi'ca Palma'ta, a tree or shrub of the order Pandanaceæ, grows in the tropical parts of South America. It produces the leaves of which Panama hats are made. Those of the best quality are plaited from a single leaf without any joints. As this process requires several months, the price of such a hat is very high.

Carlyle, kar-līl', capital of Clinton co., Ill. (see map of Illinois, ref. 9–D, for location of county), on R. R. and the Kaskaskia River, 47 miles E. of St. Louis, has fine churches and school-houses and considerable iron-manufactures. The public library contains 5000 volumes. It has a female seminary. Pop. in 1870, 1364; in 1880, 2017.

Carlyle (THOMAS), the famous English historian and philosopher, was born Dec. 4, 1795, at Ecclefechan, Scotland. He was educated in the University of Edinburgh, which he entered at the age of fourteen, and very early he embraced literature as a profession. In 1824 he wrote a "Life of Schiller." Soon after he translated Goethe's romance "Wilhelm Meister;" and these books, as well as his biographical essays on Fichte and Jean Paul, contributed very much to call the attention of the English public to the German literature, of whose ideas he himself is the English representative. In 1834 he moved from Craigenputtock, near Dumfries, where he had led a very secluded and almost solitary life, to London, and his literary activity soon widened and became more varied. In 1837 he wrote the "History of the French Revolution" (3 vols.). In 1840 he delivered his celebrated course of lectures on "Heroes and Hero-Worship." In 1845 he published "Oliver Cromwell's Letters and Speeches, with Elucidations and a Connecting Narrative" (5 vols.). In 1851 he wrote "The Life of John Sterling," and from 1858 to 1864 published the "Life of Frederick the Great" (6 vols.), besides producing a great number of essays, reviews, and pamphlets of a miscellaneous character. Carlyle's stand-point as a historian and philosopher was not one of conviction, but of temperament. He could only write when in the attitude of an opponent. What all the world hates he would defend, admire, and love. What all people strive after he would mock and scorn and deride. But he could keep the attitude through six volumes without vacillating, and he was as eloquent and brilliant when he defended as he was grotesque and sardonic when he attacked. Taken as a whole, his writings are one maze of glaring confusion. In 1837 he represented history as an evolution of natural forces according to necessary laws, against which all efforts of individual passion or shrewdness are ridiculous. In 1840 he represented history as the work of the great men, of the heroes, in whose track the mass of the people have to follow like sheep. In all his writings he tells us that human greatness is truth, and truth alone. A man is great in proportion to the amount of truth there is in him. But his heroes happen to be among the greatest liars history knows of—as, for instance, Frederick the Great and Mirabeau. With Carlyle his ideas contradict his ideals. His ideas were those of the German philosophy as it culminated with Hegel—lofty, but without power of progress, radiant like the stars, but like them indifferent to what they shine upon. His ideals were those of the English middle class: what has power must be revered; what is successful must be admired. To bring these ideas into harmony with these ideals is impossible, and the undercurrent of sadness and sourness which flows through all Carlyle's writings, and which now and then bursts forth to the surface with weird chants, is the natural result of such an attempt. But the almost violent mental vigor which was Carlyle's nature, and the perfect veracity which was his character, have produced a combination of these inconsistent elements which, in the details, is always stirring and exciting, even when it makes us sick at heart, and which in our days of harmony of mediocrity is exceedingly refreshing. Carlyle was never mediocre. Even when he played the part of a clown, he was unsurpassed. Indeed, there was only one thing in history which he could not master—the fact. He liked to mock the German historians, and addressed them generally as Mr. Dryasdust; but whenever he himself tried to state a fact and keep it intact, he at once became a Mr. Drierthandust. D. Feb. 5, 1881. His *Life* was written by Froude (1884). CLEMENS PETERSEN.

Carmagnole, a political song of the Jacobins in the French Revolution, also applied to a popular dance of that period, and to a jacket which was worn by the revolutionists as a symbol of patriotism.

Carmar'then, or **Caermarthen** (anc. *Maridunum*), [Welsh, *Caer Fyrddyn*], a seaport-town of South Wales, the capital of Carmarthenshire, is on the river Towy, 8 miles from its entrance into the Bristol Channel. It has a picturesque situation, but the streets are steep and narrow. The Towy, which is here crossed by a bridge, is navigable for vessels of 200 tons from its mouth to this point. Tin plates, cast iron, timber, slates, lead ore, marble, and grain are exported from it. The famous prophet Merlin is said to have been born here. Pop. in 1881, 10,512.

Carmar'thenshire, or **Caermarthenshire,** a county of South Wales, is bounded on the N. by Cardigan, on the E. by Brecon, on the S. E. by Glamorgan, on the S. by the Bristol Channel (here called Carmarthen Bay), and on the W. by Pembroke. Area, 974 square miles. The surface in the northern and eastern parts is mountainous; the soil of the valley is fertile. It is bounded on the N. by the river Teify, and intersected by the Towy, which flows through the celebrated Vale of Towy, 30 miles long. Its mineral resources are copper, coal, iron, lead, slate, and marble, etc. Cap., Carmarthen. Pop. in 1881, 124,861.

Carmel, on R. R., capital of Putnam co., N. Y. (see map of New York, ref. 7–K, for location of county), 50 miles N. by E. from New York City and 15 miles E. of the Hudson River, has a young ladies' seminary. Pop. in 1870, 590; in 1880, 571.

Car'melites, or the **Order of St. Mary of Mount Carmel,** a celebrated monastic order of the Roman Catholic Church. It was probably founded on Mount Carmel in the twelfth century, but the Carmelites claim to have been instituted by the prophet Elijah. They were compelled by the Saracens to wear a striped dress, whence they were formerly called in England Barred Friars. They were at first under the rule of Saint Basil, but afterwards a part of them came under the mitigated rule of Innocent IV.; hence these were called Mitigated Carmelites. In the tenth century a part of the Carmelites sought and obtained a severer rule. These are called Barefooted Carmelites (*Discalceati*). They are entirely independent of the former. Their manner of life is very austere. The Carmelite monks and nuns (who were first admitted to the order in 1452) are found, both Mitigated and Discalceate, in almost every country, though in numbers they are much reduced. The best known member of the order in modern times is the French pulpit orator, Father Hyacinthe.

Car'mel, Mount, a mountain-ridge of Palestine, extends from the plain of Esdraelon to the Mediterranean, and terminates in a steep promontory in that sea, about 9 miles S. W. of Acre: lat. 32° 51′ 10″ N., lon. 34° 57′ 42″ E. It is formed of limestone, with an admixture of hornstone. Its highest point is 1740 feet above the sea, and it terminates in a bluff 480 feet above the sea. Oaks, pines, olives, and laurels grow on its summit and sides. Carmel is mentioned in Scripture as the place where the prophet Elijah slew the priests of Baal. He lived there hidden during the reign of Ahab, and the cave in which he found shelter is still shown. From the first passage of Scripture (2 Kings iv. 23) in which the mountain is mentioned, it appears that it was considered a holy place, where altars were erected to Baal; hence the reason why Elijah selected it for his sacrifice. The exact place where the wondrous contest between Jehovah and Baal took place and the fires proved who was the true God (1 Kings xviii. 20–42) has not been identified. The meaning of the word Carmel in Hebrew is a *park* or *garden*. Near the top of the bluff is a monastery, the inmates of which, 18 in number, are called CARMELITES (which see). The ORDER OF MOUNT CARMEL was a body of one hundred knights, all of noble descent, instituted by Henry IV. of France.

Carmenta, a prophetic divinity of ancient Italy, was one of the Camenæ, and was worshipped by the Roman matrons at a festival called Carmentalia.

Car'mi, a city and R. R. junction, capital of White co., Ill. (see map of Illinois, ref. 10–F, for location of county), at the head of navigation on the Little Wabash River, 150 miles S. E. of Springfield. It has iron and woollen manufactures and several flour-mills. Pop. in 1880, 2512.

Carmin'atives [from Lat. *carmen*, a "charm"], medicines to relieve flatulence and pain in the bowels, such as cardamoms, peppermint, ginger, and other stimulating aromatics.

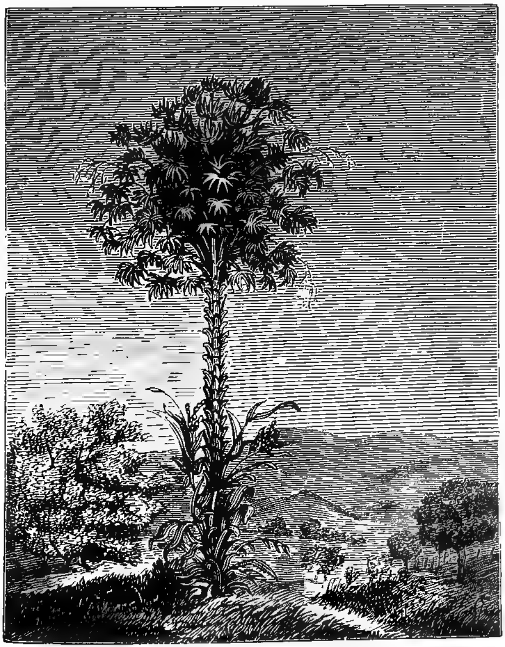
Car'mine [Fr. *carmin*, from the Arabic KERMES (which see)], a beautiful red pigment composed chiefly of cochineal, mixed with alumina and a little oxide of tin. It is employed by artists and silk-dyers, and is an ingredient in the best red inks. It is considered the most beautiful of all red pigments, and has been in use since the middle of the seventeenth century. Under the name of *rouge* it is used by ladies to paint their cheeks. One of the processes by which it is prepared is as follows: Digest one pound of cochineal in three gallons of water for fifteen minutes; add one ounce of cream of tartar, heat gently for ten minutes, add half an ounce of alum, and boil it for several minutes. After the impurities have settled, the clear liquid is placed in clean glass pans or shallow glazed dishes, in which it is allowed to stand while the carmine is slowly deposited. Imitations of carmine are made of red sandal-wood, Brazil-wood, and other substances, and are often sold as *rouge*. (See COCHINEAL.)

Carmo'na (anc. *Carmo*), a town of Spain, in the province of Seville, is picturesquely situated on a hill or high ridge 21 miles N. E. of Seville. It is near the railway which connects Seville with Córdova. It contains a fine old Gothic church, a ruined castle, and a university. Here are manufactures of woollen fabrics, hats, soap, leather, etc. It has a large annual cattle fair. Pop. 20,074.

Carnac, a village of France, department of Morbihan, 19 miles S. E. of Lorient. On a wide plain adjacent to Carnac, and near the sea, is a remarkable monument, consisting of about 1100 to 1200 (formerly over 4000) rude obelisks of granite, standing with their smaller ends on the ground, arranged in eleven parallel rows and from six to twenty-one feet high. Most writers have called these remains Druidical or Celtic, but late authorities ascribe them to a pre-historic race. Pop. in 1881, 2871.

Car'nahan (JAMES), D. D., LL.D., a Presbyterian divine, born near Carlisle, Pa., Nov. 15, 1775, graduated at Princeton in 1800, and was a tutor there 1801–04. After holding several pastorates, he became in 1823 president of Princeton College, performing his duties with fidelity and wisdom till his resignation in 1854. Died Mar. 2, 1859.

Carnahu'ba Palm, or **Caranai'ba Palm** (*Copernicia cerifera*), a beautiful palm which abounds in the N. part of Brazil. It seldom attains a height of more than forty feet. The fruit is edible, and the timber is valuable for several purposes. The leaves of this tree are covered beneath with wax, which is collected, and, like the wax of certain other species of palm, is an article of commerce. Its timber is exported to England, where it is used for veneering.



Carnahuba Palm.

Car'nallite, a hydrated chloride of potassium and magnesium, which occurs in coarse granular masses, mixed with rock-salt, near Magdeburg, in Prussia. It is used as a fertilizer of the soil.

Carnar'von, or **Caernarvon** (anc. *Segontium*), a seaport-town of North Wales, capital of Carnarvonshire, is on the E. side and near the S. W. end of the Menai Strait, which separates it from the island of Anglesey. It is 7 miles S. W. of the Menai Bridge, and about 60 miles W. S. W. of Liverpool. The harbor will admit vessels of 400 tons, and steamboats ply between this port and Liverpool. Carnarvon is a much-frequented watering-place, and has beautiful scenery in the vicinity. Here is a castle founded by Edward I. in 1282, which now forms one of the most imposing ruins in the kingdom. It has thirteen embattled towers surmounted by turrets. Carnarvon is about half a mile from the site of *Segontium*, an ancient Roman town or station. Pop. in 1881, 10,258.

Carnarvon (HENRY HOWARD MOLYNEUX HERBERT), EARL OF, an English conservative statesman, born in London June 24, 1831. He was appointed secretary of state for the colonies in June, 1866, and he framed a plan for the confederation of the British North American colonies, which was approved by Parliament. He resigned in Mar., 1867, because he was opposed to the Reform bill which Disraeli introduced.

Carnar'vonshire, or **Carnarvon,** a county of North Wales, bordering on the Irish Sea, has an area of 544 square miles. It is bounded on the N. W. by Menai Strait and Carnarvon Bay, on the N. by the Irish Sea, on the E. by Denbigh, and on the S. by Merioneth and Cardigan Bay. The surface is very mountainous, and the scenery is remarkably grand. Here is Snowdon, which is the highest mountain in Wales, and rises 3571 feet above the level of the sea. Among the minerals of this county are copper, lead, zinc, coal, and roofing-slate. The chief branch of rural industry is the rearing of black cattle for the dairy. Carnarvonshire is traversed by the Chester and Holyhead Railway, which crosses the Menai Strait. Capital, Carnarvon. Pop. in 1881, 119,195.

Carnat'ic, The, a former division or region of India, on the coast of Coromandel, was bounded on the E. by the Indian Ocean or Bay of Bengal, and extended from Cape Comorin to about 16° N. lat. Its other dimensions were not well defined. It contains numerous large temples, and other monuments which attest its former splendor.

Carna'tion [Lat. *carnatio*, from *caro*, gen. *carnis*, "flesh"], "flesh-color." This term is used in painting, and is applied to the flesh-tints or natural color of flesh, also to the parts of a picture which represent the nude human figure. The art of producing a good carnation appears to be difficult, and not well understood by most modern painters.

Carnation, a beautiful and fragrant double-flowering variety of the *Dianthus Caryophyllus*, or clove pink. It is a universal favorite of florists, and exists only in a state of cultivation. Scarlet, purple, and pink are the prevailing colors of the flowers, which are often three inches in diameter. Florists prefer those in which the colors are perfectly distinct. The numerous varieties which have been produced by the florist's art are arranged in three classes—*flakes*, *bizarres*, and *picotées*. The flakes have only two colors, disposed in broad stripes; the bizarres have three colors, in irregular spots and stripes, and the picotées have an edging of scarlet, red, or purple on a white or yellow ground. Carnations prefer a rich soil, and should have free access to the fresh air. They are propagated either by layers or *pipings*—*i. e.* short cuttings.

Carne'ades [Gr. Καρνεάδης], a Greek philosopher and orator, born at Cyrene, in Africa, in 213 B. C. He opposed the doctrines of the Stoics, was the founder of a school called the New Academy, and maintained that man has no criterion of truth. He was distinguished for his subtle dialectic and powerful and specious eloquence. In 155 B. C. he was sent as ambassador from Athens to Rome, where he gained much applause by his orations. One day he eulogized justice, and the next day refuted himself by a sophistical argument tending to confound the distinction between justice and injustice. This offended Cato, who caused him to be expelled from Rome. Died at Athens about 129 B. C.

Carne'lian, or **Corne'lian** [Fr. *cornaline*], a name given to a fine variety of chalcedony which is composed chiefly of quartz. The color is red or flesh-color, and rarely milky white. It has a conchoidal fracture. Fine specimens of it are found in Hindostan, where they are highly prized, and are manufactured into various ornamental articles. Carnelians are also found in Europe and the U. S. The bright, clear red are most valued. They are much used by the lapidary, but a mass of considerable size and uniform color is rarely found.

Carnesville, Ga. See Appendix.

Car′nifex Ferry, over the Gauley River, Nicholas co., Va., about 8 miles below Summerville, gives its name to the severe action on the N. bank of the river near this ferry, Sept. 10, 1861. The Confederates under Gen. Floyd, numbering about 5000, had strongly intrenched themselves in this position, where they were attacked by the forces under Gen. Rosecrans on the afternoon of the 10th Sept. Darkness terminated the battle of the day, and during the night Gen. Floyd, being largely outnumbered, escaped with his command across the Gauley River, destroying his bridge behind him, which prevented pursuit. All the camp equipage and munitions of war fell into the hands of the Federal forces.

Carnio′la [Ger. *Krain*], a division or crown-land of the Austrian empire, is bounded on the N. by Carinthia, on the N. E. by Styria, on the S. E. and S. by Croatia, and on the S. W. by the Adriatic Sea and the Littoral province. It was formerly a part of the kingdom of Illyria. Area, 3857 square miles. The surface is mountainous, and partly occupied by the Carinthian Alps. Among its remarkable physical features is Lake Zirknitz, and the rock-bridge of St. Kanzian, which is 130 feet high. The chief river is the Save. Carniola contains the quicksilver-mine of Idria, which is one of the richest in the world. Iron, coal, and marble also occur here. Among the products are flax, silk, honey, and wine. Pop. in 1880, 481,243.

Car′nival [from the Lat. *caro*, gen. *carnis*, "flesh," and *vale*, "farewell"], a festival in the Roman Catholic countries of Europe just preceding Lent. It was formerly most brilliantly celebrated at Venice; later, especially in Rome. Like many other usages in modern Europe, the customs connected with the Carnival probably originated in the heathen spring-time festivals, as the Lupercalia and Bacchanalia of the Romans, and the Yule-feasts of the Germans. During the Middle Ages costly banquets with the rich, and drinking-bouts amongst others, marked the time. Recently, the Carnival at Rome has lasted eight days, during which the whole city is given up to revelry, the centre of which is the street called the *Corso*. In this all the houses are hung with crimson drapery, and each afternoon a constant line of carriages and promenaders is passing through it. Most of those who appear in the street are masked, and an incessant interchange of bouquets, *confetti*, and other harmless missiles makes a scene of extreme liveliness. At six o'clock, after the firing of cannon and the clearing of the Corso by troopers, a number of horses are let loose at one end of the street, and are urged by the shouts of the people to full speed. The last event of the Carnival week is the celebration of the *Moccoletti*. For this, after dark, all the revellers, on foot, in carriages, and at the windows of the Corso, provide themselves with a number of small lighted tapers, which each endeavors to preserve, while he puts out as many as possible of those of his neighbors. The political disturbances of Italy somewhat depressed these festivities from 1859 to 1870.

Carniv′ora [Fr. *carnivores*, from Lat. *caro*, gen. *carnis*, "flesh," and *voro*, to "devour"], devouring flesh, feeding on flesh; applied to animals which prefer flesh and eat little or no vegetable food. They belong to the class Mammalia, and are synonymous with the old order Feræ. It is characteristic of them to have sharp cutting teeth, simple stomachs, very muscular bodies, and active habits. This order includes, among other animals, all those quadrupeds which are properly called beasts of prey, excepting a few of the marsupials of Australasia, which are carnivorous in their habits, and resemble in their external characters certain animals of this order, which they may be said to represent in the native fauna of that region. Interesting fossil remains of Carnivora are referred to the eras just preceding and just following the glacial period. The order is divided into several families, as Felidæ, Mustelidæ, Ursidæ, Canidæ, Phocidæ, etc. (which see).

Car′nochan (J. M.), M. D. See Appendix.

Carnot (Lazare Hippolyte), a French radical republican, son of the following, born at Saint-Omer April 6, 1801. He was a member of the Chamber of Deputies from 1840 to 1848, and was minister of public instruction from February to July of that year. From 1864 to 1868 he was again a member of the legislative assembly. In 1871 he was again elected to the Assembly, where he voted with the extreme left. He wrote an able work on Saint-Simonism, and published the memoirs of his father (2 vols., 1860–64).

Carnot (Lazare Nicolas Marguerite), Count, a celebrated French statesman and geometer, born at Nolay, in Burgundy, on the 13th of May, 1753. He was educated at the military school of Mézières, and published in 1783 an "Essay on Machines," in which he gave a new and important theorem on the loss of force. As an earnest friend of the popular cause he was elected to the National Convention in 1792. He voted for the execution of Louis XVI., and was chosen a member of the Committee of Public Safety in Aug., 1793; but he took no part in the contest between the Girondists and Jacobins, nor in the cruel excesses of the Reign of Terror. He rendered important services to the republic as war minister by the formation of plans of the campaigns, the selection of generals, and the organization of the army. In this arduous labor he displayed administrative abilities of the highest order. In 1795 he was elected a member of the Institute, and also one of the five members of the Directory. He was proscribed by Barras and the majority of the Directors, and condemned in 1797 to deportation, but escaped to Germany. He was Bonaparte's minister of war in 1800, but he soon resigned, being too independent and too earnestly republican to serve under that chief. After the emperor had suffered reverses, he returned to his aid, and defended Antwerp heroically in 1814. During the Hundred Days (1815) he was Napoleon's minister of the interior. He went into exile on the restoration of 1815, and died at Magdeburg Aug. 3, 1823. He published, besides other able works, "Geometry of Position" (1803), which contains several new theorems. (See D. F. Arago, "Biographie de Carnot," 1850; P. F. Tissot, "Mémoires historiques sur Carnot," 1824.) As a military engineer he is referred to by all subsequent writers upon the art of fortification. His own "system," and his great work, "Sur la défense des places fortes" (the latter written to stimulate a more protracted defence of fortresses during the decline of Napoleon's power), though open to criticism, have exerted no small influence upon the progress of the art.

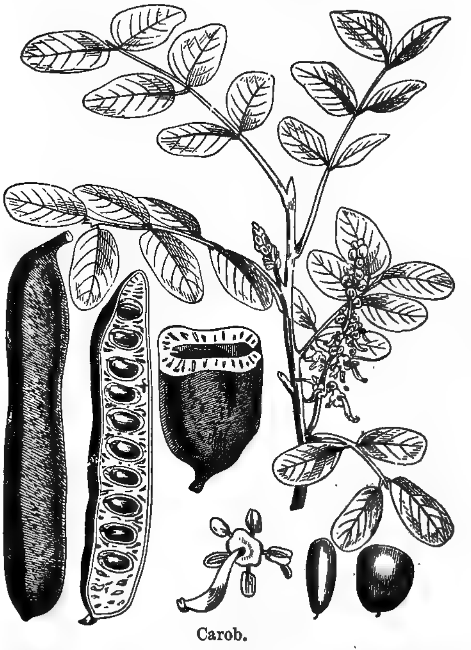
Revised by J. G. Barnard.

Carn′wath (a parish in Scotland, in the county of Lanark), Earls of (1639), Barons Dalzell (Scotland), 1628), and baronets (1666).—Henry Arthur Hew Dalzell, twelfth earl, born in 1858, succeeded his father in 1867.

Caro, capital of Tuscola co., Mich. (see map of Michigan, ref. 6–J, for location of county), on R. R. and Cass River, about 80 miles N. E. of Lansing. Pop. in 1884, 1800.

Caro (Annibale), born in 1507 at Citta Nuova, near Ancona, in the Papal States; was for several years a tutor in the family of Lodovico Gaddi; entered after the latter's death (in 1543) the service of Lodovico Farnese, a natural son of Pope Paul III., and since 1545 duke of Parma and Piacenza, and accompanied in 1548 Cardinal Alessandro Farnese to Rome, where he died in 1566. His works were not published until after his death, but occupy a foremost place in the Italian literature of the sixteenth century; they comprise a translation of the "Æneid," "Rime" (1569), "Lettere familiari" (2 vols., 1572–75), etc. A collected edition appeared in 1757 in 6 vols.

Car′ob, or **Algaro′ba** [Arabic, *kharoob*], (*Ceratonia Siliqua*), a tree of the natural order Leguminosæ, is a native of the countries around the Mediterranean. It has



Carob.

pinnate, evergreen leaves, with two or three pairs of large oval leaflets. The fruit is a brown pod, four to eight inches long, having a fleshy or mealy pulp of an agreeable taste, which is extensively used as food by the Arabs, Moors, and Italians. This fruit or pod is supposed to be the same as the article translated "husks" in the parable of the Prodigal Son; and it is thought by some that the locusts eaten by John the Baptist were these pods. They are imported into England and the U. S. under the name of locust beans; also called "St. John's bread." The wood of the carob is hard and valuable.

Caroli'na Mari'a, queen of Naples, born Aug. 13, 1752, was a daughter of Francis I. and Maria Theresa of Austria. She was married in 1768 to Ferdinand, king of the Two Sicilies, over whom she obtained great influence. She persuaded him to join the coalition against Bonaparte, who expelled King Ferdinand from his kingdom in 1806. She died in Vienna Sept. 8, 1814.

Carolina, North. See North Carolina.

Carolina, South. See South Carolina.

Car'oline Ame'lia Eliz'abeth, queen of England, born May 17, 1768, was a daughter of the duke of Brunswick and a niece of George III. of England. She was married in 1795 to the prince of Wales, afterwards George IV., who regarded her with aversion, and separated from her soon after the birth of their daughter, the princess Charlotte. On the accession of George IV. in 1820, she was prosecuted on a charge of adultery, was defended by Mr. Brougham, and was not convicted. Died Aug. 7, 1821.

Caroline Books, The (*Libri Carolini*), exercised a decisive influence—at least, so far as the Latin Church was concerned—on the settlement of the question of image-worship. The second synod of Nicæa (787) declared in favor of images, and Pope Adrian I., who had participated in the synod, accepted its decrees and communicated them officially to Charlemagne and the Frankish Church. Charlemagne, however, who at that moment was not on good terms with the Byzantine court and suspected the pope of playing false, determined to have not only the authority of the synod but also the orthodoxy of its decrees thoroughly scrutinized by his own theologians; and the result of that scrutiny was the *Libri Carolini*. The work is divided into four books, or 120 chapters, and contains a very sharp criticism of the synod and its decrees. The principle which it tries to establish is this: Christian art must have full freedom in its representation of Christian ideas, but any superstitious misuse of such artistic creations must be rigidly excluded. It was sent to the pope, who received the rebuke with complete submission, and the further decisions of the synods of Frankfort (794) and of Paris (825) were based on it. The best edition of the work is that by Heumann (Hanover, 1731).

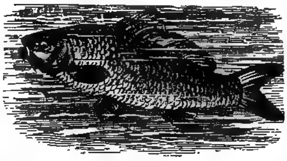
Car'oline Islands, or **New Phil'ippines,** an archipelago of Oceanica, is situated between the Philippines, the Ladrones, the Marshall Islands, and New Guinea, and extends from lat. 3° 5′ to 12° N. Area, 872 square miles. They number about 500 islands. The greater portion of the inhabitants are of the Malay race. The islands were discovered in 1543, and named after Charles V. The Spaniards have always claimed them as forming part of the Philippines. In 1885 the Caroline Islands were claimed by Germany. The sovereignty of Spain over these islands was decided by the pope the same year, and admitted by Germany and Great Britain. Pop. estimated at 30,000.

Caron'delet, a former village of Missouri, on the Mississippi River, about 5 miles S. of St. Louis. In 1860 it was annexed to St. Louis. (See South St. Louis.)

Carot'id [perhaps from the Gr. *κάρα*, the "head," and *οὖς*, gen. *ὠτός*, the "ear," because it passes to the head under the ear] **Ar'tery,** the great anterior artery which on each side distributes blood to the head. In man, each primitive or common carotid at the upper margin of the larynx or organ of voice separates into two of nearly equal size—the external and the internal carotid. The external carotid supplies the larynx, tongue, face, and scalp; its principal branches are the superior thyroid, the lingual, the facial, the occipital, the posterior aural, the internal maxillary, and the temporal. The internal carotid enters the cavity of the skull through a tortuous canal in the temporal bone, and separates into the anterior and middle cerebral arteries, which are the principal arteries of the brain; in its course through the dura mater it gives off the ophthalmic artery, which subdivides into small branches which afford the eye its principal supply of blood.

Wounds of the carotids are generally from stabs or cuts. Those attempting suicide often try to cut them, but rarely cut sufficiently deep by the side of the windpipe. But should either vessel be wounded, death results almost immediately. Punctured wounds may not be immediately fatal; they may heal, or a false aneurism may result. Sir Astley Cooper was the first to tie the common carotid for aneurism, in Nov., 1805; Abernethy had tied it for a wound in 1798, and others probably had tied it before him, and the operation has been successfully performed in a number of cases. Owing to the interchange of branches between the two sides, cutting off the blood through one carotid is seldom followed by affections of the brain. Dr. Mussey tied both carotids within twelve days of each other without any such result. Revised by Willard Parker.

Carouge, a town of Switzerland, in the canton of Geneva, on the river Arve, 1½ miles S. of Geneva, is beautifully situated, and surrounded by elegant villas and orchards. It has manufactures of watches, leather, pottery, and thread. Pop. in 1880, 5889.



Carp.

Carp (*Cyprinus carpio*), a fresh-water fish of the family Cyprinidæ, is a native of Europe and Asia, and has been long naturalized in countries in which it is not indigenous. It is found in lakes and rivers, prefers still waters, and feeds on aquatic plants, worms, insects, etc. Its length in some cases is two feet or more, but it is generally less than a foot long. It is very tenacious of life, and is said to attain the age of 200 years. The flesh of the carp is highly esteemed as food, but it is not a very valuable fish to the angler, because it does not bite freely. It is remarkable for its fecundity, and 700,000 eggs have been found in a carp of moderate size. The gold-fish is a species of carp.

Carpa'thian (or **Karpathian**) **Mountains** [Ger. *Karpathen*; anc. *Carpates*], a long curvilinear range of mountains, chiefly in the Austrian empire. It separates Hungary from Galicia, and Transylvania from Moldavia and Wallachia, and is nearly in the form of a semicircle, one end of which meets the Danube at Presburg, and the other touches the same river at New Orsova. This chain, which is about 800 miles long, is divisible into two portions, called the Eastern and the Western Carpathians, the latter of which extend along the N. border of Hungary. The highest points of the Eastern Carpathians, which are of primitive formation, are Negui, 8573 feet, and the Kuhhorn, 7303 feet. Among the Western Carpathians the Eisthalerspitze rises 8875 feet above the sea. Many of the Hungarian mountains are formed of limestone. The sides of the Carpathians are mostly covered with forests of pine, beech, and other trees. The vegetation presents four zones—that of the beech, to 4000 feet above the sea; that of the Scotch fir, to 5000 feet; that of the dwarf-pine; and that of the moss. Minerals, including gold, silver, copper, iron, and quicksilver, are abundant.

Carpeaux (Jean Baptiste), a French sculptor, born in Valenciennes in 1827. He established his reputation in 1863 by the group "Ugolino and his Children." His most celebrated works are a group representing "The French Empire spreading Light over the World, and protecting Agriculture and Science," made for one of the pediments of the Flora Pavilion of the Tuileries in 1865, and another representing "La Danse," made in 1869 for the New Opera. He was one of the most prominent representatives of the naturalistic school. Died Oct., 1875.

Car'pel [from the Gr. *καρπός*, "fruit"], a botanical term applied to a transformed leaf which becomes a simple pistil or one of the elements of a compound pistil. The upper surface of the leaf forms the inner surface of the carpel. The number of ovaries and stigmas of a pistil depends on the number of carpels of which it is composed, but several are often united so as to appear as one.

Carpenta'ria, Gulf of, is a broad and deep indentation of the N. coast of Australia, and is a portion of the South Pacific Ocean. It extends from Cape Arnhem to Cape York, and is about 500 miles long from N. to S. and 350 miles wide. It is mostly included between lat. 10° 40′ and 17° 30′ S., and between lon. 138° and 142° E. Its shores are generally low. It encloses numerous islands. It is visited by vessels for the *bêche de mer*, which is found in its waters. It was named in honor of Peter Carpenter, who from 1623 to 1627 was governor-general of the Dutch possessions in the East Indies. It has been explored by Cook (1770), Flinders (1802), Stoke (1841), Leichardt (1845), Gregory (1856), Landsborough (1861–62), and McKinlay (1862).

Carpenter (Charles C.), U. S. N., born Feb. 27, 1834, in Greenfield, Mass., entered the navy as a midshipman Oct. 1, 1850, became a passed midshipman in 1856, a lieut. in 1858, a lieut.-commander in 1862, and a commander in 1869 (now captain). While attached to the iron-clad Catskill as executive officer he participated in the attacks upon the forts of Charleston harbor of April 7 and July 10, 1863, and is honorably mentioned in the reports of his commanding officer, Commander George W. Rodgers. He was in the severe engagement with Fort Wagner on the 17th of Aug., 1863, when the Catskill was struck thirteen times and Commander Rodgers killed, and bore himself bravely and well. FOXHALL A. PARKER.

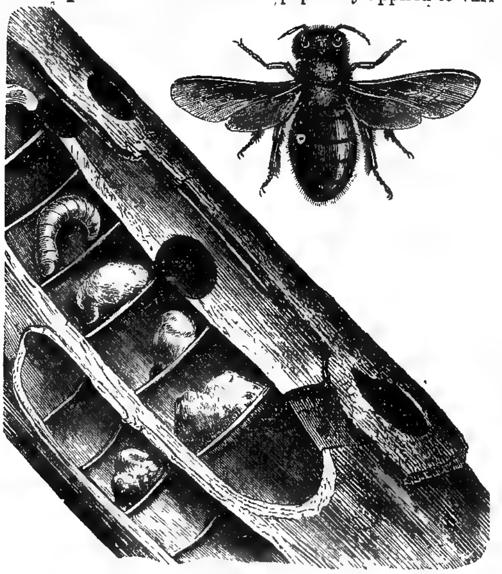
Carpenter (FRANCIS B.), an American artist, born at Homer, Cortland co., N. Y., Aug. 6, 1830. His portrait of President Lincoln and his "Emancipation Proclamation" are esteemed his best works. He published an interesting narrative entitled "Six Months at the White House."

Carpenter (GEORGE W.), born at Germantown, Pa., July 31, 1802, became a successful merchant of Philadelphia, and was from 1823 till his death treasurer of the Academy of Natural Sciences in that city. He took a great interest in science, particularly in geology, mineralogy, and the medical sciences. Died June 7, 1860.

Carpenter (LANT), LL.D., an English theologian, born at Kidderminster April 5, 1780. He published an "Introduction to the Geography of the New Testament" and "Unitarianism the Doctrine of the Gospel." In 1817 he became minister of a Unitarian church at Bristol. He was drowned in 1840 in the passage from Naples to Leghorn.

Carpenter (MATTHEW H.), an American lawyer, born at Moretown, Vt., Dec. 22, 1824, was at U. S. Military Academy two years, studied law with Rufus Choate, and was admitted to the bar in 1845. In 1848 he removed to Wisconsin, where he resumed his profession; elected to the U. S. Senate Mar. 4, 1869, and served continuously, except during one term, till his death, Feb. 24, 1881.

Carpenter (WILLIAM BENJAMIN), M. D., LL.D., F. R. S., an eminent English physiologist, a son of Dr. Lant Carpenter, born in 1813, studied medicine and graduated as M. D. in Edinburgh in 1839. In the same year he published an important work entitled "Principles of General and Comparative Physiology." His reputation was widely extended by an excellent work called "Principles of Human Physiology" (1846). This has gone through several editions, and is considered by many to be the best work extant on that subject. He became professor of medical jurisprudence in University College, London, and for many years edited the "British and Foreign Medico-Chirurgical Review." Among his works are "Zoology, and the Instinct of Animals" (2 vols., 1838), and "The Microscope: its Revelation and Uses" (1856). He had few living equals in acquaintance with natural science, capacity for original inquiry, and skill as a scientific writer. Some of his latest investigations have been in regard to oceanic currents. He was president of the British Association for the Advancement of Science in 1872. D. Nov. 10, 1885.—His sister, MARY CARPENTER, born in 1807, a distinguished philanthropist, was especially known in connection with "ragged schools" and other agencies for juvenile reform. She visited the U. S. in 1873. Died in London June 15, 1877.



Carpenter Bee.

Car'penter Bee is a name popularly applied to various hymenopterous insects of the bee family, distinguished from other bees by their skill in working wood. They mostly inhabit warm countries. Perhaps the most celebrated of the tribe is the *Xylocopa purpurea* of Southern Europe, a beautiful insect of a rich blue color, about the size of a large humble bee. It attacks dry wood, especially when partly decayed, cutting a longitudinal canal about a foot deep and more than a third of an inch wide. After finishing one of these canals, it lays an egg at one extremity of the hole, and places near it a mass of pollen and honey as food for the future larva. The egg and its accompanying store of food are then hermetically sealed up by a thin wall composed of powdered wood, formed into a very hard compound by being mixed with a substance secreted by the insect. In this manner the mother-bee divides her house into many little chambers with one egg in each. In due time the eggs hatch, each of the larvæ devours the food prepared for it, and then passes into the chrysalis state. At last, when the perfect insects are developed, they destroy the partitions made by the parent bee, and escape into the air; the one produced from the egg first laid escaping first, through an opening made for it by the mother, and the others following in order. The genus is also American.

Carpenter, Ship's, is a warrant officer whose duty it is to repair the hull, masts, and spars of a ship of war. During a battle he watches for shot-holes, and is prepared to stop them with plugs. He attends constantly to the state of the pumps.

Carpentras (anc. *Carpentoracte*), a town of France, department of Vaucluse, is on the river Auzon, 15 miles by rail N. E. of Avignon, and near the base of Mont Ventoux. It is surrounded by walls which were built about 1365, and are flanked by towers, and is mostly well built. It has a Gothic cathedral, part of which was erected in the tenth century, and a public library of 22,000 volumes, containing also a large collection of medals and antiquities; also manufactures of cotton and woollen fabrics, brandy, etc. Here are remains of a Roman triumphal arch. Pope Clement V. removed the papal court to this town in 1313. Pop. 10,848.

Car'pentry implies the art of building structures in wood, and signifies more especially that branch of industry which is applied to the construction of wooden buildings, wooden bridges, and the framings of heavy machines. The labors of the carpenter are necessarily directed by some knowledge of the forces which may be brought to act upon the structure when completed; that is, by some knowledge of the principles of engineering.

The lesser and lighter works of wood, such as furnish the interiors of dwellings, are the products of another branch of labor, termed *joinery*. The work of the joiner is guided more or less directly by the artist, and bears less reference to strength, rigidity, and the forces concerned than to external proportion and æsthetic fitness to surroundings.

The skill of the carpenter is directed towards giving two distinct qualities to the structures he builds—viz. *strength* and *rigidity*. The first is secured mainly by *dimensions* assigned to the different parts, and the skill with which these parts are united; and the latter depends largely upon the *arrangement* of the several members.

We will treat these two topics more fully.

Strength.—Timbers designed for structures are subjected to one or more of the following varieties of strain: transverse, tensile, compressive. A transverse strain is a force applied to a beam in a direction more or less perpendicular to its length; the timbers of a floor afford examples. A tensile strain is one that tends to elongate, and a compressive strain one that, acting in the direction of the length of the member, tends to shorten or crush it.

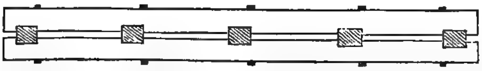
When the entire structure is of such dimensions that each member of it may be formed of a single stick of timber, the work of the artisan is comparatively simple, and is guided by plain and brief rules. But when by reason of the size of the entire work single parts are required of greater dimensions than can be supplied by single pieces of timber, then skilful joining of smaller parts must be relied upon to meet the emergency. Now, to so combine separate pieces of timber as to form a single member, and thereby employ the available strength of the component parts, at the same time to form such a connection with adjacent portions of the structure as to transmit properly the force assigned to the position, is to apply in the fullest sense the science of carpentry.

It may be remarked here that even in our most important bridges no special effort is made to secure solid timbers for the larger members, because the quality of thorough soundness can be more easily secured by a judicious selection of smaller parts, and then a proper combination can be made to ensure the requisite strength.

When a beam is subjected to transverse strain the fibres upon the side that tends to become convex under the action of the strain are subjected to a tensile or pulling force, while upon the opposite side they are at the same time compressed. The simple experiment of bending a twig that has bark upon it will illustrate this fact. The bark on the convex side is torn asunder and on the other side compressed into wrinkles. It becomes evident upon slight reflection—1st, that the extreme upper and lower fibres are most severely strained; and 2d, that the central portion of the stick is acted upon by forces comparatively slight. The obvious conclusion is, that the original force is best sustained by portions of the stick at some distance from the middle of its depth, and consequently that beams acted upon by transverse forces should present considerable width in the direction of the bearing force. It is easily demonstrated that the strength of a beam of given length and breadth, to bear a weight between two supports, varies as the square of the depth of the beam. Floor-beams are accordingly made narrow and deep.

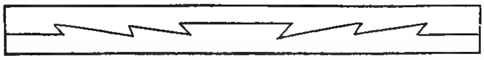
To secure depth of beam without employing material which is comparatively of little use the method has been employed of joining two sticks by blocks and bolts, as shown in Fig. 1.

FIG. 1.



It will readily be seen that the condition of providing material where the strains are greatest has been secured, provided the combination when under strain acts as a single stick. The plan fails when through want of secure bolting there is any motion among the component parts. The chances of failure increase very rapidly as the halves of the compound beam are separated by larger space, as the point is soon reached where each half acts like a simple beam; and whereas in the perfect system the upper half is urged by compressive and the lower by tensile strains only, when by insecure joining there is a slipping among the parts, each of these halves is acted upon by both kinds of force, and has near its centre material of but little use.

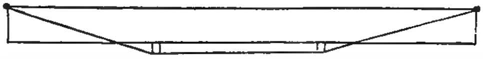
FIG. 2.



Another method of making a compound beam, though not often employed, is represented in Fig. 2. In either of the cases above represented some advantage is gained by employing different kinds of timber for the upper and lower members.

The most common way of reinforcing the strength of a simple beam is by the addition of iron rods, as shown by Fig. 3. The consideration of such a combination belongs to the subject of *trusses*.

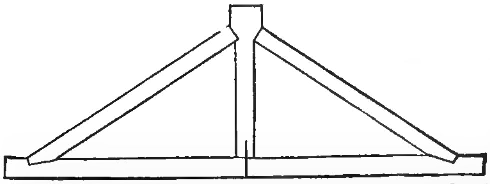
FIG. 3.



When a stick of timber is employed so as to resist a tensile force, the manner of connecting it with the portions of the structure through which or to which the force is to be transmitted becomes a matter of great importance. In the case of an iron rod, which can be furnished with a head, an eye, or a nut, the problem of attaching it so as to resist a tensile force is easily solved; but when the conditions require a wooden *tie-beam*, the problem of uniting the various parts so that the strength of the stick shall not be too largely sacrificed requires consideration, because to join timbers implies more or less cutting of their substance, and this in turn sacrifices material.

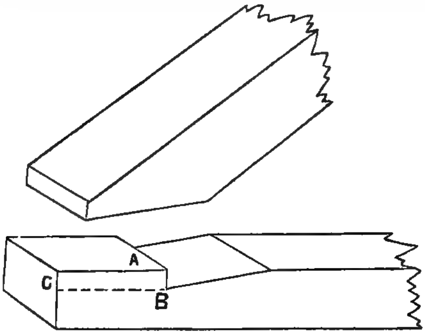
In the common king-post truss, as the combination represented in Fig. 4 is termed, the methods of uniting parts that fulfil different functions are employed. This truss is frequently employed in roofs, and also bridges of moderate span. In the latter case the flooring is sustained by the horizontal member or tie-beam; a large portion of the weight sustained is transmitted through the upright, and is received by the inclined pieces or *struts* and conveyed to the extremities of the tie-beam. The tie-beam and post are thus subjected to tensile, and the struts to compressive, strain.

FIG. 4.



In order that the tie-beam shall properly receive the thrust of the struts, the former must be notched to receive the ends of the latter. Fig. 4 shows the method usually employed; an enlarged view of the ends of the strut and tie-beam is given in Fig. 5. In constructing this truss it is necessary to regard the tendency which the strut exerts to split off the portion ABC. It is considered sufficiently secure in most kinds of timber if the length BC is ten times the depth AB, as, when this proportion is observed, the cohesion which resists splitting off is equal to that which resists the crushing of the fibres exposed to the direct pressure on the lesser surface.

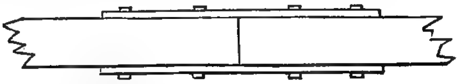
FIG. 5.



When the length of the tie-beam is such as to require the uniting of two or more pieces, the skill of the carpenter is again called in requisition to produce such a joint as shall safely resist the forces to be met.

The simplest of all is the so-called *fish-joint* (Fig. 6), the strength of which depends partly upon the few fibres of the timber that bear upon the bolts, and partly upon the friction arising from the pressure of the fish-plates. These latter are sometimes made of iron, and furnished with projections that are let or forced into the timber when bolted on. But the expedient is regarded as a clumsy one, and is only tolerated where, as in some roofs, the subsequent additions to the structure hide it from view.

FIG. 6.



Another and a common form is the *single-lock joint* or *scarf*, shown in Fig. 7, in which the resistance to direct tensile strain depends upon the surfaces opposed to each other at *a*, and which may be one-third the sectional area of the beam. A modification of this method of scarfing is exhibited in Fig. 8, in which one-half of the beam is made available in resisting tensile strain, as the joints A and B are each one-fourth of the depth of the beam. The method of Fig. 8 has the advantage over Fig. 7 of greater strength, but it is also far more difficult of construction, as there are two bearing surfaces that must act together; the fitting of the joint therefore requires especial care. This difficulty is sometimes met by leaving spaces at A and B, into which wedges or keys are driven as the scarf is bolted together.

FIG. 7.

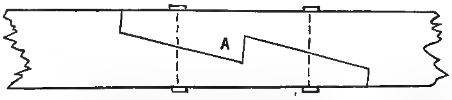


FIG. 8.

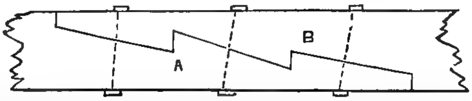
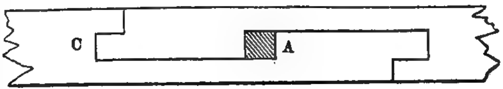


Fig. 9 represents a form of scarf in which no bolts are used, the method of locking at C being employed instead: the *key* at A is made of hard wood, and forced in so as to bring the surfaces of the scarf to a firm bearing. Of course this method of locking the scarf can be equally well applied to the methods shown in Figs. 7 and 8.

FIG. 9.



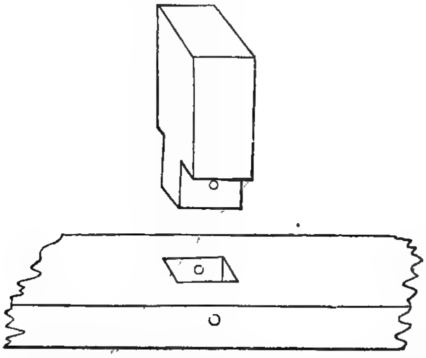
Many intricate forms of scarfing have been devised, and are exhibited in treatises on carpentry. They belong mostly to the time when but little iron was employed as an adjunct to timber construction; and even then most of the elaborate forms were rather fanciful than useful.

When timbers are united to resist thrust or compressive strain only, less skill is required than in the constructions just described. But little more is required than to bring the opposing surfaces fairly together, and secure them by the simplest possible means. Hence the "fished joint" shown in Fig. 6 will fully satisfy the conditions, and will employ the full available strength of the timber. Care must be taken, however, that the joint is not strained by a tendency which is manifested in long columns or struts to bend sideways when under pressure.

When a strut is joined to its neighboring member at an angle, as in the case shown in Fig. 4, the precaution is taken to so form the joint as to present either the whole of the end surface to the end pressure, as in the upper end of the strut of the king-post truss, or a part of it, as in the lower end shown more fully in Fig. 5. To prevent any displacement in such joints through accidental forces, they are secured by various methods, either a bolt, a notch, a tenon, or even a few nails, being employed according to the liability to lateral forces.

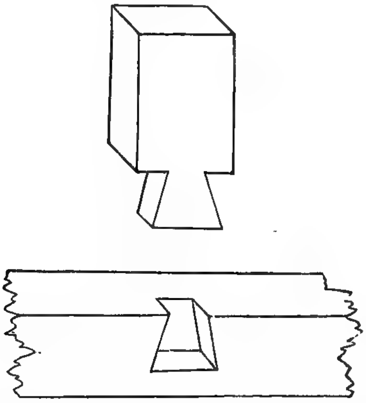
The *tenon* employed is exhibited in Fig. 10; the cut which receives it is called the *mortise.*

FIG. 10.



If the joint is liable to be urged by a force tending to pull it asunder, some security is obtained by the use of a stout pin through the tenon. A dove-tail joint is also employed for the same purpose (see Fig. 11). This form is common in joinery, but should not be relied upon in carpentry.

FIG. 11.



Rigidity, a quality which was referred to as somewhat distinct from *strength* in structures, is secured by such a disposition of material that no change of form of the entire system can occur without bringing into action the tensile or compressive resistances of certain members of it. A plain square frame, fastened however securely at the corners, may be lengthened and shortened cornerwise without calling into action the strength of the materials of the framing, except such as is concerned in fastening the corners. If, however, a stick be firmly secured to the frame, diagonally across it, no change of form can take place without extending or compressing this added *brace.* A triangular frame will not admit of change of form without a change in the length of at least one of its sides Hence diagonal braces are important members of timber framings, inasmuch as they ensure stiffness or rigidity The braces are secured by mortising; by iron straps, or more rudely by outside pieces fastened as in the joint in Fig. 6. (See TREDGOLD'S "Carpentry," by Hurst; also EMY'S "Traité de la Charpentérie.") GEO. W. PLYMPTON.

Car'pet-Bag'ger (in recent American politics) is a Republican born and reared in the North or West, who went South with or after the Federal armies, planted himself in one of the States lately constructed, and aided in organizing and drilling the negroes to vote the Republican ticket. Of course the term originated with those of adverse politics, who applied it as a stigma, and with considerable looseness, any one not a native of the South being denounced as a "carpet-bagger" if an active Republican; if "native there and to the manor born," he was termed a "scalawag." HORACE GREELEY.

Carpet-Bug. See ANTHRENUS SCROPHULARIÆ, in APPENDIX.

Car'pets. The word "carpet," denoting floor-covering, is of unknown origin; it is supposed, by some, to be derived from "Cairo," probably because Egypt is the country credited with first using floor-coverings as articles of luxury in her ancient days of splendor.

As a commercial term, "carpet" or "carpeting" is the generic name for the various grades of goods in that line, whatever their material, mode of construction, or technical appellation. The original form of the carpet was that of a large rug, which was spread upon the floor when occasion required; and the Eastern carpets, the manner of whose manufacture has undergone but little change for many centuries, are invariably made so to this day. The modern way of weaving carpeting in long, narrow strips, to be sewn together, doubtless had its origin in the greater convenience and cheapness which that form admits of through its adaptation to the ordinary loom.

Before the invention of the Jacquard loom, however, carpets were either of very simple pattern, or, if elaborate in their designs, necessarily very expensive. The ancient royal manufactory of the Gobelins in Paris has always occupied the first place in regard to artistic perfection. Some of the carpets produced there cost from 100,000 to 200,000 francs, requiring five to ten years for their completion. None of them have been for sale since the year 1791; they have been presented to the different sovereigns of Europe, and are only to be found in the palaces of courts. The invention of Jacquard, so peculiarly adapted to the weaving of various grades of carpets, together with the still more recent improvements in looms, has greatly facilitated the production of carpeting at once beautiful and durable, and at the same time cheap enough for persons of moderate means or economical tastes; so that the use of carpets has probably increased more during the last fifty years than that of any other commodity of equally ancient origin. At present, the U. S., in proportion to population, is by far the greatest consumer of carpets of all the nations in the world.

The principal grades of carpeting known to commerce (leaving out the Gobelins, Turkish, Persian, and others of similar rug-like make) are Aubusson, Moquette, Axminster, Wilton, velvet, Brussels, tapestry Brussels, ingrain (two or three ply), and Venetian, taking rank, as to value and general desirability, in the order named.

Aubusson, Moquette, and Axminster are very similar in appearance and construction, and are made with a high, tufted pile, thick, durable, and expensive. They are constructed with a firm groundwork of linen or cotton, upon which the pile, containing the design, is fastened in tufts of soft woollen yarn. As these tufts are supplied from a series of rollers corresponding in number to the picks or wefts completing one pattern, and in length to the width of the carpet, and in their action entirely independent of the warp and woof composing the body of the fabric, the employment of an almost unlimited number of colors is admissible, and the designs in those grades are therefore generally of the most perfect and elegant description. They are principally manufactured in England and France. One factory of Axminster carpets is in operation in the U. S.; it has been very successful, and its productions rank well with the imported articles as regards quality and beauty.

Wilton and Brussels are woven alike and of the same materials (linen back and worsted face); the face of both is formed by inserting wires between the warp threads in such a manner that on their withdrawal a series of raised loops of the worsted warp is formed, upon which the design appears. In Wilton these loops are cut open and sheared smooth, while in Brussels they remain uncut. The worsted portion of the carpet being exclusively in the warp, the threads of which are of continuous color throughout the piece, each particular color requires a special set of threads, worked in an independent manner by what is technically called "frame." This arrangement secures great perfection and clearness of design, for each color being brought to the surface entirely by itself, while the others are carried under or through the linen back until brought up in their turn, the work has the appearance of embroidery on canvas. But as the colors in the direction of the warp are limited to five (no larger number of frames being convenient), the designs in these goods are of necessity simple, and no patterns requiring elaborate shading can be attempted in them. From the number of colors thus employed, the different qualities of these carpets receive the names of two, three, four, and five frame respectively.

Velvets and tapestry Brussels are also manufactured alike in a manner corresponding to Wilton and Brussels, with the difference that only one set of worsted warp threads is used, upon which all the colors are printed by means of color-rollers before the fabric is woven, and upon the correct proportioning of spaces of the various colors the perfection of the goods is in a great measure dependent. In designing patterns for these goods the artist is allowed free scope as to the number and arrangement of colors, and profuseness in that respect does not add very greatly to the cost; hence we find these goods usually much more elaborate of design and more lavishly colored and shaded off than Wilton and Brussels. The manufacture of tapestry (both velvet and Brussels) was commenced in England in 1842. It was soon after introduced in this country, but for twenty years, by reason of patent restrictions, two establishments monopolized the business here. Since the expiration of the patents new concerns are rapidly organizing, and the indications are that in a few years this will be the most important branch of carpet manufacture in the country. Tapestry carpets are now used to an extent greater than that of all other grades combined, with the exception of ingrains. The largest concern in the world manufacturing these goods (in connection with the other principal grades) is that of John Crossley & Sons', Halifax, England, a stock company. They employ nearly 6000 hands.

The ingrain carpet (also called Kidderminster, after the city which formerly manufactured it largely) is the only kind of carpet made exclusively of all wool, and it may be worn on either side, though usually one side is more desirable in coloring than the other. The names "ingrain" and "three-ply" are derived from the modes of their construction. The former is composed of two distinct thicknesses, interwoven or "ingrained" wherever the colors change or mingle; the latter of three layers, also interlacing each other. The design is very similar on both sides, but the colors are reversed. The American consumption of these goods is supplied by home manufacture. Philadelphia has upwards of 5000 looms employed on them, and very large establishments in Connecticut, Massachusetts, and New York State turn out the better qualities. Venetian is the name given to a fabric composed of woollen warp and coarse hemp filling, usually striped in color, and made in widths suitable for stair coverings. Philadelphia furnishes in that grade nearly all the cheap stair carpets used throughout the country.

The carpet manufacturing business of the U. S. is a very important industry. The capital invested is over $21,000,000; the last census (1880) gives the following:

	Establishments.	Capital.	Value of Products.
Carpets, rag	396	$252,604	$861,710
Carpets, other than rag	195	21,468,587	31,792,802
Carpets, wood	5	41,600	102,170
Total	596	$21,762,791	$32,756,682

William Berri, Jr., Editor of "The Carpet Trade."

Car′pi, a fortified town of Northern Italy, province of Módena, is on the canal of Carpi, 12 miles N. N. W. of Módena. It is the seat of a bishop, and has a citadel, a fine cathedral, a seminary for priests, and manufactures of silk. Pop. 5076.

Carpi′no, a town of Italy, situated in the province of Foggia, and on Mont Gargano, 30 miles N. E. of Foggia. Pop. 6264.

Carpoc′rates, or **Car′pocras,** a philosopher at Alexandria in the reign of the emperor Hadrian who founded a Gnostic sect about 130 A. D. He believed in the transmigration of souls, and maintained that the world was created by angels. He is accused of teaching principles that tend to subvert morality. His followers existed as late as the sixth century.

Car′polite [from the Gr. καρπός, "fruit," and λίθος, a "stone"], a name applied to fossil fruits. Many such have been described, mostly belonging to the carboniferous formation.

Car′pus, a Latin term signifying the wrist, in anatomy denotes the series of bones between the fore arm and hand. In man there are eight small bones in two rows; the upper row consists of the scaphoides, lunare, cuneiforme, and pisiforme; the lower, of the trapezium, trapezoides, magnum, and unciforme. The upper row is articulated with the radius of the fore arm; the lower with the metacarpal bones of the Hand (which see). The number and form of the bones of the carpus vary much in different animals, but rudiments of them, at least, appear in all mammals. They are quite distinct in the flipper or paddle of the whale, as well as in the fore leg of the ox and the horse.

Carp′zov, a Saxon family of the seventeenth century celebrated for learning, of which the most distinguished members were Benedict, professor of Wittenberg, author of "Definitiones forensis," "Practica nova rerum criminalum," "Jurisprudentia consistorialis," and "Processus juris"—works which had an extended influence on German laws; died Aug. 30, 1666; Johann Benedict, professor of theology at Leipsic, brother of the above, who wrote "Systema theologicum," born in 1607; died in 1657; Johann Gottlob, born Sept. 20, 1679, grandson of the above, professor of Oriental languages at Leipsic, who wrote "Introductio in libros canonicos" and "Critica sacra Veteris Testamenti." Died April 7, 1667.

Carqui′nez (written also **Karquenas**), a strait of California which connects the Bay of San Pablo with Suisun Bay; lat. 38° 04′ 16″ N., lon. 122° 15′ 19″ W. It is from 1 to 2 miles wide and 7 miles long, and is navigable for steamboats. Large ships can ascend it to Benicia. The Carquinez Strait forms the boundary between Solano and Contra Costa counties.

Carr (Eugene A.), an American officer, born Mar. 20, 1830, in Erie co., N. Y., graduated at West Point 1853, and Apr. 29, 1879, colonel Sixth Cavalry. He served on frontier duty 1850–61; scouting against Lipan Indians 1854 (severely wounded in skirmish near Diablo Mountain); on Sioux expedition 1855, Utah 1858, and Kiowa and Camanche expedition 1860, engaged in several skirmishes. In the civil war became colonel Third Illinois Volunteer Cavalry Aug. 15, 1861, and was promoted brigadier-general U. S. volunteers Mar. 7, 1862, serving in operations in Missouri 1861–62, engaged at Wilson's Creek; in command of division in pursuit of Price into Arkansas 1862, engaged at Pea Ridge (thrice wounded); in command of the army of S. W. Missouri 1862, and of district of St. Louis 1862–63; in command of division in Vicksburg campaign, engaged in operations against the place; at Port Gibson, Champion Hill, Edward's Station, Black River Bridge (brevet colonel), and capture of Vicksburg; in the department of Arkansas, commanding cavalry division on Camden expedition 1864, engaged at crossing of Little Missouri; in command of the district of Little Rock 1864 (brevet brigadier-general), engaged at Clarendon and Camden; in command of a division of the Sixteenth corps in operations against Mobile 1865, engaged at Spanish Fort; and in various districts and post commands since 1865. Brevet major-general U. S. A. Mar. 13, 1865, for gallant and meritorious services in the field. George W. Cullum.

Carr (Joseph B.), an American general of volunteers, born in Albany, N. Y., Aug. 16, 1828, educated at Troy, N. Y. On the outbreak of the recent civil war he was commissioned (April 14, 1861) lieutenant-colonel of the Second New York Volunteers, and colonel May 10, 1861. The Second regiment was the first volunteer regiment to leave the State. In 1862 Carr was commissioned a brigadier-general of volunteers; he was at the battle of Big Bethel, and bore a conspicuous part in all the battles of the Army of the Potomac up to the final surrender of Lee's army, April, 1865. He was brevetted major-general Mar., 1865, and mustered out of service Sept., 1865. Having in the mean time been engaged in the manufacture of chain-cable, he was in 1881 elected to the office of secretary of state for the State of New York, and re-elected in 1883. He was nominated for lieut.-gov. of N. Y. by the Republican convention Sept. 23, 1885.

Carr (Sir Robert), a British gentleman who was appointed by Charles II. in 1664 one of the royal commissioners to New England. He assisted in the capture of New Amsterdam from the Dutch, and changed its name to New York in honor of the duke of York, afterwards James II. Died June 1, 1667.

Car′rageen′, or **Irish Moss,** is a name given to several species of sea-weed which are not mosses, but algæ. The species which yields the greater part of the carrageen of commerce is the *Chondrus crispus*. It is used as medicine and as an article of food, and is esteemed for its emollient and demulcent properties. It grows on the rocky coasts of several countries of Europe and on the eastern shores of North America. It is from two to twelve inches long, branched, cartilaginous, flexible, and reddish-brown in color. It is considered easy of digestion. Jelly and blanc-mange are made by boiling the carrageen in water or milk, with an addition of sugar and spices. The Iceland moss (*Cetraria Islandica*) is a wholly different plant, though used in a similar way. It is not a true moss, but a lichen.

Carra'ra (anc. *Cararia*), a town of Italy, in the province of Massa-Carrara, is on the Avenza, near the Mediterranean, 133 miles by rail N. W. of Pisa. It has an old collegiate church, a ducal palace, and an academy of fine arts. Here are celebrated quarries of white statuary marble, which have been worked for two thousand years or more. Many foreign artists come here to work, in order to save the expense of transporting the marble. The quarries, of which there are more than thirty in the vicinity, are in high hills or mountains formed chiefly or entirely of marble. Pop. 6797.

Carrara Marble is a white, fine-grained, saccharine marble obtained at Carrara, Italy, and well adapted for statuary. It is a metamorphic limestone of the oolitic formation. Besides this fine white marble, several inferior varieties are obtained in the quarries of Carrara. Some of these are veined and blue.

Carratra'ca Springs, a post-village of Plantagenet township, Prescott co., Ontario (Canada), has large hotel accommodations, and a copious mineral spring whose waters are very highly esteemed for their alterative effect. The county is bounded on the northern side by the Ottawa River. The township is of comparatively new growth.

Carrel (Nicolas Armand), an eminent French writer and leader of the republican party, was born at Rouen May 8, 1800. He served in the army in his youth. He gained distinction by an able "History of the Counter-Revolution in England." Carrel, Mignet, and Thiers became in 1830 chief editors of the "National," a liberal daily paper of Paris. In 1830 Thiers and Mignet retired from the editorship, and Carrel obtained the control of the "National," which he edited with great ability. He was an eloquent and popular writer, and was qualified by sound judgment and moderation to be the leader of a party. He was mortally wounded in a duel by Émile de Girardin, and died two days after, July 24, 1836.

Car'rell (Rt. Rev. George Aloysius), D. D., born at Philadelphia, Pa., June 13, 1803, studied at Mount St. Mary's College, became in 1829 a Roman Catholic priest, was stationed in Philadelphia, Pa., Wilmington, Del., and St. Louis, Mo., where he was a professor and afterwards rector in the university; in 1849–53 was president of the Purcell Mansion College at Cincinnati, O.; in 1853 he was consecrated bishop of Covington, Ky. Died Sept. 25, 1868.

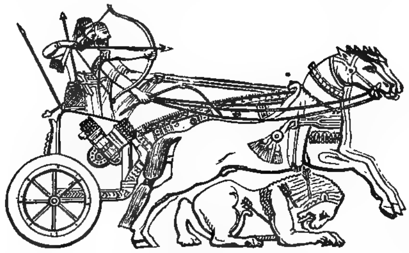
Carre'ra (Rafael), a general of mixed Indian and negro extraction, was born in Guatemala in 1814. He fought against the federal party in the civil war (1837–39), and became the general-in-chief of the insurgents. He was chosen president of Guatemala in 1847, and re-elected in 1851 president for life. He was an absolute monarch while in power. Died April 14, 1865.

Carriacou, kăr'e-ạ-koo', the largest of the Grenadine Islands, in the British West Indies, 20 miles N. E. of Grenada. It is 7 miles in length and about 3 miles in breadth. Chief crop, cotton. Hillsboro' is on its western side.

Carriages, Coaches, Chariots, Wagons, and **Carts.** We have chosen to place all these vehicles under one head, since they are so closely connected that it is almost impossible to make any other satisfactory classification. It is probable that the idea of a vehicle with wheels, to be drawn by animals, must have occurred to man soon after the domestication of the horse and the ox. The first attempts in this direction must have been very rude, much like the bullock-carts of India and South Central Africa of the present day—the wheels solid pieces of wood, thin slices of the trunk of a tree, and the axle a solid beam, with the ends rounded and thrust through the rude wheels, which creaked horribly as they revolved. From this cumbrous axle a pole or shafts extended forward, while attached directly to it was the body of the cart or wagon, no springs or intervening elastic substance mitigating its inevitable jolting. The cart was undoubtedly of earlier origin than the chariot; but though progress in those days was slow, yet within 600 years after the Flood the Egyptians, and probably the Assyrians also (for the two nations kept pace with each other in mechanical inventions), were constructing both chariots and carts or wagons, which indicated a great advance in mechanical knowledge. They were at first, and indeed for several centuries, two-wheeled vehicles, but the wheels were no longer solid pieces of wood, but had a hub in which the axle was inserted, and at first four, then six, then eight, and finally (though not till near the close of the Assyrian or Medo-Persian monarchy) twelve spokes, the diverging ends of which were inserted in a rim of wood, which was bound with a tire of bronze. Whether this rim was originally whole or composed of several pieces or felloes is uncertain, but at the period of the Assyrian monarchy felloes were in use. The chariot was box-shaped, but open in the rear, the front being about four feet in height. It was probably three or four hundred years later that those intended as state carriages were provided with a back, and a seat in which the nobles or royal personages sat or reclined, while a charioteer stood in front and drove the horses.

The chariots were used for two purposes: first, as an evidence of the great dignity and exalted station of the king or prince who occupied them, as when Pharaoh made Joseph "ride in the second chariot which he had" (Gen. xli. 43), and as when the funeral procession for Jacob went up out of the land of Egypt, and "there went up with Joseph both chariots and horsemen," in token of the high rank of the deceased (Gen. l. 10). It is noteworthy that during the time which elapsed between these two incidents we find Joseph sending wagons (probably carts, or simple two-wheeled vehicles, drawn by oxen) from Egypt to Canaan for his brethren to bring their wives and children to Egypt (Gen. xlv. 19). A second use of these chariots was for war-purposes. It is hardly probable that they were used in this way so soon as for regal pomp and display. There is a tradition that Erichthonius of Athens built the first war-chariot about 1586 B. C. At the time of the Exodus (B. C. 1491) Pharaoh had 600 war-chariots, and it is implied (Ex. xiv. 7) that besides these there were other chariots in Egypt which were employed for the same purpose. These war-chariots had on their sides cases for the bow and sheaf of arrows, and also for the spears or lances, and usually an archer or a spearman stood on either side of the charioteer, and shot his arrows or hurled his spears at the enemy as the charioteer drove furiously to the conflict. The Canaanitish kings and the kings of Moab in the next 150 years after the Exodus are often spoken of as having numerous chariots of iron; by which is generally understood, not chariots constructed of iron, but having iron or bronze scythes attached to the axles of their chariots. These, driven at great speed against a force of footmen or cavalry, proved terribly destructive. The Israelites under the theocracy were prohibited the use of chariots, but in the time of David, and still more in that of Solomon, they began to accumulate them, and Solomon maintained a force of 1400 chariots; these and the horses which drew them were mostly imported from Egypt at a cost of about 1050 shekels for each chariot—about $650, or, reckoning the difference in the value of money then and now, equivalent to at least $3000 of our money; so that his force of chariots must have been worth at least $4,200,000. But another item in the cost of these establishments were the richly embroidered housings and trappings for the horses and the cloths for the chariots, manufactured for a long period in Tyre or in some of its tributary states (Ezek. xxvii. 20).

Fig. 1.

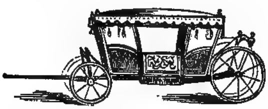


Assyrian War-Chariot.

Until near the close of the Assyrian monarchy the chariot was generally drawn by three horses. At that time the third horse was withdrawn, but the Persians a little later drove four horses, attached, like our stage horses, to the chariot in pairs. The chariot continued to be a two-wheeled vehicle until near the Christian era, when its use for war-purposes was discontinued, and among the Romans, Greeks, and the Sybaritic nations of the Orient it became the synonym of luxury and effeminacy. It was mounted on four wheels, and drawn by four or six horses elegantly caparisoned, and the chariot itself was trimmed and cushioned with the most luxurious embroidered cloths of the East. Usually but two persons besides the driver occupied it, though there was often room for six. There were chariot-races in the Olympian and Isthmian games, and the nobles of Greece and Rome drove at full speed along the magnificent Roman roads and highways. It was probably in one of the more modest of these vehicles that the Ethiopian treasurer of Candace, queen of Ethiopia, was returning to his country from his visit at Jerusalem when he met Philip (Acts viii. 27, 28). During the period of the later Roman empire and the decline of its power these richly decorated carriages multiplied, with the other indications of the luxury and effeminacy of the people. There was not, however, even in the most costly of these vehicles, anything answering to the springs of our modern coaches and carriages. Leather and steel of the best quality were both abundant, but the idea of using either for rendering the motion of these carriages easier did not occur to the carriage-builders of those days.

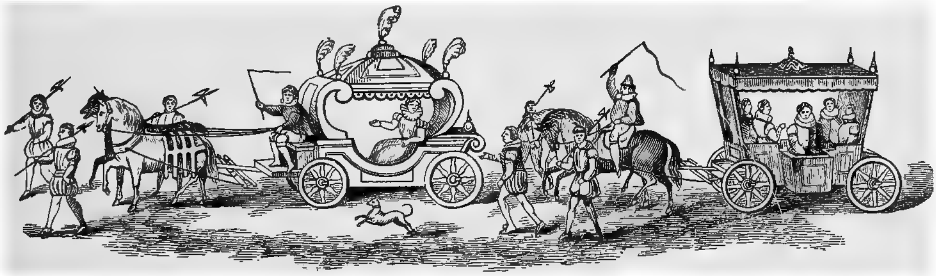
During the Dark Ages the roads were so rough and poor that carriages were almost entirely abandoned as a means for the conveyance of persons, the only method of land-travel being on horseback, and even the broad-wheeled heavy wagons or wains, used to some extent for the transportation of goods, moved over the highways with the greatest difficulty. On the Continent, asses, mules, and the large but slow and sure-footed Norman horses were used for the packing of goods from one country to another, the huge panniers on either side of the animal almost concealing him from sight. In 1280, according to Beckman, Charles of Anjou and his queen entered Naples in a *caretta*, a small but highly decorated chariot. Fourteen years later, in 1294, Philip the Fair issued an ordinance forbidding the wives of citizens to use carriages, or perhaps more accurately *cars*, probably open two or four-wheeled vehicles, which seem to have come into use about that time. For the next 200 years their use was very infrequent, and seems to have been confined to royal personages. Yet in this time there had been introduced one change which was perhaps an improvement. The canopy (probably borrowed from the Oriental umbrella held over the monarch in his chariot), which had hitherto been sustained by four pillars, and had been open at the sides, now gave place to a close drapery, which concealed the occupant from view except when looped up. The emperor Frederic III. attended the council or diet at Frankfort in 1474 and 1475 in close or covered carriages, that of the latter year being magnificently decorated. Soon after this time the German princes seem to have entered upon a rivalry to outshine each other in the splendor of their equipages. In 1509, at a tournament in Rappin, the electress of Brandenburg's carriage was completely covered with gold, and those of the other duchesses were ornamented with crimson and purple curtains and draperies of the richest satin. From this time the use of coaches by the nobility, and especially by the feudal lords, spread gradually over continental Europe; but, though the coaches were low and broad-wheeled, the condition of the roads was a serious obstacle to their use. In 1550 there were only three coaches in Paris. In 1610, Henry IV. was assassinated in his coach. Rude carriages called whirlicotes, two-wheeled vehicles without straps or springs, and having the horses attached to them by ropes, had been occasionally seen in England as early as the time of Richard II. (1377–99), and it is recorded that his mother was conveyed in one at the time of the rebellion of 1399. But the state coach was first introduced in the time of Queen Elizabeth, in the year 1555, it is said, by Walter Rippon, a Dutchman, who built one in that year for the earl of Rutland, and in 1564 another for the queen, who made him her coachman. Of this coach, and a later one built by the same man for her when attended by her maids of honor or her ministers, we give an illustration copied from Höfnagel's print of Nonsuch Palace. These coaches were without springs of any kind, though that of Henry IV., figured above, appears to have been suspended on heavy bands of leather or steel.

Fig. 2.



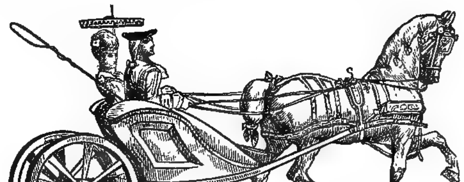
Henry IV.'s Coach.

Fig. 3.



Queen Elizabeth's State Carriage.

Fig. 4.

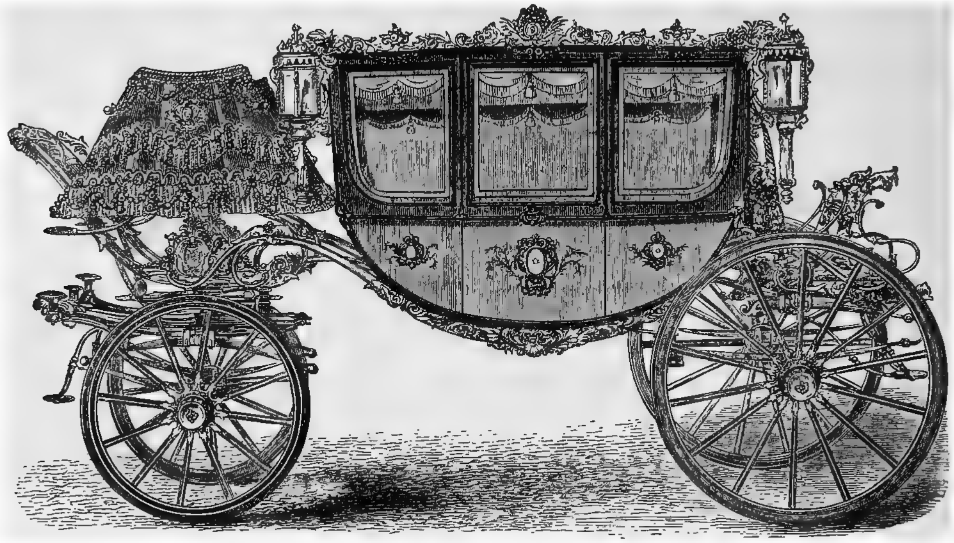


Private Carriage of the Seventeenth Century.

The English nobility soon set up their carriages, and, as Buckingham quaintly expresses it, "within twentie years there became a great trade of coachmaking." Some of the nobles increased the number of horses attached to these coaches to six, or even eight. The use of private carriages was confined to the aristocracy for the next hundred years, but a few hackney-coaches (so called from the French *coche-à-haquenée*, a vehicle with a hired horse) were kept for hire after 1625. Fifty years later there were twenty of these in Edinburgh, but such was the condition of the roads and streets that there was not much demand for them, and a hundred years later the number had dwindled to nine. During nearly the whole of the eighteenth century these hackney-coaches, the heavy and slow-going stage-coaches, and the post-chaises, were the only vehicles in England for the accommodation of those travellers who did not own horses or coaches. There was, indeed, one other mode of travelling, very slow and inconvenient, which was resorted to by the common people, and sometimes by the middle classes. The huge broad-wheeled covered wagons used for the transportation of goods, and drawn by six, eight, or twelve of the great Normandy horses, had a space partitioned off at the hinder end and strewn with straw, in which they could carry six or eight passengers, all of whom had to sit on the straw on the floor of the wagon. This was called "riding in the tail of the wagon." But even this limited accommodation was only to be found on the great thoroughfares, as away from these goods were carried on pack-horses. Even as late as in 1750 the journey from London to Birmingham by stage-coach, a distance of 116 miles, occupied nearly the whole of three days and nights. In 1754 the first line of stage-coaches was established between London and Edinburgh, and the advertisement stated that "a two-end glass coach machine, hung on steel springs, exceeding light and easy, would go through in ten days in summer and twelve in winter, the passengers lying over during the Sabbath at one of the villages on the route." The distance between the two cities is about 400 miles, and it is now run by the ordinary fast trains of the Great Northern Railway in ten or eleven hours. The introduction of steel springs for coaches dates from about 1750, but these were not at that time the elliptic or the C spring, but a bow of steel, the two ends of which were secured to the axle, and the centre reinforced by shorter strips of steel, much like the heavy springs we see on some of the passenger cars on the railways. The leather thorough-braces, whether attached to a crossbar, as they were at first, or to the C spring, as was done later, did not come into use till near the close of the eighteenth century.

The great improvement in the public highways in Great Britain, which was the result of the labors of Macadam, Telford, and other civil engineers at the close of the last and the commencement of the present century, and the reorganization of the postal arrangements, led to the establishment of those lines of stage-coaches on all the principal thoroughfares which De Quincey has so eloquently described as "the glory of England" and "the poetry of motion." These coaches were well built, strong, and so well provided with springs that their motion was easy, and did not weary the traveller even on long journeys. They were run by time-tables, and made their ten miles an hour regularly. From about 1795 to 1835 these vehicles were the favorites of travellers, and carried hundreds of thousands of passengers annually; but when the railway lines were constructed between the large towns the stage-coaches began to fall into disuse, and they are now only employed on short and subordinate routes, and their number is decreasing every year. But with their decrease there has been a vast increase in the number of private carriages of all descriptions, till now these are numbered by hundreds of thousands. They are of a great variety of designs, and are intended for one, two, four, or even six horses, and vary in their capacity from the skeleton or sulky for a single passenger, who is his own driver, to the family coach, phaeton, or carryall, into which from eight to a dozen can be stowed. The hackney-coaches have very generally given place to cabriolets or *cabs*, as they are generally called, vehicles drawn by a single horse and carrying two or four passengers besides the driver, which were introduced about 1820. There are now nearly 60,000 of these vehicles in use in London. Omnibuses, introduced about 1831 from France, have been used to some extent.

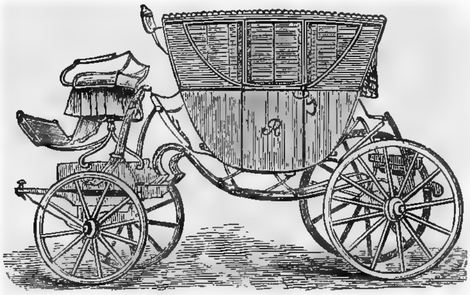
Fig. 5.



The Viceroy of Egypt's Carriage, built in Paris in 1867; cost $15,000.

In this country the prevalent mode of travelling for the first two centuries was on horseback, the roads preventing any very extensive use of wheeled vehicles. There were, however, even at the time of the Revolution and for some decades before, a few family coaches, maintained by the wealthy and aristocratic families of the larger towns. These were heavy, lumbering affairs, drawn by six large horses, and seldom moved faster than a very slow trot. In New York, Pennsylvania, and New Jersey the great Conestoga wagon, broad-wheeled, and with its huge canvas-covered body elevated both in front and rear, drawn sometimes by the Normandy horses, sometimes by four or six yokes of oxen, crept at a slow pace over the rough roads to carry goods from the seaports into the rural districts. These same wagons in our times have been used in the Mississippi Valley and on the Western plains, as well as in Western Pennsylvania, West Virginia, the mountain districts of North and South Carolina, Georgia, and East Tennessee, to transport both goods and emigrants, and have received the name of "prairie schooners." At the time of the Revolution the stage-coach was unknown on this continent. In 1791 there were but 1905 miles of post-roads in the U. S., and over the greater part of these the mails were carried in heavy wagons, occupying three or four days in the trip from Philadelphia to New York, or making the round trip in a week, while they took ten days for the journey from New York to Boston. The improvements in the roads led to improvements in the vehicles, and on the great thoroughfares from 1810 to 1845 the stage-coaches were, of their kind, admirable vehicles. Accommodating nine inside, and usually six, including the driver, on the outside, with a good supply of baggage covered with a heavy leather boot in the rear, and drawn by four or six spirited horses, these vehicles, though not making quite as good time as the English stage-coaches, were the admiration of all beholders. Troy, N. Y., became celebrated for its coaches, as it has since for its horse-cars, and the stage-proprietor who could assure his customers that he used only the best Troy coaches was sure of ample patronage. For the travel in newer regions and over somewhat rougher roads what were called the Concord wagons or coaches, originally made in Concord, N. H., but now manufactured also in Chicago and in other Western cities and towns, were preferred. Most of the coaches in use in the Pacific States are of this description. They are furnished with strong brakes to check their too rapid descent of the mountain declivities.

Fig. 6.



Washington's Carriage.

The omnibus has not been used to any great extent except in cities and large towns, but in these, until the street-cars of the horse-railroads began to take its place, it was the favorite vehicle for public travel. At one time, about 1857 or 1858, there were nearly 500 plying on the streets of New York City. The present number is not more than 120. The omnibus is too well known to need description or illustration. It is a French invention, introduced into Paris about 1827, and into New York in 1830.

The other public carriages for hire have been hackney-coaches, or hacks, as they are generally called, four-wheeled close carriages, drawn by two horses, and of which there are now several styles, such as the close coach, the caleche, the quarter coach, the C-spring coach, the double caleche, the barouche, the six-seat rockaway, and the clarence, the last having a glass front and sides. Cabriolets or cabs, either two or four-wheel vehicles drawn by one horse, are also used to some extent, but have never been as popular here as in London. The hansom cab, with a caleche top and the driver's seat at the back, the reins extending over the top, has been very little used here. A style called crystal cabs, having a glass front like the clarence, but on a very much smaller scale, was for a time much liked.

The days of heavy state carriages drawn by four or six horses, with coachman, footmen, and outriders, is past in this country. The wealthy citizen may have his family carriage, with a pair of horses, a coachman and footman in livery, but beyond this he does not go; oftener he is found behind a pair of horses with a single servant in a dog-cart, dos-a-dos, stanhope, or buggy. There is a variety of family carriage for one or two horses adapted to the wants of various classes, and in city or country almost every family of moderate means have their carriage of some sort. Physicians have carriages of special styles for their use, and almost all tradesmen have their wagons, often very highly ornamented, for their several pursuits. The express business employs many wagons of a peculiar style, and the heavy ice-wagons and coal-carts add to the demands upon the wagon-maker and the discord of city streets. The production of children's carriages is an industry of the last two or three decades, and the dolls' carriages are still more recent. Both employ considerable capital and are increasing in the amount of production. The annual product of carriages, wagons, children's carriages, etc., in 1880, was about $112,000,000, aside from R. R. cars.

L. P. Brockett.

Carrical′. See Karikal.

Car′rick (John Donald), born at Glasgow, Scotland, April, 1787. He was a miscellaneous writer and journalist. His chief work is a "Life of Sir William Wallace" (2 vols.) in Constable's "Miscellany." Died Aug. 17, 1837.

Carrick, Earls of (1748), Viscounts Ikerrin (1629), and Barons Butler (Ireland, 1607).—Somerset Arthur Butler, fifth earl, born Jan. 30, 1835, succeeded his brother in 1846.

Carrickfer′gus, a seaport-town and borough of Ireland, on the north shore of Carrickfergus Bay or Belfast Lough, 10 miles by rail N. N. E. of Belfast, is situated in the county of Antrim, but forms a county by itself, called "the county of the town of Carrickfergus." The town extends about a mile along the shore of Belfast Lough. It has a fine old parish church, said to have been founded in 1164. It contains also Presbyterian, Methodist, and dissenting meeting-houses, a Roman Catholic church, a town-hall, court-house, etc.; also several spinning-mills and manufactures of linen and starch. It was formerly a place of great strength. Here is a remarkable and picturesque castle, supposed to be 700 years old, standing on a high rock and on the sea, on which three sides of it are situated. It is used as an arsenal, barracks, and a fort for the defence of the harbor. King William III. of England, landed here June 14, 1690, sixteen days before the battle of the Boyne. In 1760 it was surrendered to a French naval force under Thurot, who evacuated it on the appearance of the English squadron under Commodore Eliot soon after, which captured Thurot's squadron. Capt. Paul Jones, an American colonial naval officer, captured the sloop-of-war Drake in Carrickfergus Bay Apr. 24, 1778, but made no attempt to seize the town. The surface of the county is generally hilly, and its chief crops are oats and potatoes. This locality has long been noted for its cheese. Carrickfergus has important fisheries, and is celebrated for its oysters, lobsters, and scollops. It has considerable trade with Liverpool, though its harbor is shallow and poor; it might, however, be easily improved. The people are mostly Protestants of Scotch descent. A part of the ancient wall is still standing. The town is connected with Larne by railway. The rural district contains Lough Morne, which has an area of about 90 acres, and is situated at an elevation of 556 feet above the level of the sea. The port of Carrickfergus was for a long time the chief market on this part of the coast. It returns one member to Parliament. There are mines of salt in the vicinity. Pop. in 1871, 9452.

Carrickmacross′, an inland town of Ireland, in the county of Monaghan, province of Ulster, is 46 miles N. W. of Dublin. The town consists mainly of one long street. One of its churches serves as the cathedral for the Roman Catholic archbishop of Clogher. The town has a savings bank, a Presbyterian meeting-house, a bridewell, and a well-endowed grammar-school, and has a fair, held five times a year. Pop. 2063.

Carrick-on-Shannon, an inland town of Ireland, the capital of the county Leitrim, province of Connaught, is situated on both sides of the navigable Shannon River, 85 miles W. N. W. of Dublin. The town lies principally on the Leitrim bank of the Shannon River, is connected by a bridge with that part of the town which is on the Roscommon side, and is on the Midland Great Western Railway. It has a church, a Roman Catholic chapel, two Methodist meeting-houses, and a county infirmary and dispensary. It also contains the county court-house, jail, and bridewell, and has considerable trade, chiefly in provisions. A canal has been cut from this place to Lough Erne. Pop. 1587.

Car′rick-on-Suir, an inland town of Ireland, in the south riding of the county of Tipperary, province of Munster, is situated on the river Suir, 13 miles by rail E. of Clonmel. It has an old bridge, a parish church of high antiquity, a Roman Catholic chapel, a hospital, a convent, and a picturesque ruined castle built about 1310 by an ancestor of the earl of Ormond. The town is situated near the junction of the counties of Tipperary, Kilkenny, and Waterford. Grain and other products of the soil are exported from this place by the navigation of the river. It has linen and woollen manufactures. Slate is extensively quarried in the neighborhood. Pop. 4986.

Car′rick's Ford, a point on the Cheat River near St. George, Tucker co., West Va. The Confederate forces under Gen. R. B. Garnett, in retreat from Laurel Hill, where they had abandoned most of their artillery and stores, were here attacked by three regiments of U. S. troops under Gen. T. A. Morris. A brisk engagement ensued, in which the Confederates were routed and Gen. Garnett killed. The Unionists captured the Confederate wagon-train and one piece of artillery. This affair occurred July 13, 1861.

Carrier (Jean Baptiste), a French Jacobin notorious for his cruelty, was born at the village of Yolai, near Aurillac, in Haut-Auvergne, in 1756. At the commencement of the French Revolution in 1789 he was only an obscure attorney, but was brought into notice by its progress, and was sent to the National Convention in 1792. He was sent to Nantes in Oct., 1793—where he found many Vendean prisoners—to assist in repressing the civil war commenced by the priests and royalists in La Vendée. He selected a committee in order to give the appearance of legal sanction to his cruelties, but took them from the lowest and most vicious class of the people. He soon dispensed with all formality, and executed his prisoners in large numbers at one time. He murdered multitudes of men, women, and children by various modes. Many of these victims were crowded into boats which were scuttled and sunk in the river Loire. This was called "Republican baptism." The cruelties and obscenities related of this worst of Jacobin leaders are almost incredible. More than 15,000 persons were put to death by him in a single month. Soon after the fall of Robespierre the public called for justice against Carrier, and he was finally recalled by the Committee of Public Safety, and condemned by the Revolutionary Tribunal. He was guillotined Dec. 16, 1794. An account of his life and crimes was published by Bœbuf in 1798.

Carrier (Joseph Auguste), a French painter of portraits, miniatures, and forest scenery, was born in 1800 at Paris, and studied under Gros, Prud'hon, and the chevalier Saint. He first exhibited in 1824, has won several medals, and in 1866 was decorated with the cross of the Legion of Honor.

Carrier (Thomas), died May 16, 1735, at Colchester, Conn , aged 109. He was a native of the West of England, settled in Andover, Mass., and married Martha Allen in 1664. His wife was hung at Salem in 1692 on a charge of witchcraft, she having, it was alleged, appeared to her daughter in the form of a black cat. About 1715, Carrier removed to Colchester. He retained his strength and faculties in a surprising degree till his death.

Carrière (Denis Desiré), born at Nancy, Feb. 12, 1813, died in Paris in June, 1853. He was educated in the seminary of Pont-à-Mousson, afterward in that of Nancy, and attracted some attention both as a poet and as an essayist. Most interest have his three epistles to Lamennais on the "Paroles d'un Croyant," "Affaires de Rome," and "Evangiles." He was also a frequent contributor to "L'Univers," "Moniteur catholique," and other papers.

Carrière (Joseph), a French *abbé* and theologian, born at Aveyron Feb. 19, 1795. He became professor of theology in the seminary of Saint-Sulpice, Paris, and was especially noted for a Latin work treating upon marriage, upon justice and law, and upon contracts. This work is highly esteemed. Died April 23, 1864.

Carrière (Moritz), a German *littérateur*, born at Griedel, in Hesse, Mar. 5, 1817, studied philosophy at Giessen, Göttingen, Berlin, and in Italy. In 1849 he became professor of philosophy at Giessen, and after 1853 held that position at Munich. He has published "Der Kölner Dom als freie deutsche Kirche" (Stuttgart, 1843), "Abälard und Heloise" (Giessen, 1844), "Die Religion in ihrem Begriff," etc. (1841), "Die philosophische Weltanschauung der Reformationszeit" (1847), "Die letzte Nacht der Girondisten" (a poem, 1849), "Religiöse Reden und Betrachtungen für das deutsche Volk" (1850), "Das Characterbild Cromwells" (1851), "Das Wesen und die Form der Poesie" (1853), "Deutsche Geisteshelden im Elsass" (1871), "Die Kunst im Zusammenhange der Culturentwickelung und die Ideale der Menschheit" (1863–71), and other works. He defends Christianity, opposes Ultramontanism, and is of the liberal school. As an art-critic he takes a high rank.

Car′rier Pig′eon, a variety of the domestic pigeon (*Columba livia*), is remarkable for the sagacity with which it returns to its home after it has been conveyed to a distant place. All the varieties of pigeons are not only swift of flight, but they have an intense love of home, and a remarkable power of discovering their way to it from long distances. These capacities are possessed in a high degree by the carrier-pigeon, and hence it has been celebrated from the remotest antiquity. It is trained to carry messages in various countries. The letter sent by this mode is sometimes enclosed in a quill and tied to the bird's leg, neck, or wing. Pigeons are trained by a progressive system, the young birds being at first taken to a small distance from their home and set loose. The distance to which they are taken is gradually increased to thirty miles or more. When pigeons are to be trained as carriers, they must be brought within a short time from the place to which they are to return; this period should not be longer than two weeks, and should be at a time when they have young in their nests; their wonderful fecundity makes this last condition exceedingly easy in practice. The birds should also be kept from the light and without food for about eight hours before being liberated. When they are liberated and thrown up for a journey, they first rise spirally to a great height in the air, usually hover about a while in an uncertain manner, and then fly swiftly to their destination. Before the invention of the electric telegraph they were often employed to carry news of the changes in the prices of stocks. The balloons which the Parisians sent up during the siege of Paris in the winter of 1870–71 carried each a number of these birds, which were employed as bearers of despatches in the public service. Some of them, after being taken more than 100 miles, returned to Paris, notwithstanding the inclemency of the season. They have been known to fly 1000 miles or more, and at times to fly more than 100 miles an hour. They have been sent home from great distances at sea, with no possible guide as to direction—a seeming demonstration of the theory that these birds are prompted as to the direction in which to fly by some instinct at present altogether inexplicable. Some birds, however, are puzzled by foggy weather or by a coating of snow upon the ground. Many pigeons fly well only in a general N. and S. direction, others E. and W. There are several breeds of the carrier pigeon, the Belgian stock being generally regarded as affording the best messenger birds. There are, however, various forms of the Belgian breed, but most of the birds have considerable family likeness. They should be over fourteen inches long, and in weight should exceed one pound. A wattle of larger or smaller size generally extends across the bill. Most Belgian birds have a short head, long neck, and very broad, muscular shoulders. Many have a wide circle, without feathers, around the eye. The Turks are regarded as training this bird most successfully. The Asiatics, it is stated, have employed the carrier pigeon from the earliest times. Anacreon mentions it as a carrier of letters; Pliny mentions its use by beleaguered cities. Concerning the investment of Modena he said: "Of what avail were sentinels, circumvallations, or nets obstructing the river when intelligence could be conveyed by aërial messengers?" In the time of the Crusades these birds were extensively employed by the people of the invested cities; and there are instances mentioned in which the pigeon was captured by the besiegers and made the bearer of a very different message from that with which it was originally charged. In some cases hawks were kept by the besieging-parties for the express purpose of being flown at and intercepting the carriers. The English merchants in Aleppo, in the palmy days of the Turkey Company, had regular communication with Scanderoon, 80 miles distant, by means of this bird. It is related that in the East regular relays of pigeons were formerly flown from towers thirty or forty miles apart, the birds being trained to carry messages both ways. The message was transferred from bird to bird, and thus great distances were traversed in a short time. Before the electric telegraph was invented there were lines of birds flown from Halifax, N. S., to Boston, Mass., and from Sandy Hook to New York, with the European news. In the Franco-German war very long documents were micro-photographed, and sent in packages of only a few grains weight with complete success. REVISED BY CHARLES W. GREENE.

Carrières, de (LOUIS), a Roman Catholic theologian, was born in 1662 at Cluvilé, near Angers, France. He became a soldier, and in 1689 joined the Congregation of the Oratory. He became distinguished as a theologian, and published, at the request of Bossuet, a "Commentaire Littéral" (24 vols. 12mo, 1701–16). This work is very popular in France even at the present day. Most of the comments are made in the translated words of the Bible itself. It has been often reprinted. Died at Paris June 11, 1717.

Car′riers, Com′mon, those who undertake for hire to transport from one place to another the goods or persons of such as choose to employ them. They are distinguished from *private* carriers by this readiness to afford accommodation to the public generally, and are subjected in law to a different responsibility. They may be either carriers by land or carriers by water. Familiar examples of the former kind are stage-coach proprietors, railway companies, express companies, wagoners, and teamsters, etc.; of the latter, the owners and masters of steamships, ferry-boats, and vessels of all kinds engaged in a general transportation business. The principles of law exhibiting the rights and duties of common carriers form a subordinate department under the general subject of BAILMENT, and, as in other varieties of the same legal relation, the degree of care necessary in the custody and treatment of whatever is received by the bailee is not dependent in all respects for its determination upon the contract of the parties, but arises by force of established legal rules. The difference in these requirements, depending upon the circumstance whether there be a carriage of goods or a carriage of passengers, demands that these two branches of the subject be examined separately.

Common carriers of goods are placed under a responsibility of excessive stringency. They are held liable for all loss or damage which occurs during transportation except that occasioned by "the act of God or the public enemy." They are made virtually insurers of the goods against all perils except those arising from these two sources, and the infrequency of exemption must be so great as to afford relief but very rarely. The reasons for imposing a duty so severe grow out of considerations of public policy. The facility with which the carrier or those who may collude with him can purloin or injure goods entrusted to his oversight and disposal, and the difficulty of ascertaining the true cause of the loss, are thought to place the members of the community so entirely at his mercy that their interests demand the most ample protection. Moreover, the fact that the application of this rule has not proved detrimental to the growth and prosperity of transportation companies indicates that its apparent undue severity, while conducing greatly to the advantage of the public, has worked no practical injustice even to the carriers themselves. The phrase "act of God" is held to extend only to such inevitable accidents as occur without the intervention of human agency. Thus, losses directly occasioned by winds, floods, lightning, and earthquakes would be properly included under this designation, and the carrier would be relieved from liability. But robbery, even if committed unexpectedly and by an irresistible force, or fire occasioned by some incendiary, wholly without the carrier's negligence or connivance, would be causes of loss containing that element of human agency which makes the exemption inapplicable. Damage resulting from natural causes, such as frost, fermentation, evaporation, the natural decay of perishable articles, or the inherent viciousness of animals, are placed upon the same footing as losses caused by the "act of God." By the phrase "public enemies" is meant those with whom the nation is at war or pirates on the high seas. Thieves, robbers, and mobs would not be included under this term.

It is a carrier's duty to receive for transportation all goods offered of the kind which it is his usual custom to carry. He may, however, demand the payment of freight in advance, and may refuse all articles of a dangerous quality. All persons who engage his services must be charged for the same service equably. Suitable vehicles for transportation must be provided, in charge of competent servants; the goods must be carried safely to the proper place of destination by the usual route and with all reasonable despatch, and there delivered, or held ready for delivery, to the owner or consignee. Reasonable instructions given by the owner or his agent relative to the mode of carriage of the goods must be followed, unless compliance is impracticable. The carrier is also held accountable for all acts of his employés within the scope of their employment, even though they violate his instructions as to the mode of performance. He cannot escape from his obligations as to the carriage of the goods by attributing default to his own agents.

The responsibility of common carriers begins upon the delivery of the goods for transportation. A delivery at the usual place of receiving freight or to the employés in the usual course of business is sufficient. But where goods are transferred to carriers with instructions not to transport them until further notice, the extraordinary liability already considered does not attach in the mean time, and it is only necessary that the ordinary care which is obligatory upon warehousemen be exercised until carriage really commences. The responsibility terminates when the goods have reached their destination and been actually delivered. But if, upon the lapse of a reasonable time after arrival, they are not claimed and removed, the carrier's liability is not entirely ended, but only modified in degree. It is then his duty to store the property in a safe and secure warehouse to await the owner's demand, and he is only accountable thereafter for ordinary care. Important distinctions are drawn between various classes of carriers in reference to the proper mode of delivery. These are rendered necessary by the different kinds of transportation adopted in the several cases. Thus, express companies employ conveyances which can be readily sent from dwelling to dwelling, and they are consequently held bound to make actual personal delivery at the owner's place of business or residence. Carriers by water, on the other hand, can proceed no farther than the wharf. Hence, according to a well-settled usage clearly applicable to sea-going ships, no other delivery is demanded than can be made there; but the convenience of the consignee is still regarded, as far as practicable, by imposing upon the carrier the obligation, rendered necessary by the uncertain time of arrival, that notice be given when the vessel has reached her place of discharge of the cargo. In railway transportation, again, the circumstances are still different. The cars are confined to a given line, have a regular terminus, and trains are run uniformly in accordance with published time-tables. Hence, according to some authorities, personal delivery is so completely excused that not even notice of arrival is necessary. The better opinion seems to be that notice is required, and that the consignee has a reasonable time within which to take the goods before the strict liability of the carrier is modified into that of the warehouseman.

The purpose of these various regulations manifestly is, that the interests of both carrier and owner be promoted. The "reasonable time" after arrival during which the carrier's heavy responsibility as insurer is to continue will be most speedily terminated when the owner has immediate knowledge that the goods lie at his disposal.

There are instances, however, in which delivery is sufficient to discharge the carrier, though not made to the owner himself. This occurs when several parties are engaged successively in the transportation of the same articles. The liability of each, in the absence of special circumstances, terminates when the next undertakes the duty of carriage. At least, such is the doctrine upheld generally by the decisions of the American courts. In England, on the contrary, the rule is maintained that the first carrier who receives the goods, if he accepts them for a destination beyond his own route, continues liable until the entire journey is completed, and the subsequent parties, though the injury or loss may occur on their own lines of travel, are exempted from liability on the contract. This proceeds upon the notion that the contract for transportation is tacitly made with the first carrier. According to the prevailing opinion in the U. S., the cases in which these views should be followed are those in which the first carrier engages by special contract for the entire route. It should be added that there may be such a business connection between various parties concerned in continuous transportation as to make them all liable as partners for the entire transportation.

Questions of much importance arise as to how far a carrier's duty and responsibility may be modified by usage or custom, or by specific contract entered into with the owner, or by notice given him. It is well established that common usage, if uniform and reasonable, may be pleaded in justification of peculiar regulations adopted. Thus, the nature of the goods which will be received or the route which will be generally pursued may be determined in this manner.

But these common modes of reducing responsibility are comparatively insignificant in view of those qualifications established by contract or notice. The policy of allowing the carrier to so limit his liability has been much questioned, but the validity of such agreements is now generally recognized. Bills of lading and instruments of an analogous character, given by the carrier on accepting goods for transportation, contain almost invariably stipulations in regard to exemptions from loss by fire and other enumerated perils, and are regarded as constituting a contract between the carrier and shipper. In like manner, notice brought home to the knowledge of the owner of the goods and assented to by him will have in general the same effect. At this point there is a great practical difficulty. The question is, What will be sufficient evidence of assent on the owner's part to a notice? It is plain, at least, that the notice must be so given by the carrier as naturally to attract the attention of the shipper, and must be so precise and clear that he can readily acquaint himself with its contents. Assuming this to be so, *can the carrier shake off his extraordinary responsibility by notice?* It is now quite clear that he cannot. He may make in this manner reasonable regulations in the nature of by-laws, pointing out the articles that he will carry, or requiring a statement of their value, so as to know what care will be properly demanded of him, and what reasonable charge he should make. But when all this is done he cannot shake off his character of insurer by notice. To do this there must be a contract—some evidence of assent; and notice by the carrier is no evidence of assent by the shipper. He, by his silence, should fairly be assumed to insist on the carrier's common-law responsibility. The English courts held otherwise at one time, but the salutary doctrine here maintained is now substantially established in England by statute. Under its legislation the carrier may relieve himself to a considerable extent by notice, but cannot escape entirely the consequences of his own neglect or misconduct. The notice must not only be really or presumptively known to the owner of the goods, but must also be reasonable in its character.

Common Carriers of Passengers.—These are not held to as stringent a liability as carriers of goods. They are not made insurers of the passengers' safety, but are nevertheless required to use the utmost care, and are responsible for even the slightest negligence. The reason for this difference is, that they can have no such complete control over persons as over goods. Passengers must largely retain freedom of movement and self-direction. It is no more than just, therefore, that the carrier's duty should be correspondingly modified. Extreme vigilance may be demanded, but not the duty of preventing injuries to which the passenger's own heedlessness may expose him. In accordance with this principle, injuries occurring from any defect in the construction of machinery or vehicles which proper care could have guarded against, or from their unskilful management, subject the carrier to responsibility. He is answerable for the acts of his agents, whether negligent or wilful, done within the scope of their employment. It is his duty to exclude lawless and disorderly persons from his conveyances, or, failing to do so, he may, according to some authorities, be held responsible for any violence they may perpetrate on the passengers.

When, however, the passenger's own negligence is the proximate cause of the injury, the carrier is not liable. Thus, if an attempt should be made to get upon a train while the cars were in motion, or a passenger's head or arm should be thrust from a window, and accidents occur in consequence, his own imprudence would be fatal to any claim for damages. This proposition leads to an important branch of the law termed "contributory negligence," which may be defined to be that negligence without which the injury would not have happened, while at the same time, on the part of the carrier, on being made aware of the passenger's negligence, there must be reasonable care used to avert its effects.

The common duties of passenger carriers are, to receive all who offer to take passage as long as their vehicles suffice, to carry them the entire route, to treat all with civility and propriety, and bring them to their destination within the stipulated time. They are not, however, compelled to receive persons of offensive or disorderly conduct, or any who by reason of disease or disgusting habits are unfit associates for the other passengers. Reasonable regulations may be adopted concerning the control of passengers, such as that fares must be paid in advance, tickets must be exhibited when called for, and the like. Expulsions of persons in a suitable manner and without unnecessary force from their vehicles for refusing to comply with such rules are considered justifiable.

The liability of passenger carriers for baggage committed to their charge is in general the same as that of common carriers of goods. In other words, they are held bound as insurers. If, however, the passenger prefers to retain exclusive control of his own property, as a coat, an umbrella, or a satchel, the carrier's responsibility is modified. The liability continues until delivery is made, either to the owner at the final destination or to another carrier in a continuous line of transit, and the duty of storing and preserving goods is the same that has been already detailed in the ordinary case of carriage of goods. The effect of contract or notice is also similar. The obligation to convey baggage arises independently of any special agreement in relation thereto, being considered as incidentally connected with the undertaking to carry the passenger himself, and no additional payment is necessary. But some measure of relief is granted to the carrier on account of this lack of remuneration by defining his accountability more narrowly. He is only liable for articles properly denominated baggage, and not for everything which the passenger may choose to consider such. Articles of necessity or personal convenience are reasonably included within the meaning of the term, but not merchandise or large sums of money or silver plate; and the like. For instance, jewelry used for personal ornament, a reasonable amount of money for travelling expenses, the instruments of a surgeon required in practice in the course of his journey, have all been considered "baggage," and the carrier made accountable for the loss. But the samples of a traveller acting for a commercial house would not be baggage, but merchandise, unless the carrier was made aware of their nature, and then without objection received them as baggage. The principle governing this matter is that concealment of the true nature of the package presented as baggage is a fraud on the carrier. All inference of fraud is dispelled if the contents be disclosed, and there is no objection to the carrier accepting merchandise in trunks if he see fit.

Appropriate remedies exist in favor of carriers. They may detain goods for the freight. They have an action against strangers who interfere with their possession, and may even recover the full value of the goods, holding the surplus above their charges in trust for the owner.

In this brief summary of the rights and duties of common carriers attempt has only been made to exhibit common-law provisions and principles. Statutory enactments exist in England and in various States relating to the subject, the details of which must be sought by reference to the acts themselves. In particular, the so-called English "Carriers' Act" may be referred to. (The subject is treated in much detail in such works as REDFIELD "On Railways," and ANGELL "On Common Carriers." The rules of damages will be found in SEDGWICK or MAYNE "On Damages.") T. W. DWIGHT.

Carrigain (PHILIP), born in New York in 1746; studied medicine, and settled in 1768 at Concord, N. H., where he became one of the most celebrated physicians and surgeons in the State. He died at Concord, N. H., Aug., 1806.

Carrigain (PHILIP), son of the preceding, born in Concord, N. H., Feb. 20, 1772; graduated at Dartmouth College in 1794; practised law at Concord, Epsom, and Chichester; was secretary of state of New Hampshire for four years, and was also clerk of the New Hampshire senate. He made extensive surveys in New Hampshire, and published a large and very good map of it in 1816. He died at Concord, N. H., Mar. 6, 1842.

Carrington (EDWARD), born in Virginia, Feb. 11, 1749; commissioned lieutenant-colonel of Harrison's artillery regiment in the Revolutionary army Nov. 30, 1776; served under Generals Gates and Greene, and became the quartermaster-general of the latter; commanded the artillery with success at the battle of Hobkirk's Hill, Apr. 24, 1781, and at Yorktown. He was a delegate to Continental Congress from Virginia in 1785–86, and was foreman of the jury in Aaron Burr's trial for treason. D. Oct. 28, 1810.

Carrington (HENRY B.), LL.D., born at Wallingford, Conn., Mar. 2, 1824; graduated at Yale 1845; studied law at Yale Law School; prof. in New Haven Collegiate Institute; in 1848 commenced practice of law in Columbus, O.; in 1857, being on the staff of Gov. Chase, aided in the organization of the State militia; at the opening of the civil war was made col. of the 18th U. S. Infantry, and soon after brig.-gen. of vols. After the close of the war he joined his regiment, and served on the Plains in the West until 1868; in 1869 was prof. of military science in Wabash College, Ind. Wrote "Absaraka, the Home of the Crows," "History of the Battles of the American Revolution," etc.

Carrington (PAUL), brother of Edward Carrington, noticed above, was born in Virginia Feb. 24, 1733; graduated at William and Mary College, Va.; was engaged in 1736 in the expedition under Colonel Byrd to establish the boundary-line between Virginia and North Carolina; practised law; was a member of the house of burgesses 1765–75, and voted against the Stamp-Act resolutions of Patrick Henry; was a member of the house of delegates, from which he passed to the bench of the general court in May, 1779; he became a member of the court of appeals, and held that office until 1811; was a member of the Committee of Safety throughout its existence, and in the Virginia convention voted for the adoption of the Constitution. D. June 22, 1818.

Carrington (PAUL), son of the above, was born in 1764. He was distinguished as a Revolutionary soldier in the battles of Guilford Court-house and Green Spring; was a graduate of William and Mary College, Va.; member of the house of delegates and of the Virginia senate; was judge of the superior court. D. Jan. 8, 1816.

Car'rion Flowers, a name given to the flowers of several species of *Stapelia,* which smell like carrion. They are natives of the Cape of Good Hope.

Carrington, Dak., **Carrizo,** and **Carrizo Springs,** Tex. See APPENDIX.

Carroll, R. R. junction, capital of Carroll co., Ia. (see map of Iowa, ref. 5–E, for location of county). Pop. in 1870, 384; in 1880, 1385; in 1885, 1885.

Car'roll (CHARLES) **of Carrollton,** an American patriot, born at Annapolis, Md., Sept. 20, 1737. He inherited a large estate in land, and was regarded as the richest man in Maryland. He was chosen a delegate to the Continental Congress in 1776, and signed the Declaration of Independence. To distinguish himself from another man of the same name, he signed himself "Charles Carroll of Carrollton." He was elected to the Senate of the U. S. in 1788. He was of the Roman Catholic faith, and was a man of great dignity and worth. He was a lawyer by profession, educated in France and England, and was especially honored as the last survivor of the signers of the Declaration of Independence. Died Nov. 14, 1832.

Carroll (JOHN), D. D., LL.D., first Roman Catholic bishop of the U. S., and cousin of the preceding, born Jan. 8, 1735, at Upper Marlborough, Md., became in 1773 professor at Bruges, in Belgium. In 1786 he was, at the instance of Franklin, appointed vicar-general, and in 1790 he was consecrated as bishop of Baltimore. In 1791 he founded St. Mary's College. A few years before his death he was raised to the archiepiscopacy. Died Dec. 3, 1815.

Carroll (WILLIAM), born in Pittsburg, Pa., in 1788; emigrated to Nashville, Tenn., in 1810; capt. and brigade insp. under Gen. Andrew Jackson, Feb. 20, 1813; col. and insp.-gen. Sept., 1813, to May, 1814; fought a duel in 1813 with Jesse, a brother of Col. Thomas H. Benton; maj.-gen. Tenn. militia Nov. 13, 1814, to May 13, 1815; famous for his services in defence of New Orleans, especially in the battle of Jan. 8, 1815; gov. of Tenn., 1821–27, and 1829–35. Died Mar. 22, 1844.

Car'rollton, capital of Pickens co., Ala. (see map of Alabama, ref. 4–B, for location of county). P. in 1880, 349.

Carrollton, capital of Carroll co., Ga. (see map of Georgia, ref. 3–F, for location of county), is on the Little Tallapoosa River. Pop. in 1880, 926.

Carrollton, on R. R., a city, capital of Greene co., Ill. (see map of Illinois, ref. 7–C, for location of county), 34 miles N. N. W. of Alton. It has a fine public-school building, an academy, a library association, and various manufacturing industries. Pop. in 1880, 1934.

Carrollton, capital of Carroll co., Ky. (see map of Kentucky, ref. 2–H, for location of county), on Ohio River, at the mouth of the Kentucky River, manufactures cloth, flour, etc. Pop. in 1870, 1098; in 1880, 1332.

Carrollton, capital of Carroll co., Miss. (see map of Mississippi, ref. 5–F, for location of county). Pop. in 1870, 377; in 1880, 394.

Carrollton, on R. R., capital of Carroll co., Mo. (see map of Missouri, ref. 3–F, for location of county), 66 miles E. N. E. of Kansas City; contains a school-house built at a cost of $40,000, two flour-mills, a woollen factory, etc. Pop. in 1870, 1832; in 1880, 2313.

Carrollton, on R. R., capital of Carroll co., O. (see map of Ohio, ref. 4–I, for location of county), is about 125 miles E. N. E. of Columbus. P. in 1870, 813; in 1880, 1136.

Carronade, a short iron cannon for naval service, invented by Mr. Gascoigne, and named after the Carron Iron-works in Scotland, where it was first made. It is lighter than the ordinary guns, and has a chamber for powder like a mortar. Carronades are now nearly obsolete.

Carron Oil, a mixture of lime-water and oil, useful as an application to burns. It was named from the Carron Iron-works, where it has been much used. (See LIME, MEDICINAL USES OF.)

Car'rot (*Daucus*), a genus of plants of the order Umbelliferæ. The common carrot (*Daucus carota*) is a biennial plant, a native of the East, but naturalized both in Europe and America. Its leaves are pinnately compound; the flowers creamy white. The root of the cultivated plant is much thicker and more agreeable to the taste than the wild. It is largely given to cattle, for which, as well as for men, it is a wholesome and moderately nutritious article of food. The plant has some beauty, its leaves having been, during the reign of Charles I., worn in England by ladies instead of feathers. The root is used for poultices.

Carruthers (ROBERT). See APPENDIX.

Car'son (ALEXANDER), LL.D., of Tubbermore, descended from the Covenanters who sought the same kind of an asylum in North Ireland as the Puritans found in North America. Probably the world has had no grander type of men than those produced by colonizing Scots in Ireland; and perhaps of all the men that grew from this rugged grafting, no one was a more characteristic scion than Alexander Carson. He was born in 1776, in county Tyrone, Ireland. His father and mother were Presbyterians, and in his youth they set him apart for the ministry, and gave him his education at the University of Glasgow. Here he was *facile princeps*. He paid especial attention to Greek, and drove his studies in all departments so hard that his firm constitution seemed ready to sink. His tremendous power of concentration was fully shown in his college life, and was of the highest service in all his life's work. He became pastor of the Presbyterian church in Tubbermore when he was in his twenty-second year. In the same year he was married to the companion of his life, Margaret Ledlie. The Unitarian controversy which shook the Presbyterian churches in North Ireland during the early part of this century was to him a cause of great mental anguish. The prevailing worldliness and evil practices of many members of the synod of Ulster constrained him at last to say that all the wealth of the Indics could not induce him to celebrate another communion service when he must share in the responsibility of such doctrines and practices. About the year 1805 he drew up his "Reasons for Separating from the Synod of Ulster." In this he argues for the independence of each church from all others. Thus he became a Congregationalist, or an Independent, as the term is used in Great Britain. In doing this he resigned all the earthly support he had. The majority of his congregation clave to him, and the law decided that the church property should be theirs, but as they could not retain it without strife, he gave it up, and "preached for many years in cold, incommodious barns, and often in the open fields." Afterwards a rude stone building was raised in the village of Tubbermore. Its interior was neither painted nor plastered, and the seats were hard benches. Here he preached for thirty years. Not long after his views on church government were changed, one of the Baptist missionaries supported by the Haldanes of Scotland came over to the north of Ireland, and Carson's congregation were much troubled in mind by the new-comer. The pastor attempted to confute the Baptists, but after a month spent in prayer, reading the New Testament, and ransacking the Greek language, he burned his manuscripts and proclaimed himself a Baptist. He devoted all his scholarship and much of his time to enforcing the views of the Baptists.

His preaching was entirely expository. During his long ministry in Tubbermore he expounded the entire Scriptures, and was well on his way through them a second time when death silenced him. His custom was to take a chapter in course, in the Old Testament, for his morning discourse, and a verse or two of the New Testament, in course, for the afternoon. He was scrupulous to observe whatever was ordained by Christ and the apostles and practised in the Church, including the ceremony of the kiss of holiness and love. The singing of his great congregation was of the most artless kind. A few of the old minor tunes and the Scotch metrical Psalms, with Watts' and some other hymns, was the whole apparatus from year to year. He taught that the ordinance of the Lord's Supper should be observed every Lord's Day, and the church, in common with nearly all the Baptist churches in Ireland, so practised. It is said that the salary he received from the church did not average more than thirty pounds a year. He sustained his large family chiefly by farming, teaching, and whatever he realized from time to time by the sale of his books. He was a wonder to many, in that he was able to educate his sons and provide for his daughters. He had thirteen children. Many of his congregation came many miles every Lord's Day to hear him. Old women there were who walked, on going and returning, distances varying from five to twenty miles. In the doctrines of the gospel Dr. Carson held the very highest ground. He maintained the federal headship of Christ, the actual imputation of his righteousness to the redeemed, and the actual imputation of their sins to the atoning Saviour. He believed and maintained the verbal inspiration of the Scriptures; that the atonement of Christ was made for his Church only; that man is entirely powerless to do good, yet entirely responsible for sin; that the gospel is to be preached to all; and that the sinner's guilt is increased by rejecting it. There were five great subjects which chiefly occupied his pen: the mode and subjects of baptism, the Godhead of Jesus Christ, the Romish controversy, the inspiration of the Scriptures, the harmony of God's attributes in the gospel, and the wonders of God's providence towards his Church. He was most diligent in the use of his time, and testified of himself that he had scarcely ever lost an hour. He had such a power of abstraction that he wrote some of his profoundest treatises while his children were climbing over his chair. His style of writing is remarkable. His sentences are short, and of the simplest possible construction. He was a reasoner who would as soon be guilty of a larceny as of an intentional fallacy. He very rarely attempted anything like fine writing, but sometimes a few words are so used as to produce a sublime effect. He preached always entirely without notes. His eloquence has been described as "volcanic." He threw such light upon the most recondite parts even of the Old Testament that there grew up under his ministry a multitude of people unlearned in everything else, but mighty in the Scriptures. So rapt was his auditory in his discourses that many times they half rose from their seats. The common people thronged to hear a man who hardly ever spoke a word they could not understand, and yet who dealt with the deepest things that can busy the mind of man. In unfolding the glory of the gospel his face absolutely shone; he seemed to be caught up to heaven, and to be ministering between a living God and a dying world.

In person, Dr. Carson was well fitted for his laborious life. He was of middle height, broad-shouldered, deep-chested, stout-limbed. His eye was clear and piercing, his features of a noble Roman cast, and when he died, nearly seventy years old, he had scarcely a gray hair. His voice was very powerful, and so tireless that four hours of almost continuous exercise did not weary it, week after week. His delivery was lively and natural. Those who only knew him from his controversial writings, thought of him as a fiery and unrelenting polemic, and indeed he treated any thing like a weak argument without mercy; yet in private life he was gentle and kindly, without a tincture of pride or vanity. His Christian character was remarkable. He prayed like a little child. His spirit may be judged from the words with which he closed his essay on the "Doctrine of the Trinity:" "Lord Jesus, I own thee before men—deny me not before thy Father and the holy angels!" He resolved at one time to come to America, but after his preparations were well advanced his congregation were so apparently broken-hearted at the thought of his leaving them that, to use one of the beautiful, homely idioms of the north of Ireland, "he could not find it in his heart to leave them."

He died in Belfast in 1844; his death was the result of a fall into the water from a steamer's plank. He was making way for a lady to go aboard, and lost his balance; he was rescued, but somewhat injured, and a fever ensued, which in a few days ended his life. He was a man of rare and saintly self-denial, of zeal that was bounded only by strength, of learning vast and varied, of logic keen to divide between truth and error, and of singleness of purpose to know nothing but Christ crucified. And this man lived for thirty years the pastor of a humble village church in Ireland, and desired no title among men but that of "minister of the gospel!" THOMAS ARMITAGE.

Carson (CHRISTOPHER), an American trapper, commonly called KIT CARSON, was born in Kentucky Dec. 24, 1809. He served as a guide to Fremont in his Rocky Mountain explorations. He was an officer in the U. S. service in both the Mexican war and the great civil war. In the latter he received a brevet of brigadier-general. Died May 23, 1868.

Carson City, on R. R., capital of the State of Nevada (see map of Nevada, ref. 3–C, for location of county), and county-seat of Ormsby co., is situated near the E. base of the Sierra Nevada, about 3 miles W. of Carson River and 15 miles S. S. W. of Virginia City. It stands on a plain, or rather on a plateau, but is surrounded by grand and picturesque scenery, and is about 10 miles E. of Lake Tahoe. It has State and Odd Fellows' libraries. It was founded in 1858, had 714 inhab. in 1860, and 4229 in 1880.

Carson River, Nevada, rises in the Sierra Nevada, flows nearly north-eastward, passes through Ormsby and Lyon counties, and enters Carson Lake in Churchill county. Length, estimated at 150 miles. Carson Lake has no outlet, and is about 15 miles long.

Car'stairs, or **Carstares** (WILLIAM), a Scottish negotiator distinguished for learning and sagacity, was born near Glasgow Feb. 11, 1649. He became chaplain to William, prince of Orange, who trusted him as a confidential adviser in affairs relating to Great Britain. Having been sent to England in 1682 as the secret agent of William of Orange, he was arrested as an accomplice in the Rye-House plot, and was put to the torture, which could not extort from him any confession, although he was the depository of important secrets. After the accession of William to the throne, Carstairs had great influence in Scottish affairs, and was five times chosen moderator of the General Assembly. He became minister of Gray Friars' Church, Edinburgh, in 1704. Died Dec. 28, 1715. His virtues and abilities are highly extolled by Macaulay. (See McCormick, "Life of W. Carstairs," 1774.)

Car'stens (Asmus Jakob), a German painter, born May 10, 1754, at St. Jürgen, Sleswick, the son of a poor miller, travelled on foot to Rome to study art. His great drawing, "The Fall of the Angels," procured him a professorship at the Berlin Academy of Arts. He took the lead in reforming taste in Germany, but painted few pictures. His drawings have been engraved by Müller, 43 plates, 1869. Died May 25, 1798.

Carsughi (Renatus), born at Citerna in Tuscany 1647, died in Rome 1709. He was a member of the Society of Jesus, and finally became provincial of the order for the Papal States. He acquired a great reputation as a Latin poet and humanist. His "Poema Latinum de arte recte scribendi," a kind of rhetoric written in verse (Rome, 1709), was much appreciated.

Cart. See Carriages, etc., by L. P. Brockett, M. D.

Cartage'na, a city and fortified seaport of Spain, is in the province of Murcia and on a bay of the Mediterranean, 27 miles S. S. E. of Murcia; lat. 37° 36′ N., lon. 1° 1′ W. It occupies the declivity of a hill, and a small plain which is between the hill and the sea. The harbor, which is one of the best in the Mediterranean, is capacious enough to hold the largest fleets, and is protected from winds by highlands which enclose it on several sides. The entrance to the harbor is defended by a fortified island. Cartagena was formerly the chief naval arsenal of Spain, and had a population of 60,000, but its importance has declined. It has a Moorish cathedral, numerous churches and convents, a theatre, and an observatory; also manufactures of sailcloth and glass. Red marble is abundant here, and is used for building. Mines of silver and lead have been opened in the vicinity. Pop. 75,908. The ancient *Carthago Nova* was founded by Hasdrubal in 242 B. C. (See Carthago Nova.)

Cartage'na, written also **Carthagena,** a fortified city and seaport of the United States of Colombia, in South America, the capital of the state of Bolivar, is on the Caribbean Sea, about 275 miles E. N. E. of Panamá; lat. 10° 25′ 36″ N., lon. 75° 38′ W. It was founded in 1532, and was formerly the chief mart of New Granada and Central America, with over 25,000 inhabitants. It stands on a sandy peninsula, is well built, and has well-paved streets. The houses are mostly stone, and two stories high. It contains numerous churches, some of which are said to be splendid, several convents, a theatre, and a college. The climate is very hot, damp, and unhealthy. Cartagena has a good landlocked harbor. Sugar, coffee, tobacco, hides, and bullion are exported from this place. Pop. estimated at 9000.

Carta'go, a town of Central America, the former capital of Costa Rica, one of the oldest cities in Central America, having in 1823 over 37,000 inhabitants, is about 20 miles E. of San José. It once contained eight churches and about 3000 houses, but it was ruined by an earthquake in Sept., 1841, which is said to have destroyed seven churches and 2900 houses. Present pop. estimated at from 3000 to 5000. Near this place is Mount Cartago, 11,480 feet high.

Cartago, a town of the United States of Colombia, in the state of Cauca, and on the river Cauca, about 135 miles W. of Bogotá. It has a cathedral, and a trade in coffee, cacoa, dried beef, tobacco, etc. Pop. 7696.

Cartaud de la Vilate (François), born at Aubusson, in the department of Creuse, France, in the first years of the eighteenth century, died, while still young, in Paris, 1737. He studied theology, entered the service of the Church, and was appointed a canon of the collegiate church of his native city. His "Essays historiques et philosophiques sur le gout" (Paris, 1736) made quite a sensation. Its purpose is to destroy, or at least to weaken, the reigning enthusiasm and admiration for the Græco-Roman poets—Homer, Virgil, Horace, etc.

Carte, a French word, signifies a "card," a "ticket," a "map," a "chart." *Carte blanche* (literally, "white card") is a blank paper signed by a person and given to another, that he may prescribe or insert such conditions as he pleases.

Carte (Thomas), an English historian, born at Clifton in April, 1686. He became a priest and Jacobite. During the rebellion of 1715 a large reward was offered for his arrest, but he escaped to France. His chief work is a "History of England" (4 vols., 1747–55), which is prized for its facts, but is not well written. Many volumes of his manuscripts are preserved in the Bodleian Library at Oxford. Died April 2, 1754.

Car'tel, an Anglicised French word which in France signifies a "challenge." As a military term it is used to denote an agreement between two belligerents for the exchange of prisoners. A vessel used in exchanging prisoners or carrying proposals to an enemy is called a cartel-ship.

Carter (Elizabeth), a learned English authoress, born at Deal, in Kent, Dec. 16, 1717, was a friend of Dr. Johnson. She was a good classical scholar, and gained a wide reputation by a translation of Epictetus from the Greek (1758), which, according to Warton, is better than the original. She wrote two numbers of Johnson's "Rambler" (Nos. 44 and 100) and a number of poems, among which is an "Ode to Wisdom" (1746). Her "Memoirs" were published in 1808. Died Feb. 19, 1806.

Carter (James Gordon), an American educator, born at Leominster, Mass., Sept. 7, 1795, and graduated at Harvard in 1820. He was chairman of the committee on education in the legislature of Massachusetts, and drafted the bill which appointed the Massachusetts board of education. He became chairman of that board. Died July 22, 1849.

Carter (Nathaniel Hazeltine), an American author, born at Concord, N. H., Sept. 17, 1787, and graduated at Dartmouth in 1811. In 1820 he became editor of the "New York Statesman." He afterwards published "Letters from Europe," in two volumes. Died at Marseilles Jan. 2, 1830.

Carter (S. P.), U. S. N., born Aug. 6, 1819, in Carter co., Tenn., entered the navy as a midshipman Feb. 14, 1840, became a passed midshipman in 1846, a lieutenant in 1855, a lieutenant-commander in 1862, a commander in 1865, and a captain in 1870. He served on the E. coast of Mexico during the Mexican war. While attached to the steamer San Jacinto in 1856 he participated in the attack on the Barrier Forts at the mouth of the Canton River, China, which resulted in their capture. In July, 1861, Carter was ordered to report to the secretary of war for duty, and proceeded at once to East Tennessee, where he organized the Tennessee brigade. He was now appointed a brigadier-general of volunteers, and continued on active duty with the army during the entire war, doing most important and gallant service in Tenn., Ky., Va., and N. C., and receiving the brevet of major-general "for gallant and distinguished services." He was appointed a rear-admiral on the retired list May 16, 1882. Foxhall A. Parker.

Carteret (Philip), an English navigator. Immediately after the return of Commodore Byron, George III. ordered a new expedition for the exploration of the southern hemisphere, and Aug. 22, 1766, the Dolphin, the Swallow, and the Prince Fréderic left Plymouth under the command of Captain Samuel Wallis; Carteret commanded the Swallow. On Dec. 17 the fleet entered the Strait of Magellan; when it again sallied forth, Apr. 11, 1767, it was overtaken by a hurricane, and the Swallow was separated from the two other vessels. Carteret continued the voyage, discovered Pitcairn Island, the island of Gloucester, the island of Queen Charlotte, and Solomon's Islands, explored the strait between New Britain and New Zealand, drew a map of the western coast of Celebes, and reached Batavia June 3, 1768. On Jan. 6, 1769, he doubled the Cape of Good Hope, and on Sept. 20 he reached Spithead, having accomplished almost marvellous results, in view of the small means at his disposal. (See Hawkesworth, "An Account of the Voyages undertaken by the Orders of His Present Majesty," London, 1773.)

Car'tersville, on R. R., capital of Bartow co., Ga. (see map of Georgia, ref. 2-F, for location of county, 48 miles N. N. W. of Atlanta. Gold, copper, etc. are found in this vicinity. Pop. in 1870, 2232; in 1880, 2037.

Carte'sian Philos'ophy, the name of the system of philosophy brought forward by Réné Descartes (1596–1650), one of the most original thinkers of France or of any country. The scholastic philosophy which had prevailed in the Middle Ages, though based upon the teachings of Aristotle, had so far departed from the spirit of its great master as to have become almost vain and fruitless. What Descartes and his contemporary, Bacon, did, was, each in his own way, to help arouse a spirit of independent research in philosophy and in science. It must not be forgotten, however, that the independence of Bacon and Descartes was a result as well as a cause of this new spirit. The new current had begun to flow before their day, but they each contributed largely to swell that current.

Descartes proposed as a basis for his system, and as a ground for all knowledge, the act of conscious thought, as necessarily involving the idea of existence. His celebrated dictum, "*Ego cogito, ergo sum*"—*i. e.* "I think, therefore I exist"—is the starting-point of his philosophy. And although the dictum itself has been severely criticised, it may be fairly questioned whether the fault be not in the expression rather than in the thought intended to be expressed, and whether the appeal to our consciousness be not indeed the ultimate ground of philosophy. Those writers who deny the validity of the testimony of consciousness are nevertheless continually appealing to the same testimony when it serves their purpose. Descartes was a firm believer in the existence of a personal God, and attributed all the phenomena of nature to the continual and actual presence of an all-pervading Deity.

The ultimate conclusions reached by Descartes need not be stated here. Founded to some extent upon unwarranted hypotheses, many of his opinions are now known to have been fallacious. But the great value of his philosophy has been in the grand stimulus of thought which it has given to others. Spinoza, Malebranche, and even the modern German philosophers, are confessedly much indebted to him.

Carte′sians [from *Cartesius*, the Latin name of DESCARTES], the name given to the disciples of Descartes, or to those who adopted his system of philosophy. In the seventeenth century nearly all the philosophers of France were ranged under two parties, Cartesians and Gassendists.

Car′thage [Gr. ἡ Καρχηδών; Lat. *Carthago*], an ancient and celebrated commercial city of Africa, and the capital of the republic of Carthage, was a Phœnician colony founded by emigrants from Tyre about 850 B. C. It was situated on a bay of the Mediterranean about 20 miles S. of Utica, and near the site of the modern town of Tunis. Lat. about 36° 47′ N., lon. 10° 6′ E. The Punic or native name of Carthage is said to have been *Carthada* or *Karth Hadtha*. According to a tradition which has been immortalized by the genius of Virgil, it was founded by Dido, a sister of Pygmalion, king of Tyre, and she purchased of the natives the site of the new city. Ancient authorities concur in affirming that it was founded many years later than Utica, which was also a Phœnician colony. No record of the early history of Carthage has been preserved. "This great city," says P. Smith, "furnishes the most striking example in the annals of the world of a mighty power which, having long ruled over subject peoples, taught them the arts of commerce and civilization, and created for itself an imperishable name, has left little more than that name behind it, and even that in the keeping of the very enemies to whom she at last succumbed. Vast as is the space which her fame fills in ancient history, the details of her origin, her rise, her constitution, commerce, arts, and religion, are all but unknown. Of her native literature we have barely the scantiest fragments left. The treasures of her libraries were disdained by the blind hatred of the Roman aristocracy, who made them a present to the princes of Numidia, reserving only the thirty-two books of Mago on agriculture for translation, as all that could be useful to the republic." Our information respecting the Carthaginians is derived mostly from Roman historians, who were deficient in impartiality, and from Polybius, who has preserved some genuine Punic documents.

Carthage seems to have been almost from its foundation independent of Tyre, but friendly relations were maintained between the colony and the metropolis, and the religious supremacy of the latter was recognized by an annual offering to the temple of Hercules at Tyre of a tithe of all the revenues of Carthage. The Carthaginians gradually acquired a dominion over the other Phœnician colonies of Northern Africa, and also over the Libyans and Numidians or nomadic tribes who occupied this region before the foundation of Carthage. This city became one of the greatest commercial emporiums of the world before the first Punic war. During the period of her greatest prosperity, Carthage was probably the greatest maritime power in the world. The population of the city amounted to about 700,000 in 150 B. C. The Carthaginian (or Punic) language resembled the Hebrew, and belonged to the Semitic or Aramaic family. The government was a republic or an oligarchy, in relation to which our information is very scanty.

A condensed summary of all that is known on this subject is given by Grote, from which we extract the chief points: "Respecting the political constitution of Carthage, the facts known are too few and too indistinct to enable us to comprehend its real working. The magistrates most conspicuous in rank and precedence were two kings or *suffetes*, who presided over the senate. They seem to have been renewed annually, though how far the same persons were re-eligible we do not know; but they were always selected out of some few principal families or *gentes*. There is reason for believing that the genuine Carthaginian citizens were distributed into three tribes, thirty curiæ, and 300 gentes. From these gentes emanated a senate of 300, out of which, again, was formed a smaller council or committee of thirty *principes*, representing the *curiæ*. . . . The purposes of government were determined, its powers wielded, and the great offices held—suffetes, senators, generals, or judges—by the members of a small number of wealthy families. In the main, the government was conducted with skill and steadiness, as well for internal tranquillity as for systematic foreign and commercial aggrandizement. Within the knowledge of Aristotle, Carthage had never suffered either the successful usurpation of a despot or any violent intestine commotion."

At a period little later than her first distinct appearance on the stage of recorded history, Carthage possessed an imperial authority, in a greater or less degree, over the northern coast of Africa from the Pillars of Hercules to the Great Syrtis, a distance of about 16,000 stadia (2000 miles). But the only part of this extensive territory that was entirely subject to the dominion of Carthage was the country which extended S. of the city about ninety miles, and the boundaries of which were nearly the same as those of Zeugitana, and the strip of coast along which lay Byzacium and Emporia. Like other great commercial states, Carthage found that her maritime enterprise led her on almost inevitably to engage in foreign conquests and to contend for the dominion of the sea. The first foreign province that she acquired appears to have been the island of Sardinia, which belonged to Carthage at the time of her first treaty with Rome, 509 B. C. This island was the principal emporium of her trade with Western Europe, and always ranked as the chief among her foreign possessions. Among the earliest objects of the military enterprise of the Carthaginians was Sicily, then occupied by several Greek colonies. For the conquest of this island they sent a fleet of 3000 ships, with an army of 300,000 men, commanded by Hamilcar. He was defeated by Gelon, tyrant of Syracuse, at Himera, in 480 B. C., and was killed in this action, which was one of "the decisive battles of the world," and was important in a degree which no contemporary could estimate. The Carthaginians in 410 B. C. renewed the war against the Greeks of Sicily, and obtained possession of part of that island, where they were involved in a long contest with Dionysius of Syracuse. They planted colonies in Hispania (Spain), and derived much riches from the gold and silver mines of that peninsula, but their relations with the natives were peaceful, and they did not attempt to subjugate Spain before the Punic wars. Polybius states that all the islands of the Western Mediterranean belonged to Carthage at the commencement of the Punic wars, 264 B. C. In 509 B. C. a commercial treaty was concluded between Carthage and Rome. This celebrated document has been preserved by Polybius. The second treaty between these two powers was made in 348 B. C. It appears that the Carthaginians never came into hostile contact with the Athenian republic, although the latter was a great maritime power while Carthage was near the zenith of her prosperity.

The army of Carthage was composed chiefly of Libyan conscripts and slaves and foreign mercenaries. This defect in her military system was probably one of the chief causes of her ruin. This system could not afford the republic internal security, for the soldiers had little devotion to the cause for which they fought, and the enemies of Carthage found it their best policy to "carry the war into Africa." It would be an error to regard the Carthaginians as a merely commercial people. Agriculture was a favorite pursuit of the nobles, citizens, and colonists, and the soil of her African territory was extremely fertile. Her prosperity was also promoted by manufactures and mechanical arts. Gold and silver were the standard of value at Carthage, but we have no evidence that the republic coined money, as no Punic coins are now extant which were struck before the Romans conquered that state. Her merchant-ships passed beyond the Pillars of Hercules and made voyages to the British Islands. The Carthaginians also carried on an extensive inland trade by caravans, which traversed the deserts to the valleys of the Nile and Niger.

Carthage and Rome were the two greatest powers of the world when their competition for the rich island of Sicily involved them in the first Punic war, 264 B. C. The Romans, who had no navy when the war began, suffered several defeats at sea, and one of their generals, Marcus Regulus, who invaded Africa, was taken prisoner. They gained a great naval victory near Lilybœum in 241 B. C., which ended the war. The Carthaginians obtained peace by ceding Sicily and Sardinia to the victors. Carthage was so impoverished by this long war that she could not pay her armies. The mercenaries revolted in 240 B. C., and were joined by most of the subject Libyans in a civil war which brought Carthage to the brink of ruin. After the suppression of this revolt the peace and stability of the state were menaced by a feud between Hanno and Hamilcar Barca, who became respectively the leaders of the aristocratic and democratic parties. The great abilities and sagacity of Hamilcar restored the prosperity of the republic by the conquest of Spain, which, says Heeren, "was then the richest country of the known world." He invaded Spain in 237 B. C., and gained several victories, but he subdued the Spaniards by kindness rather than force. Before he had conquered all the Peninsula he died in 229, leaving the completion of the enterprise to his son-in-law, Hasdrubal, and his own son, the famous Hannibal. The latter succeeded to the chief command of the army in Spain in 221 B. C. His conquests provoked the hostility of the Romans, and he began the second Punic war by marching across the Alps and invading Italy in 218 B. C. After he had defeated the Romans at several places in Northern Italy, he gained a most signal and complete victory at the great battle of Cannæ in the summer of 216 B. C. The second Punic war seems to have been conducted by Hannibal rather than the state, from which he received little aid or co-operation. By his military genius and personal resources he maintained himself in Italy for about fifteen years. (For the details of this war, which was ended by the victory of the Roman general Scipio at Zama in 202 B. C., the reader is referred to the article Hannibal.) The treaty which the victors dictated in 201 B. C. deprived Carthage of all her dominions outside of Africa. Hannibal, who soon obtained the ascendency in Carthage, made important reforms, which reduced the power of the aristocracy and the judges, but he was driven into exile by a hostile faction in 195 B. C. The Romans, who resolved to destroy Carthage, found a pretext to commence the third Punic war in 150 B. C. The Carthaginians made an heroic and desperate resistance, but their capital was taken and utterly ruined in 146 B. C. On the commanding site of the Punic Carthage the emperor Augustus founded a Roman town, which was also called Carthage, and became a very rich and populous city. Already in the second century before Christ an attempt was made to build a Roman Carthage. In 122 B. C., Cajus Gracchus led 6000 colonists to Africa and founded the city of Junonia. But the place was still fresh with the curses and the hatred of the Romans, and the colony did not thrive. Quite otherwise with the colony which Augustus sent out in 29 B. C. The air had been purified, and all the natural advantages of the site soon made themselves felt; and before long the new city stood as a rival to Alexandria and claimed rank as the second city of the empire. Herodian states that in his time it was next to Rome in population and wealth. In 439 A. D. it was taken by Genseric, who made it the capital of the Vandal kingdom in Africa. It was captured and finally destroyed by the Arabs in 647 A. D. Few vestiges of its ancient grandeur remain to indicate its site, except some broken arches of a great aqueduct which was fifty miles long. (See Arnold, "History of Rome," vol. ii.; Heeren, "Historical Researches into the Politics, Commerce, etc. of the Ancient Nations of Africa," 1824; Böttiger, "Geschichte der Carthager," 1827; Münter, "Religion der Karthager," 1821; Davis's "Carthage and her Remains.")

William Jacobs.

Carthage, R. R. junction, capital of Hancock co., Ill. (see map of Illinois, ref. 5–B, for location of county), 13 miles E. of Keokuk. It has a Lutheran college. Pop. in 1870, 1448; in 1880, 1594.

Carthage, capital of Leake co., Miss. (see map of Mississippi, ref. 6–B, for location of county), is about 60 miles N. E. of Jackson. Pop. in 1880, 285.

Carthage, a city and R. R. centre, capital of Jasper co., Mo. (see map of Missouri, ref. 7–D, for location of county), on Spring River, is situated in the centre of the rich lead-regions of South-west Missouri, with numerous manufactories, an academy, two public schools, two parks, and a public library. On the morning of July 5, 1861, a force of Confederates under Gov. Jackson and Gen. Price, numbering about 3500 men, while retreating from the army of Gen. Lyon, were confronted about 7 miles E. of this town by a body of Federal troops under Gen. Sigel, numbering about 1500. Gen. Sigel was superior in artillery, while the Confederates, largely outnumbering him, had the advantage also of a body of cavalry. Gen. Sigel, availing himself of his superior strength, opened fire with his artillery, which he continued, to the severe loss of the Confederates, for several hours, when, to avoid being outflanked by the Confederate cavalry, and to protect his baggage-train, he was obliged to fall back, which he accomplished in good order, continuing his retreat to Carthage and to Sarcoxie, 15 miles eastward. The Federal loss was less than 50 killed and wounded, while the Confederate loss was reported to be 50 killed and about 150 wounded. Pop. in 1880, 4167.

Carthage, R. R. junction, Jefferson co., N. Y. (see map of New York, ref. 2–G, for location of county), on Black River and its canal, 23 miles by rail E. of Watertown. It has extensive water-power, lumber-mills, forges, foundries, and manufactories of nails, machinery, leather, furniture, wooden-ware, etc. Pop. in 1880, 1912.

Carthage, capital of Moore co., N. C. (see map of North Carolina, ref. 3–G, for location of county), about 60 miles S. W. of Raleigh. Pop. in 1880, 366.

Carthage, capital of Smith co., Tenn. (see map of Tennessee, ref. 5–G, for location of county), is on the Cumberland River, 50 miles by land E. N. E. of Nashville. Pop. in 1870, 477; in 1880, 327.

Carthage, capital of Panola co., Tex. (see map of Texas, ref. 3–K, for location of county), about 45 miles S. of Jefferson. Pop. in 1880, 290.

Cartha'go No'va [the Lat. for "New Carthage"], an ancient and celebrated city of Hispania (Spain), on the Mediterranean, was founded by Hasdrubal in 242 B. C. It had an excellent harbor, and became a great commercial city of the Carthaginians. It also derived much prosperity from its rich silver-mines, in which 40,000 men are said to have been employed, In 210 B. C. it was captured by Scipio Africanus. Strabo informs us that it was in his time a great emporium of exports and imports. It was destroyed by the Goths before 550 A. D. The site is occupied by Cartagena (which see).

Car'thamine, a dyestuff obtained from the *Carthamus tinctorius*, a plant which is a native of India and Egypt, and is sometimes called saffron or safflower. This is the plant used in domestic medicine and known as saffron, but it is very different from the true saffron, or *Crocus sativus*. It is used to dye cotton and silk, to which it imparts a beautiful red color which is not very permanent.

Carthu'sians [Lat. *Carthusiani*; Fr. *Chartreux* (fem. sing. *Chartreuse*)], a monastic order founded in France by Saint Bruno in 1084. It was sanctioned by the pope in 1170, and was propagated in England and Italy. The monasteries of these monks in England were called Charterhouses, a corruption of the French *Chartreuse*. Their rules require them to perform manual labor, to abstain from eating flesh, and to observe ascetic practices, among which is a vow of continual silence. They built near Grenoble a magnificent convent called La Grande Chartreuse. Their houses are few at present. The Carthusian nuns were dispersed during the French Revolution. They have been restored, but are very few in number.

Cartier (Sir George Etienne), Bart., an eminent Canadian statesman, a descendant of the following, was born Sept. 6, 1814. He became distinguished as the leader of the French Canadian conservatives, and was the author of many legal and political reforms. Died May 20, 1873.

Cartier (Jacques), a French navigator, born at St. Malo Dec. 31, 1494. He discovered the river St. Lawrence in 1534, and ascended it as far as the site of Montreal. He returned to France in 1536. Died about 1554.

Cart'ilage [Lat. *cartilago*] is a firm, opaque, highly elastic substance of a pearly white or bluish-white color (rarely yellow), presenting to the eye a homogeneous appearance, but in reality composed of cells (corpuscles) variously combined with a fibrous, granular, or structureless intercellular substance. Cartilages may be classified as the temporary, the permanent, and the accidental. The temporary cartilages are substitutes for bone in the earlier periods of life, and after a time become ossified. At birth the extremities and larger eminences of the long bones and the margins of the flat bones are still cartilaginous, and this cartilage does not altogether disappear till puberty. Permanent cartilages are articular or non-articular. Articular cartilages are attached to the extremities of bones and enter into the formation of joints. Non-articular cartilages are usually more flexible than the articular. They are sometimes attached to bones to lengthen them out, as, for instance, in the nose and some of the ribs. In other cases they form the basis of distinct organs, as the larnyx, the Eustachian tubes, the external ear, the trachea, and the eyelids. Accidental cartilages are cartilaginous concretions which are occasionally found in situations where they do not normally occur, and are of little general interest, except as the basis of chondromata or cartilage-tumors. There is also a substance called fibro-cartilage, composed of cartilage mixed with white fibrous tissue. There is another substance known as spongy cartilage found in a few organs. Osseine (ostein) is frequently but incorrectly called bone-cartilage.

Cartilag'inous Fishes, those whose skeletons are destitute of true bone. In the chondroganoid group the skeleton is almost entirely cartilaginous; in the dipnoan group it is partly cartilaginous and partly ossified. (See Fish.)

Cartoon' [Fr. *carton*; It. *cartone*, from the Lat. *charta*, "paper"*], a term applied in the fine arts to a design drawn on paper for a fresco, oil picture, or a tapestry. The cartoon is of the same size as the subsequent work, and is sometimes primed or washed with ground-color. The artist draws the cartoon in order that he may adjust the drawing and composition of his subject in circumstances in which alterations can be made with facility. The drawing is made either in chalk or in distemper. The cartoon when finished is transferred to the canvas or plaster, either by tracing with a hard point or by pricking with pins, charcoal in both cases being used.

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* The French *carton* and the Italian *cartone* are properly augmentatives from *carta*, "paper," and signified originally large, coarse, strong paper.

The use of cartoons is particularly important in fresco paintings, of which only a small portion can be executed at a time, because the plaster must be moist when the pigment is applied to it, and it would be impossible to sketch the whole design on the plaster in the first instance. Therefore the cartoon must be traced in compartments so small that the artist can finish one before the plaster becomes dry. The most famous works of this kind are seven cartoons of Raphael which are preserved at Hampton Court in England. These are a part of a set of twenty-five in number which were sent to Flanders to be copied in tapestry for Pope Leo X. After the fabrication of the tapestry, which is said to be extant in Rome, the cartoons lay neglected at Brussels, and many of them were destroyed. The seven which were purchased by Rubens for Charles I. of England represent the following subjects: 1, Saint Paul preaching at Athens; 2, the death of Ananias; 3, Elymas the sorcerer struck with blindness; 4, Christ delivering the keys to Saint Peter; 5, the sacrifice at Lystra; 6, the apostles healing the sick in the temple; 7, the miraculous draught of fishes. These have been engraved by Dorigny and Audran. When the collection of Charles I. was sold these cartoons were purchased for the nation by Cromwell's special command.

Car'tridge, a case containing the proper quantity of powder or ammunition required to charge a gun or firearm. Cartridges for muskets are usually paper tubes, each containing a small amount of powder and a leaden ball. These are called ball cartridges. The paper used for this purpose is strong, and is made into a tube by means of a mandrel. Thinner paper is applied to certain parts of the tube, so that the powder has two or three thicknesses of paper around it, but the ball has only one. Besides this form there are several patent cartridges. A cartridge which contains powder only is called a blank cartridge. Cartridges for cannon or large guns are chiefly made of serge or flannel sewed up in the form of a bag, which, filled with a given weight of powder, is tied around the neck and strengthened by iron hoops. Cartridges for pistols are usually copper cylinders, having at the base the proper amount of fulminating powder, which inflames the charge of gunpowder upon being struck by the hammer, and these cartridges are used in most breech-loading firearms. A great number of cartridges is at times kept in store.

Cartwright (Edmund), an English clergyman, noted as the inventor of the power-loom, was born at Marnham April 24, 1743. He wrote "Arminia and Elvira" and other poems. In 1785 he exhibited his first power-loom, the introduction of which was violently opposed by the operatives, who burned a mill containing 500 of his looms. In 1809 he received a gift of £10,000 for his invention. Died Oct. 30, 1823.

Cartwright (John), Major, a brother of the preceding, was born at Marnham Sept. 28, 1740. He became an officer in the navy, but he refused to fight against the U. S. He gained distinction as an advocate of parliamentary reform and as a friend of liberty. Died Sept. 23, 1824.

Cartwright (Peter), D. D., a Methodist preacher, born in Amherst co., Va., Sept. 1, 1785. He labored with great success for upwards of sixty years, and is said to have preached 18,000 sermons. His labors were chiefly in the Mississippi Valley. Died Sept. 25, 1872.

Cartwright (Samuel A.), M. D., one of the most distinguished physicians of the South-west, and who was chief surgeon during Andrew Jackson's campaigns. He was born in Virginia in 1793, studied medicine under the celebrated Dr. Rush, and graduated at the University of Pennsylvania. He commenced the practice of his profession in Huntsville, Ala., but soon moved to Natchez, Miss., which became his field of labor for a quarter of a century. His numerous contributions to medical science may be found scattered through the journals of his day; he received valuable medals and prizes on medical topics—for he was a vigorous writer—especially for his labors on yellow fever, cholera infantum, etc., and a golden testimonial from the planters of his own county for his successful treatment of the Asiatic cholera. In 1836 he visited Europe, and in 1848 he removed to New Orleans. During 1862 he was consulted by Mr. Davis how to improve the sanitary condition of the Southern troops stationed near Port Hudson and Vicksburg. It was while in the discharge of this duty that he contracted the disease of which he died. Cartwright's treatment of hæmorrhoids by the sulphate of iron was generally adopted in the army; and that for prevention of the constitutional symptoms of syphilis was confirmed in the New York Hospital. Of him it has been said, "Full of charity and good-will towards all men, he fulfilled faithfully his station in all the relations of life." His last days, as all his life had been, were passed in doing good. Paul F. Eve.

Carus (Karl Gustav), a celebrated German physiologist, was born at Leipsic in 1789. His lectures on comparative anatomy, delivered in his native town in 1812, attracted great attention, and still more his book on the circulation of the blood in insects. It is, however, his writings on subjects belonging partly to science, partly to art—as, for instance, "Psyche," "Physis," "Natur und Idee," etc.—which have gathered a brilliant circle of the greatest scientists and artists to his house in Dresden, where he lived as court-physician. Died July 28, 1869. His "Lebens erinnerungen und Denkwurdigkeiten" appeared at Leipzig (1865–66, 4 vols.).

Carvahal (Tomas José Gonsalez), born at Seville in 1753, died in Madrid in 1834. He studied law, held some office in the financial department of the government, and was in 1812 appointed director of the University of San Isidoro. Having established there a chair of international law, he was imprisoned in 1815; released by the revolution of 1820, he was exiled by the counter-revolution, but allowed to return in 1824. As a writer he is a pupil of Luis de Leon. His metrical translations of the poetical books of the Bible are very celebrated.

Carver (John), a native of England, came in the Mayflower to America in 1620, and was elected first governor of the Plymouth Colony. Died in April, 1621.

Carver (Jonathan), an American traveller, born in Connecticut in 1732. He made an exploring expedition across North America to the Pacific Ocean in 1766–68, and published "Travels through the Interior Parts of North America." Besides his "Travels," which became very popular, he also wrote an excellent essay on the cultivation of the tobacco-plant. Died in London in 1780.

Carvin-Épinoy, a town of France, in the department of Pas-de-Calais, is on a railway 11 miles S. S. W. of Lille. It has manufactures of beet-root sugar, starch, and earthenware. Pop. in 1881, 7759.

Car'ving, a branch of sculpture, performed on metals, bone, stone, wood, and ivory. It is a branch of sculpture, but the latter term more especially denotes the construction of independent figures of men and animals, while carving represents designs of all kinds on the surface of various objects, such as furniture, doors, walls, goblets, crucifixes, etc. Ivory was the favorite material in the East from an early period. During the palmy days of Grecian art ivory was largely employed. The earliest statues of the gods were generally of wood, different kinds of wood being appropriated to different divinities. Carvings in ivory form an important branch of early Christian sculpture. During the seventeenth and eighteenth centuries we find ivory again extensively employed. Ornamental carving is now executed on a large scale by various machines. (See Wood Carving.)

Ca'ry (Alice), a talented poet and prose-writer, born April 26, 1820, 8 miles from Cincinnati, O., was the daughter of one of the first settlers of Cincinnati. Her family was of New England origin, and her parents were persons of cultivation and in good circumstances, but, as they lived in a newly-settled country, the daughters had but imperfect school advantages. When eighteen years of age she commenced writing for the press, both in prose and verse. Her sketches, signed "Patty Lee," in the "National Era," attracted much attention. In 1850, with her sister Phœbe, noticed below, she published a successful volume of poems. In 1851 the first series of her "Clovernook Papers" appeared. In 1852 the two sisters removed to New York and devoted themselves to literature. In this they were successful, for, without becoming wealthy, they were able to maintain a pleasant and comfortable home, made not less pleasant by the genial hospitality and good taste which distinguished its owners—a hospitality which was highly prized by all who had the good fortune to share it. Among her earliest and most constant friends was the late Hon. Horace Greeley. A place at the tea-table of the Cary sisters was always reserved for him, and he was one of their most frequent and welcome guests. Their Sunday evening receptions were for years the resort of members of the guild of letters, both authors and publishers making it a place of pleasant social intercourse. Besides several volumes of poetry and a great number of contributions to periodical literature, she published two additional series of "Clovernook" (1853–54), "Hagar, a Story of To-day" (1852), "Married not Mated" (1856), "Pictures of Country Life" (1857), "The Lover's Diary" (1867), "Snowberries" (1869), and several other works. Her poetical style is graceful and of a high order of merit. Her prose is perhaps even better than her verse. She delighted in the description of simple domestic scenes, which she presented with much felicity. She was an untiring worker, though many years of her life were passed in great suffering, which she endured with remarkable patience. She died at New York Feb. 12, 1871.

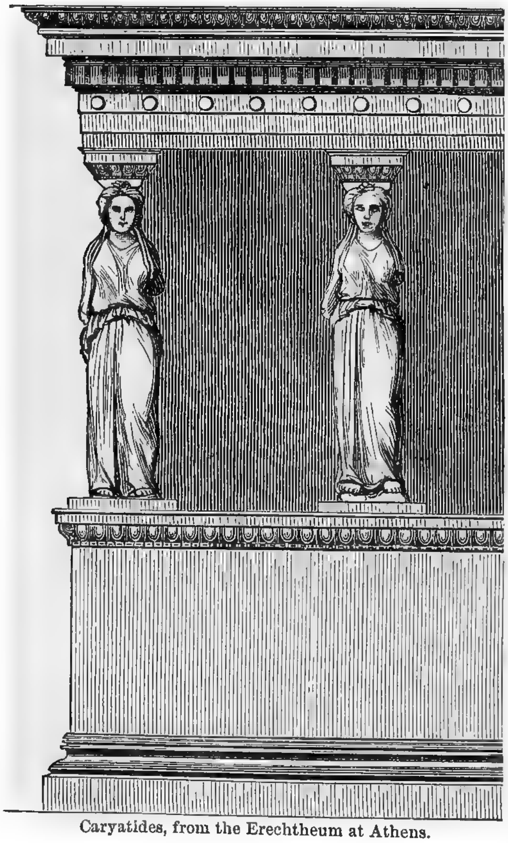
Cary (Col. Archibald), an American patriot, born in Virginia about 1730, took an active part in the convention of 1776 which framed the constitution of Virginia, and was afterwards a member of the Senate. Died in Sept., 1786.

Cary (Rev. Henry Francis), an English poet, born at Birmingham in 1772, was educated at Oxford. He became in 1797 vicar of Bromley Abbots. His reputation is founded on an admirable translation of Dante's "Divina Commedia" (1814), which is very accurate and expressive, and is generally considered the best translation of that celebrated poem. He was for some years assistant librarian of the British Museum. Died Aug. 14, 1844.

Cary (Phœbe), a younger sister of Alice Cary, noticed above, was born near Cincinnati, O., Sept. 4, 1824. One of her earliest productions, written at the age of seventeen, was the well-known poem commencing "One sweetly solemn thought comes to me o'er and o'er." Of the first volume of poems published by the two sisters, her share was much the smaller in bulk, though in the opinion of many critics her poetry was in no way inferior to that of her sister, being characterized by more variety, spirit, and humor than that of Alice. She published "Poems and Parodies" (1854), "Poems of Faith, Hope, and Love" (1868), besides numerous hymns and occasional contributions to periodicals. Phœbe Cary was remarkable for genial and ready wit in conversation. She did not long survive the death of Alice. Worn out by anxiety during her sister's long illness, and overwhelmed by grief after her death, her system was unable to throw off an attack of malarial fever, of which she died at Newport, R. I., July 31, 1871. The sisters were buried in Greenwood Cemetery, where a beautiful monument has been erected to their memory at a cost of about $1000, Mr. Greeley heading the subscription for the purpose. (See "Alice and Phœbe Cary," by M. C. Ames, 1873.)

Cary (Samuel F.). See Appendix.

Caryat′ides [Gr. Καρυάτιδες], the Latin plu. of *Caryatis*, *i. e.* a woman of Caryæ (a city of Laconia), or a virgin dedicated to the service of the Caryan Diana. The term is applied in Greek architecture to female figures which were used instead of columns to support a roof or entablature. They were usually dressed in long robes. The corresponding male figures are called Atlantes and Telamones.



Caryatides, from the Erechtheum at Athens.

Caryl (Joseph), born in London 1602, died there Feb. 7, 1673; studied at Oxford; accompanied Cromwell to Scotland in 1650, and officiated after the Restoration in an independent congregation in London. His "Exposition, with Practical Observations, on the Book of Job" (12 vols. quarto), appeared 1648–66; an abridged edition in 1836.

Cary′ocar, a genus of large trees of the order Rhizobolaceæ, which comprises but few other genera. They are natives of Brazil and Guiana, and are sometimes called pekea trees and butter trees. The fruit is a drupe or nut which has a soft, edible, and delicious kernel, and is known by the names of butter-nut and souari-nut. The drupe contains, besides the kernel, a pulp which is like butter, and is used in cookery as a substitute for it. Oil of good quality is obtained from the kernels. The timber of the caryocar is good for shipbuilding. The *Caryocar nucifera* is cultivated in the island of St. Vincent.

Caryophylla′ceæ [from the specific name of the carnation (*Dianthus Caryophyllus*)], a natural order of exogenous plants, mostly herbaceous and natives of temperate and cold countries. They have opposite, entire leaves, often united at the base, regular flowers, and stems usually swollen at the articulations. The fruit is a 1-celled capsule or pod. The order comprises nearly 1000 species, some of which have beautiful flowers, as the pink (*Dianthus*). Among the other genera are the *Silene, Lychnis, Arenaria, Stellaria* (chickweed), and *Saponaria* (soapwort), which is said to be a substitute for soap.

Caryop′sis [from the Gr. *κάρυον*, a "nut," and *ὄψις*, "appearance"], in botany, a fruit in which the seed and pericarp are so closely united as to be inseparable and undistinguishable. The fruit or grain of wheat, barley, maize, and other graminaceous plants is a caryopsis. It is a 1-celled, 1-seeded, and indehiscent pericarp.

Caryo′ta, a genus of palm, sometimes called the jaggery-palm or sugar-palm, growing in India and Ceylon. *Caryota urens*, a lofty, spreading tree, yields a large amount of fermentable juice (toddy) when its spathes are incised; this is boiled down to produce sugar. Its farinaceous pith resembles sago, and its fibres are used for making ropes.

The quantity of sugar produced in India from this and a few other palm trees is very great, but the quality is inferior. The cultivation of the jaggery-palm is entirely in the hands of a caste, or sub-caste, of Soodras, who devote their whole labor to this crop. The genus *Caryota* is botanically very distinct from all other known palms.

Ca′rysfort Reef, a dangerous coral-reef at the edge of the Gulf Stream, near the S. point of Florida, lat. 25° 13′ 15″ N., lon. 80° 12′ 45″ W., has an iron-pile lighthouse 112 feet high, with a flashing light of the first order 106 feet above the sea.

Casacalen′da, a town of Italy, in the province of Campobasso, is about 18 miles N. E. of Campobasso. It has three churches and a convent. Silk and wine of good quality are produced in this vicinity. Pop. 6000.

Casa′le, a fortified town of Italy, in the province of Alessandria, is on the river Po, 37 miles E. of Turin. It has an iron bridge across the river, an old castle, and a cathedral founded in 1474; also several convents, a college, a public library, a theatre, and two hospitals. Here are manufactures of silk twist. Casale is the seat of a bishopric, and was formerly the capital of the duchy of Montferrat. Many Roman remains are found here. Pop. in 1881, 28,711.

Casal′ Pusterlen′go, a town of Italy, in the province of Milano, on the Brembolo, 29 miles S. E. of Milan. It has manufactures of silk and linen and earthenware, and a trade in Parmesan cheese, which is made here. Pop. 5437.

Casamas′sima, a town of Italy, in the province of Bari, 12 miles S. E. of Bari. It has a convent and two abbeys. Pop. 5941.

Casano′va de Seingalt′ (Giovanni Giacomo), a celebrated Italian adventurer, born at Venice April 2, 1725. He travelled extensively, passed his life successively in many European capitals, and mixed with aristocratic society. He fought several duels, and was confined in the dungeons of Venice for nearly two years. About 1790 he became librarian to Count Waldstein in Bohemia. He is said to have been witty, dissipated, and greatly addicted to intrigues. Died June 4, 1798. He left autobiographic memoirs, which were published in 1822.

Cas′areep′, Cassareep, or **Casaripe,** a sauce or condiment made of the juice of the bitter cassava or manioc root. It is highly esteemed in Guiana, where it is employed to flavor nearly every dish. It is the basis of the West Indian *pepper-pot,* and is imported into Great Britain. It is a powerful antiseptic, by means of which meat can be kept fresh for a long time. The fresh juice is poisonous, but its noxious properties are removed by cooking.

Ca'sas, de las (BARTOLOMÉ), a benevolent Spanish Dominican missionary, born at Seville in 1474. He accompanied Nicolas d'Ovando, governor of San Domingo, to America in 1502, and preached the gospel in Hispaniola. His sympathies were excited by the cruelty with which he found that the Indians were treated, and he directed untiring efforts to the improvement of their condition, interceding with the governor, Velasquez, and the emperor Charles V. The statement that he suggested the introduction of African slaves has been abundantly refuted. After he had officiated as bishop of Chiapa in Mexico, he returned to Spain in 1551. Died July, 1566. (See ARTHUR HELPS, "Life of Las Casas," 1868.)

Casaubon (ISAAC), born at Geneva Feb. 18, 1559, died in London July 1, 1614. After the publication of the edict of January, 1561, his parents, a French refugee family, returned to France, and his father was settled at Crest in Dauphiny as pastor of a Huguenot congregation. The circumstances of the family were humble, and times became hard. Up to his nineteenth year Isaac received no other instruction than what his father could give him; he had his first Greek lessons in a mountain-cave where the family was compelled to hide from the Roman Catholic mob. In 1578 he was sent to the Academy of Geneva, and so great were his accomplishments that in 1582 he was appointed professor of Greek there. He held that position till 1596, and in 1592 he published his annotated edition of Theophrastus' "Characteres," which gives a good idea of his peculiar style as a commentator. But he lacked books in Geneva, and in 1596 he accepted the chair of professor at Montpellier. The office of teaching, however, was not congenial to him, and in 1600 he removed to Paris as librarian, having in the mean time published his most ambitious work, the revised and annotated edition of Athenæus. The ten years he spent in Paris were the busiest and the brightest time of his life, but he allowed himself to be dragged into the theological controversies of the period; and after the death of Henry IV. he left France and took up his abode in London, where he wrote his "Exercitationes in Baronium," which were left unfinished, and his "Ephemerides," published by the Clarendon Press in 1850. (See MARK PATTISON, "Isaac Casaubon," London, 1875.)

Cascade Range, a chain of mountains in Oregon and Washington Territory, is nearly parallel with the coast of the Pacific Ocean, and is a continuation of the Sierra Nevada of California. The direction of the range is nearly N. and S. Its distance from the sea-coast is in Oregon about 120 miles. The Columbia River breaks through this range, forming the cascades from which the name is derived. Among the highest summits of this range are Mount Hood, which rises 11,225 feet above the sea, and Mount Jefferson, both in Oregon. Some of the peaks are volcanic, as Mount St. Helen, about 12,000 feet high, and Mount Rainier, 14,444.

Cascades, capital of Skamania co., Washington Territory (see map of Washington Territory, ref. 5–C, for location of county), on the N. bank of the Columbia River, about 50 miles W. of Dalles City. Pop. in 1880, 149.

Cascaril'la [diminutive of *ca'scara,* the Spanish word for "bark"], a name given in South America to different kinds of bitter medicinal barks, including Peruvian bark. European and American physicians and apothecaries apply the term to the bark of the *Croton Eleutheria,* which is a small West Indian tree. This bark is imported into Europe and the U. S., and is used in medicine as a stimulant tonic.

Cas'co Bay, in Maine, washes the shore of Cumberland county, and is about 20 miles long. The city of Portland is at the western extremity of this bay, which encloses about 300 islands.

Case [Fr. *cas;* Lat. *casus,* a "fall," an "accident," a "casualty," from *cado, casum,* to "fall"], a term used in various senses, signifies an event; a condition in which a person is placed; the state of the body with respect to health or disease; a predicament; a situation or contingency; in grammar, the inflection of nouns or a change of termination; in law, a cause or a suit in a court. A wooden box in which dry goods and hardware are packed is called a case. *To be in good case* signifies "to be fat." Case, in printing, is a receptacle for types; this is divided into compartments, each of which contains the types of but one letter. Commonly there is an upper and a lower case; the upper holding the capitals, small capitals, and *sorts* little used; the lower, the small letters, points, figures, etc.

Case, in law, is used in a number of significations. (1) It indicates a form of action, called "an action on the case." This action did not exist in the early English law, but was introduced by a statute of the reign of Edward I. (Westminster 2d). It is founded on the peculiar circumstances of the case, and supplies a remedy for such wrongs as cannot be included under the term "trespass," and which are in their nature indirect and consequential. It applies to such wrongs either committed against one's person or property, whether real or personal. The action is sometimes called "trespass on the case," and at other times simply "case." Out of this action grew the modern action of "assumpsit," which is really instituted to recover damages for breach of contract. (2) It sometimes means a suit or action in court. Thus, in the U. S. Constitution it is said that the judicial power of the Federal courts shall extend to all *cases* in law and equity. The meaning of the word has been settled by adjudication, as shown in approved treatises on the Constitution. (3) Another sense is a written or printed statement of facts for the opinion of counsel or for the decision of a court without regular trial. The question then to be decided is a question of law, and the facts are sometimes presented by agreement, and at other times through the formal intervention of a jury. This is frequently called a "case stated." (4) In legal practice the word is used to denote the mode of presenting the facts which occurred at a trial to an appellate court for review. If the respective parties fail to agree on a statement of facts, the court before which the trial occurred passes definitively upon them in a prescribed manner, and is thereupon said to "settle" the case.

Case (AUGUSTUS LUDLOW), U. S. N., born Feb. 3, 1813, in Newburg, N. Y., entered the navy as a midshipman April 1, 1828, became a passed midshipman in 1834, a lieutenant in 1838, a commander in 1855, a captain in 1863, a commodore in 1867, and a rear-admiral in 1872. He served on the E. coast of Mexico during the Mexican war, participating in the capture of Vera Cruz and Tobasco. Early in 1861, Commander Case was appointed fleet-captain of the North Atlantic blockading squadron, in which capacity he took part in the capture of Forts Hatteras and Clarke, Aug. 29, 1861, and in the operations in the sounds of North Carolina in the winter of 1862. In 1863, in command of the Iroquois, and assisted by the steamers James Adger and Mount Vernon, he cut out the blockade-runner Kate, under the fire of the forts and batteries at New Inlet, N. C. Referring to the capture of Forts Hatteras and Clarke, Flag-officer Stringham, in his official report of Sept. 2, 1861, writes: "I here take the opportunity of mentioning with great pleasure the name of Commander A. Ludlow Case, my fleet-captain, for very prompt and efficient services during all the time we have been occupied in the expedition so successfully terminated." And Flag-officer Goldsborough, in a letter to the navy department dated Feb. 18, 1862, says: "It is really difficult for me to state, in adequate terms, how largely I feel myself indebted to Commanders Rowan and Case for their constant and signal services. They, hand in hand, with their marked ability and sound sense, and in the absence of all ordinary facilities, brought about, at Hampton Roads, the arming, manning, and equipment of the many vessels sent to us, from necessity, in an unprepared condition; and subsequently they both labored, most conspicuously and faithfully, in their respective spheres of action, to vanquish difficulties . . . at Roanoke. In short, their assistance has been invaluable to me." He was chief of the bureau of ordnance from Aug., 1869, to May, 1873; in June, 1873, he was appointed to the command of the European squadron. Retired Feb. 3, 1875. FOXHALL A. PARKER.

Case-hardening is forming a covering of steel on the surfaces of gun-locks, tools, the upper surface of railroad iron, grates, fenders, etc. The articles are first heated to redness, sprinkled with yellow prussiate of potash, and heated again. The heat decomposes the prussiate of potash, and the liberated carbon combines with the iron, forming a coating of steel on the surface. Another mode is to surround the articles with a layer of animal matter, such as powder from charred hoofs or waste leather, with a little common salt, and heat them in an iron case to redness, retaining them at that temperature for half an hour or more; the articles are then taken out and cooled in cold water or in oil. The coating of steel is very thin, seldom exceeding one-sixteenth of an inch. The steel covering makes the articles more durable, and admits of a better polish.

Ca'seine [from the Lat. *caseus,* "cheese"], a nitrogenous organic substance allied to albumen, found in milk, and most abundantly in that of flesh-eating animals. It is said to be occasionally found in the fluid of cysts. It is also found (as legumine, and probably as amandine, both being regarded as identical with it) in peas, beans, almonds, and other seeds. Vegetable and animal caseines behave exactly alike with chemical tests, and when pure cannot be distinguished by the taste. The proportion in cow's milk is about 4 per cent.; in dried peas, 25 per cent. Caseine is coagulated (curdled) by acids or by rennet, and is the chief constituent of Cheese (which see). It also forms insoluble precipitates with corrosive sublimate, with nitrate of silver, and with acetate of lead. Hence, copious draughts of milk afford a ready antidote in cases of poisoning with either of the above salts. Caseine is also used in calico-printing. The probable proportions of the constituent elements of caseine in 100 parts have been given as follows: carbon, 53.83 parts; oxygen, 22.52; nitrogen, 15.65; hydrogen, 7.15; sulphur, 0.85, with perhaps a little phosphorus; but its composition is not exactly known.

Charles W. Greene.

Casemate [from the Sp. *casa*, "house," and *matar*, "to kill"] was originally a loopholed gallery excavated in a bastion, from which the garrison could fire on an enemy who had obtained possession of the ditch. The term was afterwards applied to a bomb-proof vault in a fortress, which is designed for the protection of the garrison, and is sometimes used as a barrack or hospital. A casemated battery consists of such a vault or vaults, with openings for the guns, called "embrasures" or ports. The term casemate is also applied to the part of an iron-clad vessel armored to protect broadside guns.

Casement, a portion of a window-sash made to open or turn on hinges; a frame with hinges enclosing part of the glazing of a window. Such windows are very common on the continent of Europe. The term is also applied to a deep, hollow circular moulding, similar to the *scotia* of classical and the *cavetto* of Italian architecture.

Caserta. See Terra di Lavoro.

Caser'ta, a town of Italy, capital of Terra di Lavoro, is situated on a plain about 21 miles by rail N. E. of Naples. It has, besides numerous churches and a military school, a magnificent royal palace, which was built by Vanvitelli about 1755, and is one of the largest in Europe. Connected with the palace is a fine park and an aqueduct. Here is a royal silk-factory, in which about 700 persons are employed. Pop. in 1881, 30,550.

Case-Shot [Fr. *mitraille;* Ger. *Kartätschenschuss* (*i. e.* "cartridge-shot")] is the name of a projectile, consisting of several balls or bullets of lead or iron packed in a case. When the case is a cylinder of tin with a wooden bottom, the whole is called cylindrical-case or canister. The number of shot in each canister varies from 40 to 126. Some armies use canister with an explosive charge in the centre, but more commonly it has no such charge. When the balls are affixed to a central spindle without a case, or enclosed in a canvas bag, they are called grape-shot. This is especially used in garrison-artillery. Against advancing lines the effect of grape and canister at close range is often terrible, but solid shot and shell are preferred against columns. Spherical-case or shrapnel (so named from its inventor) is a thin cast-iron shell, containing a chamber with a light or bursting charge of gunpowder, around which are packed bullets of lead or iron. It should burst at least forty yards in advance of the enemy. This missile is effective at three times the range of canister, but at long distances its effect is often lost from lack of precision in the aim or in the cutting of the fuse.

Casey (Silas), an American officer, born July 12, 1807, at East Greenwich, R. I., graduated at West Point 1826, and Oct. 9, 1861, became colonel Fourth Infantry, and May 31, 1862, major-general U. S. volunteers. He served on western and northern frontiers 1826–36, in Florida war 1837–41, engaged at Pilaklikaka, on northern frontier 1842–47, in war with Mexico 1847–48, engaged at Contreras and Churubusco (brevet major), Molino del Rey, and Chapultepec (wounded in leading assault, and brevet lieutenant-colonel), on the Pacific frontier 1848–54, on tactical and arms boards 1854–55, and at Puget Sound post 1856–61, engaged in several Indian skirmishes. During the civil war he served in preparing volunteers for the field at Washington, D. C., 1861–62, in the Virginia peninsula 1862, engaged at Fair Oaks (brevet brigadier-general), as president of board for examination of officers of colored troops 1863–65, in command at Detroit, Mich., 1865–67, and commissioner to examine war-claims of Ohio. Brevet major-general U. S. A. Mar. 31, 1866, for gallant and meritorious services. Compiled and edited a system of "Infantry Tactics" for the U. S. service 1862, and "Infantry Tactics for Colored Troops," 1863, and was retired from active service July 8, 1868. D. Jan. 22, 1882. George W. Cullum.

Casey (Silas, Jr.), U. S. N., born Sept. 11, 1841, in Rhode Island, graduated at the Naval Academy in 1860, became a master in 1861, a lieutenant in 1862, a lieutenant-commander in 1866, and afterward a commander. In 1861 he was attached to the steamer Wissahickon, South Atlantic blockading squadron, and participated in the first attack on Fort Sumter, and in various engagements with the forts and batteries in Charleston Harbor.

Foxhall A. Parker.

Casey (Thomas Lincoln). See Appendix.

Cash [Fr. *caisse;* Ger. *Kasse*], money; coin or current bank-notes; ready money. It is often used to denote immediate payment, and goods are said to be sold for cash when they are not sold on credit.

Cash-book, a book in which merchants, bankers, and others keep an exact and methodical account of each sum of money received or paid by them.

Cash'el, a town of Ireland, in the county of Tipperary, is 105 miles by railway S. W. of Dublin and 49 miles N. N. E. of Cork. It is built on the slopes of an isolated limestone hill rising abruptly from a rich plain. Cashel was the residence of the kings of Munster, and is now a bishop's see. The top of the hill called the "Rock of Cashel" is occupied by the most interesting ruins in Ireland. These consist of a round tower ninety feet high, the palace of the kings of Munster, a chapel of Saxon and Norman architecture, and a cathedral which was founded in 1169, and is said to have been the largest in the country. It was built of limestone. Pop. 3976.

Cashew'-nut (*Anacardium occidentale*), a tree of the order Anacardiaceæ, is a native of the tropical parts of America, and perhaps of Asia. It abounds in a clammy, milky, and acrid juice which turns black on exposure to the air, and is used in India as a varnish. The fruit is a kidney-shaped nut attached to the larger end of a pear-shaped, fleshy stem, from which the botanical character of the genus is derived. The shell, which is double, encloses an oily kernel which is very agreeable and wholesome, and is a common article of food in tropical countries. The fleshy stem, sometimes called the cashew-apple, is also edible and refreshing, having an acid taste. In size it is nearly equal to an orange. A pleasant vinous beverage is prepared from its fermented juice. The oil is used as a remedy for leprosy. Cashew is a corruption of the French *acajou*.

Cashgar. See Kashgar.

Cashier' [Fr. *caissier*], a cash-keeper, a person who has charge of the cash in a bank, counting-house, or other place of business. The president and the cashier are the highest officers of a bank, and they write their signatures on each bank-note. The cashier superintends the books and transactions of the bank, under the order of the directors.

Cashmere, kash-meer' (ancient *Caspira*), a country of Northern India, between 32° 30′ and 34° 55′ N. lat., and 72° 20′ and 79° 40′ E. lon. Its area is said to be 60,100 square miles. On the N., N. W., W., S. W., and S. it adjoins the Punjaub: on the N., N. E., and E. the Indus separates it from Thibet; S E. and S. its valleys run into those of Thibet.

Surface.—Cashmere consists of part of the Himalaya range of mountains and some elevated but beautiful valleys. The Valley of Cashmere, 5100 square miles, is surrounded by the Himalayas, and at its lowest depression is 5500 feet above the sea. It contains several lakes, and is wondrously beautiful and fertile. The other valleys, though less extensive, are very attractive. The Himalayas have one peak in Cashmere (Panjal) 15,000 feet high; there are several passes in the mountains, but none practical for carriages. The Indus half surrounds Cashmere, but the principal river of the Valley of Cashmere is the Jhylum, which traverses the middle of the valley and escapes through the Baramoola Pass.

Productions.—The soil is mostly very fertile in the valleys; some of it requires irrigation. It yields great crops of rice, wheat, barley, maize, and excellent fruits—apples, pears, peaches, apricots, cherries, etc. The forests are of deodar (a species of cedar), pine, and walnut. Large herds of cattle and goats are pastured on the mountain-slopes, and the hair or wool of the Cashmere Goat (which see) is in great demand for the Cashmere shawls made here. Fire-arms are made in Cashmere, and precious stones are cut.

History.—Conquered by Emperor Akbar in 1586, and annexed to Mogul empire; Afghans held possession 1752–1819, and Sikhs 1819–1849: that year ceded to the British, who transferred it to Gholab Sing, whose Cashmere empire is composed of Cashmere, Baltistan, and Loday or Ladak.

Population about 3,000,000, mostly Mohammedans. Of these, 400,000 are in the Valley of Cashmere. The people are of good stature and great physical beauty. Capital and chief city, Serinagur or Cashmere. L. P. Brockett.

Cashmere Goat, a variety of the goat remarkable for its long, fine, and silky hair, from which Cashmere shawls are made. This goat is found in Thibet, from which the finest hair is imported into Cashmere, to be there manufactured. The hair is longer than that of the Angora goat, and not, like it, curled, but straight, and about eighteen inches long. A single goat does not yield more than three ounces, and the fleeces of ten goats are requisite for a shawl a yard and a half square.

Attempts have been made to introduce the Cashmere goat into Europe and America. In Northern South Carolina and the neighboring regions it thrives well, as also in California. A mixed race, produced by crossing the Cashmere and the Angora goat, possesses valuable qualities, the hair being long, fine, and more abundant than in the parent breeds.

Cas′imir III., surnamed The Great, king of Poland, born in 1309, was a son of Ladislaus, king of Poland, whom he succeeded in 1333. He enlarged his dominions by the conquest of Red Russia about 1366, and repelled the aggressions of the Tartars. He promoted education and founded colleges and hospitals. He died Nov. 8, 1370, and was succeeded by his nephew, Louis of Hungary.

Casimir IV., son of the prince Jagello of Lithuania, born Nov. 29, 1427, was in 1444 elected king of Poland. He carried on, for nearly twenty years, a war with the Teutonic Order, which in the peace of Thorn (1466) had to cede West Prussia to Poland; and by convoking in 1468 the nobility became founder of the Polish constitution. Died June 7, 1492.

Casi′no [diminutive of Italian *casa*, a "house"] signifies a place for social reunions. Italian nobles have long had casinos detached from their palaces, and public casinos were the result of an attempt made by the middle classes to imitate them.

Casi′no, or **Mon′te Casi′no,** a mountain of Italy, in Terra di Lavoro, about 55 miles N. N. W. of Naples. It is close to the town of San Germano, and is the site of a celebrated Benedictine abbey founded in 529 A. D. by Saint Benedict. This abbey is remarkable for its architecture, its wealth, its library, and the learning of its monks. Several valuable works have been issued from the press of Monte Casino.

Caso′ria, a town of Italy, in the province of Napoli, 6 miles N. N. E. of Naples. It has four fine churches. Silk is produced in this vicinity. Pop. 9791.

Cas′pe, a town of Spain, in Aragon, province of Saragossa, is situated near the river Ebro, 53 miles S. E. of Saragossa. It has three churches, a town-hall, and manufactures of oil and soap. Pop. 9157.

Cas′pian Sea [Lat. *Mare Caspium*, or *Mare Hyrcanium;* Gr. Κασπία Θάλασσα], a large inland sea forming part of the boundary between Europe and Asia. It has on the N. European Russia, on the E. the Khirgeez steppe, or Toorkomania, on the S. Persia, and on the W. Persia and Georgia. It is about 690 miles long from N. to S., and has an average width of near 200 miles. The area is estimated by Berghaus at 156,800 square miles. The depth of water towards the S. is nearly 3000 feet, but towards the N. it is generally shallow, seldom being more than 3 feet deep at a distance of 100 yards from the shore. According to some authorities, the greatest depth is only 600 feet. The depression of the surface of the Caspian below that of the Black Sea, according to the Russian survey of 1836–37, is about eighty-four feet. The Caspian receives several large rivers—viz. the Volga, the Ural, and the Koor. It has no outlet, and its superfluous water can escape only by evaporation. That the Caspian and the Sea of Aral were once connected is rendered evident by the nature of the rocks in the vast plains which extend from them in several directions. Great numbers of sturgeons and salmon are caught in this sea, in which various other kinds of fish are also abundant. A communication has been opened between the Caspian Sea and the Baltic by a canal which connects the Volga with the rivers Tvertza and Schlina. Steam-packets navigate the Caspian, the commerce of which is mostly in the hands of the Russians. The chief ports are Astrakhan, Derbend, Petrovsk, Bakou, and Krasnovodsk.

Cass (George W.), an engineer, born in 1810 in Muskingum co., Ohio, graduated at West Point in 1832. He served while lieutenant of infantry on topographical and engineer duty till he resigned Oct. 26, 1836. Civil engineer 1836–41; merchant of Brownsville, Pa., 1842–52; president of Adams Express Co., 1854–57; of Ohio and Pennsylvania R. R. 1856; of Pittsburg Fort Wayne and Chicago R. R. 1856–58 and 1859 to 1881, and of Northern Pacific R. R. 1872–77. George W. Cullum.

Cass (Lewis), LL.D., an American statesman, born at Exeter, N. H., Oct. 9, 1782. He studied law, which he began to practise at Zanesville, O., in 1802. Having entered the army as a colonel in 1812, he served in Canada under Gen. Hull, and was taken prisoner. He was raised to the rank of brigadier-general in 1813, and appointed governor of Michigan Territory in 1814. After he had held that office sixteen years, and negotiated many treaties with the Indians, he was appointed secretary of war by President Jackson in 1831. He was sent as minister to France in 1836, returned home in 1842, and was elected a Senator of the U. S. for Michigan in 1844. Having opposed the Wilmot Proviso, he was nominated as Democratic candidate for the presidency of the U. S. in 1848, but he was defeated by Gen. Taylor, the Whig candidate, who received 163 electoral votes; Gen. Cass received 137 electoral votes. In Jan., 1849, he was re-elected to the Senate of the U. S. He supported Douglas's Kansas-Nebraska bill in 1854, and became secretary of state in Mar., 1857. He resigned in Dec., 1860. Died June 17, 1866. His published writings are not numerous, but are well written and display much ability. (See H. R. Schoolcraft, "Life of General Cass," 1848; W. L. G. Smith, "Life of Lewis Cass," 1856.)

Cassagnac. See Granier de Cassagnac.

Cassan′der [Gr. Κάσσανδρος], a Macedonian prince, was a son of Antipater, regent of Macedonia. When Antipater died, in 318 B. C., Cassander and Polysperchon became competitors for the regency, and appealed to arms. Cassander was victorious, and having taken Athens, restored the aristocracy under Demetrius Phalereus in 316 B. C. He married Thessalonice, a sister of Alexander the Great, and obtained possession of Alexander's infant son, whom he put to death in 309, and usurped the throne. He joined Seleucus and Ptolemy in a coalition against Antigonus, whom these allies defeated at the battle of Ipsus in 301 B. C. He died in 297, and was succeeded by his son Philip.

Cassan′dra [Κασσάνδρα], a famous Trojan princess, a daughter of Priam, was celebrated for her prophetic inspiration. According to the poetical legend, Apollo was enamored of her, and taught her the secrets of fate, but he ordained that her prophecies should not be credited. During the siege of Troy she predicted the ruin of that city, but she was regarded as a lunatic by the Trojans. She was carried away as a captive by Agamemnon.

Cassandra, Gulf of (anc. *Toronaicus Sinus*), is a part of the Ægean Sea, in European Turkey, and extends between two peninsulas, the extremities of which are called Cape Drepano and Cape Pailluri. It is nearly 25 miles long.

Cassa′no, a town of Italy, in the province of Calabria Citeriore, 30 miles N. of Cosenza. It stands in the concave recess of a steep mountain, in the midst of beautiful scenery. It has a cathedral, several convents, and an old castle; also manufactures of silk, linen, cotton, and leather. Pop. 7456.

Cassation. See Courts, by George Chase, LL.B.

Cassa′va, a West Indian name of the plant called manioc or manihot, and of the starch or fecula prepared from its root. It is known in the U. S. by the name of Tapioca (which see). (See Manioc.)

Cassay′, Munnipoor′, or **Munepoor,** a country of Farther India, is bounded on the N. W. by Assam, and E. and S. by the Burmese dominions and the country of the independent Kookies. It is mostly included between lat. 24° and 26° N., and between lon. 93° and 95° E. The area is said to be 7584 square miles. The surface is diversified by valleys and high mountains which are covered with forests. The staple productions are tea, rice, cotton, indigo, sugar, opium, and tobacco. The finest pineapples in the world are produced here. The Cassay ponies are celebrated throughout the East, and much sought in Burmah for cavalry horses. Capital, Munipoor. Cassay became independent in 1826, before which it was part of the Burmese empire. It is governed by a native rajah.

Cas′sel (anc. *Castellum Cattorum*), a walled city of Prussia, the capital of the province of Hesse-Cassel, is pleasantly situated on both sides of the river Fulda, about 132 miles W. of Leipsic and 28 miles S. W. of Göttingen. It is connected by railways with Leipsic, Frankfort, and other towns. It has several public squares, in the largest of which, called Friedrichsplatz, stands the palace of the electors of Hesse. Near this palace is a handsome museum which has a library of 165,000 volumes. Cassel contains an observatory, a valuable picture-gallery, a theatre, several hospitals, a normal school, and academies of painting and sculpture. It has manufactures of cotton, silk, and woollen fabrics, lace, gloves, carpets, hardware, etc. In the environs of Cassel is the royal palace of Wilhelmshöhe, with beautiful gardens and fountains. This palace was occupied by the emperor Napoleon III. while he was a captive in the autumn of 1870 and the ensuing winter. Pop. in 1880, 58,290.

Cas′sel (Douglas R.), U. S. N., born Oct. 9, 1845, in Ohio, graduated at the Naval Academy as ensign in 1863, became a lieutenant in 1866, and a lieutenant-commander in 1868. While attached to the steam-sloop Brooklyn was slightly wounded at the battle of Mobile Bay, but remained at his quarters until the close of the action. He is thus honorably noticed by his commanding officer, Capt. James Alden, in his report of Aug. 6, 1864: "The other division officers—Capt. Houston of the marines, Lieut. Charles F. Blake, Ensigns Cassel and Sigsbee, with their assistants, Master's Mates Duncan and Stevens—fought their guns nobly and well." He served in the Brooklyn during both the Fort Fisher fights, and led the seamen of the Brooklyn in the assault on the fort of Jan. 15, 1865. D. at Germantown, Pa., June 20, 1875. Foxhall A. Parker.

Casselton, Dak. See Appendix.

Cas′serly (Eugene), born in Ireland in 1822. In 1824 he emigrated to America with his parents, became a lawyer and journalist of New York, and removed to California in 1850, where he became a Democratic politician and editor in San Francisco. In 1869 he was chosen U. S. Senator from that State, but resigned in 1873. D. June 14, 1883.

Cas′sia, a fragrant bark mentioned in the Bible, and supposed to be the cassia-bark of the shops, a coarse variety of cinnamon from China, Anam, and other eastern countries. It is generally sold as cinnamon, which it much resembles, though cheaper and generally inferior in quality. It yields the oil of cinnamon. "Cassia buds" are the dried flower-buds which are brought from China.

Cassia is the name of a genus of leguminous herbs, shrubs, and trees, natives of both continents. Several African and Asiatic species are valuable for their leaves, which when dried constitute the drug *senna*. The U. S. have numerous species, one of which (*Cassia Marilandica*) yields leaves which have the cathartic properties of senna in a milder degree. "Cassia pulp" or "purging cassia" comes from the pods of *Cathartocarpus Fistula* or *Cassia Fistula*, a tree of India and Egypt, now naturalized in most tropical countries. It contains a large percentage of sugar, and is used in making laxative conserves for medicinal use.

Cas′sian [Lat. *Cassianus*], (John), a monk noted as a promoter of monachism and as an opponent of Saint Augustine, was born about 350 A. D. He founded a large monastery at Marseilles (about the year 415), which was a model for many others in Gaul and Spain. He differed from Saint Augustine respecting grace, and taught doctrines which were called semi-Pelagian. Among his works is a "Treatise on Monastic Institutions." Died about 433 A. D.

Cas′sican, a name applied to the baritas of Australasia and other birds, but appropriately belonging to the genus *Cassicus*, resembling the orioles. The best known species is the *Cassicus cristatus* of South America, a bird twenty inches long, which makes a large nest exhibiting great skill in construction. The nests are often three feet long, and are hung upon the branches of trees. They are gregarious birds, and often build several of their huge nests upon the same tree.

Cas′simere [formerly *kerseymere*, not improbably derived from *Cashmere; Fr. casimir;* Ger. *Kasimir*], a twilled woollen or cotton and woollen fabric, either plain or figured, much used for men's clothing. Cassimeres are largely woven in England and the U. S., but especially on the continent of Europe.

Cas′sin (John), an American naturalist, born in Delaware co., Pa., Sept. 6, 1813. He published, besides other works, "American Ornithology: a General Synopsis of North American Ornithology, containing Descriptions and Figures of all North American Birds not given by former American Authors" (1856). Died Jan. 10, 1869.

Cassi′ni (Giovanni Domenico), an eminent astronomer, born near Nice, June 8, 1625. He discovered in 1665 that Jupiter performs a rotation in nine hours and fifty-six minutes, and published in 1668 his ephemerides of the satellites of Jupiter. Invited by Colbert, he removed to Paris in 1669, and became director of the observatory of that city. In 1684 he discovered four satellites of Saturn. His descendants for several generations were able astronomers. Died Sept. 14, 1712. (See his "Autobiography;" also Fontenelle, "Éloge de J. D. Cassini.")

Cassi′no, a town of Italy, in the province of Caserta, 49 miles by rail N. W. of Caserta. Large ruins of Roman theatres and palaces are in the neighborhood. Just above the city, on a high mountain, is the celebrated monastery Monte Cassino, with a seminary, a gymnasium, and a large library containing many valuable manuscripts. In 1877 there were 30 monks and 200 students. Pop. 5641.

Cassiodo′rus (Magnus Aurelius), a Latin historian and minister of state, was born at Scylacium (Squillace), in Italy, about 468 or 480 A. D., entered service of Theodoric, king of the Ostrogoths, about 497, and became his chief minister. He had a high reputation for ability and learning, and continued in power for many years. He wrote, besides works on grammar and rhetoric, a "History of the Goths" and a valuable collection of state papers entitled "Variarum Epistolarium Libri XII.," which was printed in 1533.

Cassiope′a, or **-pia, Cassiepe′a,** or **Cassi′ope** [Gr. Κασσιόπεια, Κασσιέπεια, Κασσιόπη], in classic mythology, the wife of Cepheus and the mother of Andromeda. She was said to have been transformed into a constellation.

Cassiope′ia, or "Lady in the Chair," a constellation in the northern hemisphere, has several stars of the third magnitude. It is represented on the celestial globe as a lady sitting in a chair. Five of its most conspicuous stars are arranged in a figure like a W. In 1572 a new and brilliant star suddenly appeared in Cassiopeia. It was observed by Tycho Brahe in November, and is said to have surpassed all the fixed stars in splendor. It disappeared in Mar., 1574, after a gradual diminution of lustre.

Cassiquia′re, or **Cassiquia′ri,** a river of South America, in Venezuela, is a deep and rapid stream, forming the S. bifurcation of the Orinoco. It issues from the Orinoco about lat. 3° 10′ N. and lon. 66° 20′ W., and flowing south-westward about 130 miles, enters the Rio Negro near San Carlos. This remarkable river opens a navigable communication between the Orinoco and the Rio Negro. It is 600 yards wide at its entrance into the latter.

Cassis, the French name of the black currant bush and its fruit. A liqueur called *liqueur de cassis* is made from the fruit, and is used in Europe very extensively.

Cassiter′ides [from the Gr. κασσίτερος, "tin"], the ancient name of certain islands (supposed to be the Scilly Isles) from which the Phœnicians procured tin.

Cas′siterite [from the Gr. κασσίτερος, "tin," and λίθος, a "stone"], native peroxide of tin, composed, when pure, of 21.62 per cent. of oxygen and 78.38 of tin. It is the common ore of tin, and the only one from which the metal is obtained. It occurs massive (as tin-stone), disseminated and fibrous (as wood tin), in rolled pieces, and in grains as sand (stream tin); also crystallized in quadrangular prisms, terminated by four-sided pyramids. Its lustre is splendent. It is obtained chiefly in Australia, Cornwall, Banca, Sweden, France, Spain, Chili, and California.

Cas′sius Longi′nus (Caius), a famous Roman conspirator and general, was a friend of Marcus Brutus, whose sister he married. He served as quæstor under M. Crassus, and distinguished himself in the expedition against the Parthians in 53 B. C. After the death of Crassus he defeated the Parthians. In the civil war that ensued he fought for Pompey against Cæsar. He was one of the conspirators who killed Cæsar in 44 B. C., soon after which event he commanded with success in Syria. His army was subsequently united with that of Brutus. Brutus and Cassius, who were the principal leaders of the republican party, were defeated by Antony and Octavius at Philippi in 42 B. C., and then killed themselves. (See Plutarch, "Life of Brutus.")

Cas′sius Parmen′sis, or **Ca′ius Cas′sius Seve′rus,** a Latin poet who wrote epigrams and elegies. He was one of the conspirators who killed the dictator Cæsar, 44 B. C. Having entered the service of Mark Antony, he fought against Augustus, by whose order he was put to death about 30 B. C. Only small fragments of his works are extant.

Cassivelau′nus, or **Cassibelau′nus,** sometimes Anglicised as **Cassib′elan,** a chief of the ancient Britons who ruled over the country N. of the Thames. He fought bravely against Cæsar when the latter invaded Britain in 54 B. C., but Cæsar took his capital and compelled him to pay tribute.

Cas′sock, a long loose garment like a frock-coat, worn under the surplice by the clergymen of the Anglican and Roman Catholic churches. It has a single upright collar. The Catholic ecclesiastics wear cassocks of colors varying according to rank of wearer—black for priest, purple for bishop, scarlet for cardinal, and white for the pope; those of the Anglican clergy are black, except the purple cassocks sometimes used by bishops.

Cassop′olis, R. R. junction, capital of Cass co., Mich. (see map of Michigan, ref. 8-H, for location of county), 98 miles S. W. of Lansing. Pop. in 1880, 912; in 1884, 1051.

Cas'sowary (*Casuarius*), a genus of birds nearly allied to the ostrich (see Brevipennes and Ostrich), but distinctively characterized by still greater shortness of wing, by a laterally compressed bill, by a bony crest, by pendent wattles on the naked neck, and by three toes on each foot, all furnished with claws, the inner toe short, and armed with a very long and sharp claw. Only one species is known, *Casuarius galeatus*, sometimes called emu by the older naturalists before that name was appropriated to the Australian bird, which now alone receives it. The cassowary is a native of the Moluccas, New Guinea, and other Asiatic islands, chiefly inhabiting deep forests. In appearance it is not unlike the ostrich, but has a much shorter neck. It is the largest known bird except the ostrich, and its height is about five feet. It feeds on fruit, eggs, and succulent herbage. When attacked, it defends itself by kicking obliquely backward with its feet, and by striking with its short wings, the rigid barbless shafts of which are otherwise useless, even to aid it in running.

Cassville, capital of Barry co., Mo. (see map of Missouri, ref. S-E, for location of county), 200 miles S. W. of Jefferson City. Pop. not given in census of 1880.

Casta'lia, or **Cas'taly** [Gr. Κασταλία], a fountain which issued at the base of Mount Parnassus, near Delphi, and was sacred to Apollo and the Muses. The ancient poets imagined that it filled the minds of those who drank of it with poetic inspiration. All persons who visited the temple of Delphi for any religious object were obliged to purify themselves by bathing their bodies or their hair in this sacred fountain. It is now called the fountain of St. John.

Castalio, or **Castellio** (Sebastian), born at Saint Martin-du-Fresne, a village of Savoy, 1515, died at Basel Dec. 29, 1563. He made the common humanist studies of the time, acted for several years as a tutor in a noble French family, and was in in 1552 appointed professor of Greek at Basel. His "Dialogues" were often reprinted, and used as a text-book up to 1731; they were translated into English under the title "Youth's Scripture Remembrancer" (London, 1743). His Latin translation of the Bible he dedicated to Edward VI. of England; his French translation, to Henry II. of France. Those translations are very characteristic for the humanist standpoint, but do not deserve the merciless criticisms which they received from the hands of Calvin and Beza. His life was written by Mähly (Basel, 1862).

Casta'nea, the classical Latin name of the chestnut; also the botanical name of a genus of trees of the order Cupuliferæ. Three species of this genus are indigenous in the U. S.—viz. *Castanea vesca* (chestnut tree), the *Castanea pumila* (chinquapin), and the golden chinquapin, or chestnut of the Pacific coast. (See Chestnut.)

Cas'tanets, a musical instrument consisting of two hollow shells of ivory or wood, which are bound together on the thumb, and struck by the fingers to produce a trilling sound in keeping with the rhythm of dances. Castanets were introduced into Spain by the Moors. They take their name (from the Lat. *castanea*, a "chestnut") from their being made of chestnut wood. The castanets are used in the ballet and in the opera.

Castanheda, de (Fernao Lopez). See Appendix.

Casta'ños, de (Francisco Xavier), duke of Baylen, a Spanish general, born April 22, 1756. He obtained the command of a corps in 1808, and defeated the French general Dupont at Baylen in July of that year. Dupont then surrendered his army, amounting to 18,000 men. Castaños distinguished himself at the battle of Vitoria, June, 1813. He was appointed captain-general in 1823. Died Sept. 24, 1852.

Caste [from the Port. *casta*, a "race"], a term originally applied to the distinct classes of society established under the Brahmanical régime in India. When the Portuguese first visited that country, at the close of the fifteenth century, they found their intercourse with the natives seriously interfered with by arbitrary social laws; certain pursuits were invariably followed by persons of a certain class, and any attempt to induce a man to perform offices which did not, according to the prevailing notions of the country, belong to his class, was obstinately resisted. The difference in appearance between some of these classes—as, for example, between the Soodras and persons of the priestly or military class—was so striking as to suggest the idea of an original difference of race; and hence the Portuguese employed the word *casta* ("race") as a general term to designate the distinctions above referred to.

According to the "Institutes of Manu" (considered by the Hindoos to be a work of divine authority, and regarded by them, indeed, in much the same light as the Law of Moses was regarded by the Israelites), there are four pure castes or classes: 1st, the priestly class, fabled by the Brahmans to have proceeded from the mouth of Brahmâ, the Creator; 2dly, the military class (called Kshatriyas, or Chuttrees), supposed to have sprung from his arm; 3dly, the mercantile class (Vaisyas), said to have been produced from his thigh; and lastly, the servile class (Soodras or Sudras), fabled to have sprung from his foot. There is reason to believe that the three higher classes were composed of persons of the original Aryan race (see Arya), but that the Soodras came from the tribes which the Aryas had conquered. Besides the four pure classes, there are various mixed or impure classes, some of which (the Chandâlas, for example) are so vile that their very shadow is pollution, and a Brahman is forbidden to take shelter under the same tree with one of these miserable outcasts. The term *pariah* (a word said to be derived from the Tamul, and to signify "inhabitant of the mountains;" see Pariah) is used in the south of India in a more general sense to denote any of the impure or degraded classes.

The Brahmans or priestly caste having (as they claim) proceeded from the mouth of Brahmâ, became his spokesmen or the interpreters of his will. The appropriate occupation of a Brahman is to teach the Vêda. It is proper to observe that the Brahmans are not all priests, but from their class alone priests are to be chosen. Many of them at the present day follow the profession of arms.

The military class is composed of warriors, chieftains, and kings. To the members of this class (Kshatriyas) only is the *executive* power of the state properly to be entrusted, though in some rare instances Brahmans have performed the part of princes, and, as already intimated, they share, at the present time, the profession of arms with the Kshatriyas.

The Vaisyas are supposed to compose the mercantile class, and also to include agriculturists, herdsmen, etc.; but in point of fact members of the two upper classes also not unfrequently engage in mercantile pursuits. Manu expressly states that in case a Brahman is unable to support himself by the offices appropriate to his calling—viz. "assisting to sacrifice, teaching the Vêdas, and receiving gifts from a pure-handed giver"—he may follow the profession of a soldier or engage in mercantile pursuits.

It is the duty of Soodras to serve the superior classes, and especially the Brahmans. It is their place to perform various menial duties, but the lowest offices in the community (that of scavenger, for example) are invariably performed by persons of the impure or mixed classes.

With respect to the first origin of caste, there can be no reasonable doubt that the institution was the invention of the Brahmans. This is shown by the manner in which the Brahmans are spoken of in the "Institutes," more particularly in those parts which treat of the duties of the other classes. "From his high birth alone a Brahman is an object of veneration even to the gods" (chap. xi. 85). "Though Brahmans occupy themselves with all sorts of mean occupations, they must invariably be honored, for they are something transcendentally divine" (ix. 319). "Let not a king, although in the greatest distress for money, provoke Brahmans to anger by taking their property; for they, once enraged, could immediately, by sacrifices and imprecations, destroy him, with his troops, elephants, horses, and cars" (ix. 313). "No greater crime is known on earth than slaying a Brahman" (viii. 381). "A Brahman is born above the world, the chief of all creatures. . . . Whatever exists in the universe is all, in effect, though not in form, the wealth of the Brahman" (i. 100). In order to guard the sanctity of the priestly caste against all encroachments, a man of any of the lower castes is strictly prohibited from marrying a Brahmanî (a Brahman woman), and the children of such marriages are irredeemably base. The offspring of a Brahmanî and Soodra (called a Chandâla) is accounted the vilest of mortals. By thus affixing an indelible mark of abhorrence upon the children, they inspire perhaps a stronger fear of such marriages than they could do by the most terrible punishments inflicted upon the parents themselves.

Whether the regulations respecting caste, as they are laid down in the "Institutes of Manu," were ever strictly enforced, has been doubted by many. Respecting this interesting question, in the entire absence of all historical testimony,* we can only reason from probabilities. The great reverence with which the "Institutes of Manu" seem to have been always regarded among the Hindoos who accept the Brahmanical religion renders it not improbable that at one time those regulations may have been as strictly observed as the ritual of the Levitical law was observed by the ancient Israelites. It would certainly be unreasonable to infer that because such an observance has not obtained in modern times, when the entire Hindoo nation has been subjugated first to one foreign despotism and then to another, it may not have prevailed in a remote antiquity, when (as there is every reason to believe) a large part of India was under the rule of sovereigns professing the Brahmanical religion. Nor can we safely argue against such an observance from the state of society represented in Hindoo dramas written near the time of the Christian era, for that was after the rise of Booddhism had broken the Brahmanical yoke, and though the new religion was subsequently displaced, the influence of the freedom which it had introduced was not wholly lost upon the people of India; in the same manner as the influence of the Revolution was felt in France even after the restoration of the Bourbons.

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* It is scarcely necessary to inform the intelligent reader that nothing deserving the name of history can be found in any of the ancient Hindoo writings, if we except those relating to the little state of Cashmere.

The doctrine of the transmigration of souls (which appears to have been almost universally accepted in India among all classes and in all ages of which we have any definite knowledge) became the principal and a most terrible engine in the hands of the Brahmans for curbing and breaking the spirit of the other classes. It may well be doubted whether the comparatively vague fear of eternal punishment taught among the nations of the West was calculated to exert anything like so powerful an influence on the mind as the definite, though infinitely varied, terrors which the priests of India presented to the imagination of the laity. Thus, one who steals the gold of a priest (unless he makes expiation in this life by some voluntary and cruel penance) will be born a thousand times in the form of a spider or some disgusting reptile; he who kills a Brahman, after having passed a long period in terrible torture will be born as a boar or some other low animal, or as a Chandâla. The poet Lucretius expressed his anxiety lest his friend Memmius, through fear of "eternal punishment after death," should be prevented from a candid and dispassionate examination into the false religious views then prevailing, because in the face of such awful terrors the mind has no means or power of standing firm. But the terrors to which the Hindoos were exposed were still more difficult to be resisted, because they appeared naturally, if not inseparably, connected with a belief (that of transmigration) which seemed indigenous, so to speak, in the Hindoo mind. There is great reason to believe that it was the intolerable tyranny of caste under the Brahmans which prepared the people of India for the rise and rapid spread of Booddhism. (See GAUTAMA.) At all events, there can scarcely, we think, be a reasonable doubt that the rise of Booddhism, which absolutely rejected all the distinctions of caste, has essentially contributed to mitigate the extreme rigor of the system as it originally prevailed.

J. THOMAS.

Castel'-a-Ma're (*i. e.* "fortress on the sea"), or **Castellama're di Stabia,** a fortified city and seaport of Italy, in the province of Naples, is finely situated on the Gulf of Naples, 17 miles by rail S. E. of Naples. It has a royal palace, a cathedral, several convents, a military hospital, and a royal dockyard; also manufactures of cotton, linen, silk, and sailcloth. The castle from which the town takes its name was built in the thirteenth century by the emperor Frederic II. It is near the site of the ancient *Stabiæ*, where Pliny was killed by an eruption of Vesuvius in 79 A. D. Pop. in 1881, 33,102.

Castel-a-Mare del Golfo, a seaport-town of Sicily, in the province of Trápani, is on a gulf of its own name, 20 miles E. of Trápani, near the site of the ancient *Segesta*. It exports cotton, wine, fruit, and manna. Pop. 8986.

Castelar' (EMILIO), an eminent Spanish orator and republican, was born in 1832. He founded in 1864 a journal called "La Democracia," in which he developed his social and political principles. He was condemned to death in 1866, but he escaped to France. In 1868 he returned to Spain, and became a member of the Cortes and a leader of the republican party. He has contributed articles to the "Fortnightly Review," and published "Old Rome and New Italy," translated into English 1873. He became minister of foreign affairs Feb. 12, 1873, and president of the Spanish republic Sept. 9, 1873, to Jan. 2, 1874.

Castel'-Buo'no (*i. e.* "good castle"), a town of Sicily, in the province of Palermo, is in the Madonian Mountains, 4 miles S. S. E. of Cefalú. It has mineral springs, and a trade in manna. Pop. 7948.

Castel'-Gandol'fo, a village of Italy, picturesquely situated on the N. W. side of Mont Albano, about 13 miles S. E. of Rome. Here are numerous villas and the pope's summer residence.

Castella'na, a town of Italy, in the province of Bari, 24 miles S. E. of Bari. Pop. 9061.

Castellane'ta, a town of Italy, in the province of Lecce, 21 miles N. W. of Taranto. It has a cathedral and several convents. Pop. 6363.

Castel'lo Bran'co (*i. e.* "white castle"), a town of Portugal, in the province of Beira, 55 miles S. E. of Coimbra. It is a bishop's seat, and has a ruined castle. Pop. 6928.

Castel'lo de Vi'de, a walled town of Portugal, in Alemtejo, about 124 miles E. N. E. of Lisbon. It has a castle, and manufactures of woollen cloth. Pop. 5086.

Castellon', a province of Spain, bounded on the N. by Tarragona, on the E. by the Mediterranean, on the S. by Valencia, and on the W. by Teruel. It is a wild mountainous region, and contains many mines and mineral springs. Area, 2447 square miles. Capital, Castellon de la Plana. Pop. 283,961.

Castellon' de la Pla'na, a town of Spain, capital of the province of the same name, is in an extensive and fertile plain about 2 miles from the Mediterranean, and 40 miles N. N. E. of Valencia, with which it is connected by a railway. It is well built, with wide and straight streets, and is supplied with water by a magnificent aqueduct. It has a handsome episcopal palace, a theatre, a hospital, and several convents; also manufactures of linen, woollen, and hempen fabrics, sailcloth, paper, firearms, glass, soap, etc. Francisco Ribalta, the famous painter, was a native of this town. Pop. 23,393.

Castelnaudary (anc. *Sostomagus*), a town of France, department of Aude, is on an eminence near the Canal du Midi, 22 miles W. N. W. of Carcassonne. It has manufactures of silk and woollen fabrics and earthenware. The canal here expands into a commodious basin 1300 yards in circumference. This town was founded on the site of *Sostomagus* by the Visigoths, who called it *Castrum Novum Arianorum*. It was taken by the English Black Prince in 1355. Pop. in 1881, 10,059.

Castelnuo'vo, a city in Austria, province of Dalmatia, on the canal of Cattaro and the Bay of Topla, has ancient walls and towers. Pop. 7188.

Castelnuovo, a market-town of Northern Italy, in the province of Alessandria, 14 miles N. W. of Asti. It has a mineral spring. Pop. 4748.

Castel-Sarrasin, a town of France, department of Tarn-et-Garonne, is near the river Garonne, 14 miles W. of Montauban. It was formerly fortified. It has manufactures of serge and worsted stockings. Pop. 7245.

Castel Ter'mini, a town of Sicily, in the province of Girgenti, 16 miles N. of the city of Girgenti. It has mines of rock-salt and sulphur. Pop. 7346.

Castel'-Vetra'no, a town of Sicily, province of Trápani, 23 miles S. E. of Trápani. It has several convents and an old castle and cathedral. Articles of coral and alabaster are made here. Pop. in 1881, 21,550.

Castiglio'ni (CARLO OTTAVIO), COUNT, an Italian philologist, known as the editor of Ulfila's Gothic Bible (1819), was born in 1784. He also wrote a memoir upon the history of the Arab cities of Africa (1826). Died April 10, 1849.

Castile, kas-teel' [Sp. *Castilla*, the "land of castles"], a former kingdom of Spain, occupied the central table-land of the peninsula, and was the nucleus and central seat of the Spanish monarchy. It first became an independent country in 762, and remained so until 1028, when it was conquered by Sancho III., king of Navarre. The kingdom of Castile was founded about 1035 by Ferdinand I., who conquered Leon and annexed it to Castile. By the marriage of Ferdinand the Catholic with Isabella of Castile in 1469, Castile and Aragon were united into one kingdom. The Castilians have long been distinguished for their pride or haughtiness. The Castilian dialect is considered purer than the dialects spoken in other parts of Spain. Pop. 3,021,799. Castile was divided into two portions, geographically as well as politically, NEW and OLD CASTILE (see below).

Castile, New [Sp. *Castilla la Nueva*], an old province of Spain, the S. portion of the kingdom of Castile, has an area of 21,081 square miles. Former capital, Madrid. It is a table-land, bounded on the N. by the Sierra Guadarrama and on the S. by the Sierra Morena. This range of mountains is rich in minerals. The soil of this region is partly sterile and not well watered. The plains receive little rain, and are nearly destitute of trees. Large flocks of sheep are raised here. New Castile is divided into four provinces—viz. Madrid, Toledo, Cuenca, and Guadalajara. Pop. 1,367,504.

Castile, Old [Sp. *Castilla la Vieja*], an old province of Spain, is bounded on the N. by the Cantabrian Mountains, on the E. by Aragon, on the S. by New Castile, and on the W. by Leon. Area, 25,412 square miles. The surface is diversified by several ranges of mountains and high table-lands, which are arid and nearly destitute of forests.

The soil in many parts is rendered sterile by deficiency of water. The chief rivers of this region are the Douro and the Ebro. Sheep and cattle constitute the principal riches of the inhabitants. Old Castile is divided into the provinces of Burgos, Valladolid, Palencia, Avila, Logroño, Segovia, Santander, and Soria. Pop. 1,654,495.

Castile, N. Y. See APPENDIX.

Casti′lla (Don RAMON), a general in the Peruvian war of independence, born Jan. 31, 1797, after the annexation of Peru to Bolivia in 1835 fled the country. He returned upon the restoration of independence in 1839, and became finance minister. In the second war with Bolivia he was taken prisoner and exiled; he returned in 1844, deposed the dictator Vivanco, and became president of Peru 1845–51, was re-elected in 1855 and 1858. Died May 30, 1867.

Castille (CHARLES HIPPOLYTE), a French political writer and novelist, born at Montreuil sur-Mer, Nov. 8, 1820. He wrote a number of romances and later biographical parallels, a history of the Second Republic (1854), and political portraits (1856–60).

Castine, kas-teen′, a port of entry of Hancock co., Me. (see map of Maine, ref. 8–E, for location of county), is on the E. side of Penobscot Bay, at the mouth of the Penobscot River, 34 miles S. of Bangor. It is 9 miles E. of Belfast. It has a good harbor, a custom-house, and manufactures of boats, ships and ship furniture, cordage, brick, etc. It has a State normal school. Pop. in 1870, including Castine township, 1303; in 1880, 1215 including 929 in v.

Castings. See METALLURGY and MOULDING.

Cast′ing Vote, the vote of the president or chairman of a public assembly, or the Speaker of a legislative body. This vote decides the question whenever there is a tie—*i. e.* when the votes of the assembly are equally divided. The Vice-President of the U. S. never votes except in case the Senators are equally divided. The Speaker of the British House of Commons never votes except in a similar contingency. It is usual for the Speaker to give a casting vote in such a way that the House will have an opportunity of reconsidering its decision.

Castle (kas′l), [Sax. *castel;* Lat. *castellum,* dimin. from *castrum,* a "camp"], a name given to a building constructed as a dwelling, as well as for the purpose of repelling attack. The name is especially given to buildings of this kind constructed in Europe in the Middle Ages. The *castella* of the Romans were constructed on the model of their stationary encampments, and may have suggested the castles of the Middle Ages, though designed for military purposes only. Traces are found in various parts of Great Britain of castles which are ascribed to its aboriginal or early inhabitants. Traces of Saxon, and even Norman, workmanship are found in structures originally Roman. But of castles for residence as well as defence few are of higher antiquity than the Conquest. The absence of strongholds was one reason why William the Conqueror so easily became master of England; as a protection against the resentment which the conquest occasioned most of the great Norman castles were built. As these castles grew in strength they afforded their possessors not only security from their fellow-subjects and their subordinates, but independence as regarded the monarch. Similar conditions in other countries led to similar results. No small portion of the history of Europe during the feudal period consists of an account of the attempts which were made by the monarchs to extirpate these dens of thieves.

The castle was generally surrounded by a moat, foss, or ditch; and that the ditch might be readily filled with water, the site was usually the bank of a river or a lake. Inside the ditch mounds were constructed, with walls and towers, both supplied with battlements and bastions. The gates were protected by towers usually of great strength. The bridge across the moat was made to draw up and down, and the entrance, in addition to thick doors, was protected by a portcullis, dropped down through grooves at the sides. The gate was further defended by a barbican and by machicolations. Passing the external wall, one entered the bailey, or ballium, which consisted of several courts, and contained the barracks, magazine, well, and chapel. Within the ballium was the donjon, keep, or citadel, a species of internal castle, placed in the most advantageous position to afford a last chance to the garrison when driven from the external works. The protection which the castle afforded to the retainers of a baron led to the construction of houses around the moat, and to this custom a very large number of the towns in Europe owe their origin.

Cas′tlebar, a town of Ireland, capital of the county of Mayo, is on the Castlebar River, about 160 miles W. N. W. of Dublin. It has an old castle, once a stronghold of the De Burgh family; also manufactures of coarse linen. The earl of Lucan has a country-seat near this town. Castlebar was taken by the French under Humbert, in 1798. Pop. 3508.

Castle Dale, capital of Emery co., Utah (see map of Utah, ref. 3–H, for location of county), is situated on San Rafael River, about 125 miles S. E. of Salt Lake City. Pop. not given in census of 1880.

Cas′tlemaine, a city in Australia, province of Victoria, in the neighborhood of rich gold-mines, connected by rail with Melbourne, 70 miles distant. Pop. 5762.

Cas′tle Peak, California, is a peak of the Sierra Nevada, about lat. 38° 10′ N. Its height is estimated at 13,000 feet.

Cas′tlereagh (ROBERT STEWART), VISCOUNT, marquis of Londonderry, an able British Tory statesman, born in the county of Down, Ireland, June 18, 1769. He was the eldest son of the first marquis of Londonderry. He entered the House of Commons in 1794, and efficiently promoted the union of Ireland with England in 1800. In 1802 he was appointed president of the board of control by Mr. Pitt. He became secretary of state for the department of war and the colonies in 1805, and fought a duel with George Canning in 1809. About this time he was the favorite leader of the Tory party, and a political rival of Canning. He entered the ministry of Lord Liverpool as secretary for foreign affairs in Feb., 1812, and as such was a powerful director of the coalition against Napoleon. He represented Great Britain at the Congress of Vienna, 1814, and the Congress of Paris, 1815. On the death of his father, in 1821, he inherited the title of marquis of Londonderry. He committed suicide Aug. 12, 1822, and left no issue. (See his "Memoirs and Correspondence," 8 vols., 1848.)

Castle Rock, cap. of Douglas co., Col. (see map of Colorado, ref. 3–E, for location of county), at the foot of the celebrated Castle Rock, 32 miles S. of Denver, is on R. R. and Plum Creek. Principal business, cattle-raising and dairying. Pop. in 1880, 88.

Castleton, Rutland co., Vt. (see map of Vermont, ref. 7–B, for location of county), on R. R. and Castleton River, 11 miles W. of Rutland, is the seat of Castleton Seminary and a State normal school, and has manufactures of agricultural implements, marbleized slate, etc. Pop. in 1870, of Castletown township, 3243; in 1880, 2605 including 590 in v.

Cas′tletown, an English town, capital of the Isle of Man. It has a Danish fortress, Castle Rushen.

Castor. See BEAVER.

Cas′tor, a remarkable binary or double star of the second magnitude in the constellation of Gemini, is called also α Geminorum. The two stars rotate around their common centre of gravity, and according to Sir John Herschel perform a rotation in 253 years.

Castor and **Pol′lux** [Gr. Κάστωρ and Πολυδεύκης], heroes of classic mythology, called also **Dioscu′ri** [Gr. Διός, "of Jupiter," and κοῦροι, "children"], were twin-brothers and the offspring of Leda by Jupiter, who visited Leda in the guise of a swan. According to one version of the myth, Leda brought forth two eggs, from one of which the two immortal babes, Pollux and Helen, were born, and from the other the mortal, Castor and Clytemnestra. The principal exploits of the twin-brothers were their expedition to Attica to rescue their sister Helen from Theseus, their participation in the hunting of the Calydonian boar and in the Argonautic expedition, and their combat with the sons of Aphareus. Castor was killed in the combat, and when Pollux found him dead he implored Jupiter that he too might die, in order to be together with his brother. Jupiter took mercy upon the great love of Pollux, and, according to Homer, restored life to Castor on the condition that both of them should on alternate days descend to Hades, or, according to another version of the myth, placed them both together among the stars. Generally, the Dioscuri are represented by art mounted on fiery steeds, with spears and egg-shaped helmets ornamented with stars. They presided over the public games; Castor was the god of equestrian exercise, Pollux of boxing. But they were also the patrons of hospitality, ready to befriend any one who approached them with sincerity. They were chiefly worshipped by people of Dorian descent, and Max Müller thinks that the deification of some of the Tyndaridæ forms the true nucleus of the whole myth. They were also worshipped with great devoutness in Rome, where they had a magnificent temple in the Forum.

Castor and Pollux, the name given to an electrical meteor which sometimes appears at sea, attached to the extremities of the masts of ships, under the form of two balls of fire. Sailors consider this phenomenon a sign of fair weather, but a single ball, which is called Helena, is supposed to portend a storm.

Castor (Antonius), an ancient physician of high reputation who lived at Rome in the Augustan age, and died about 80 A. D. Pliny states that he had a botanic garden, the first mentioned in history.

Casto'reum, or **Cas'tor,** a substance secreted in glandular sacs closely connected with the reproductive organs of the beaver (*Castor fiber*). Each beaver produces two of these sacs or pouches. This substance is used by perfumers, and was formerly esteemed a valuable remedy for hysteria, catalepsy, and other diseases. It is an antispasmodic.

Castor'idæ, a family of Rodents comprising the beaver (*Castor*), distinguished by the depressed oval and scaly tail.

Castoroi'didæ, an extinct family of Rodents allied to the beavers, represented by the genus Castoroides.

Cas'tor Oil (*Oleum Riçini*), a fixed oil from the seeds of the castor-oil plant. The best variety is obtained by pressure in the cold, and is known as *cold-pressed* castor oil. But the warm-pressed Italian oils are the pleasantest as a medicine. In the Indies great quantities are prepared by boiling the seeds, but the oil is irritating, dark in color, and not fit to use as a medicine. Exposure to the sun's light bleaches the oil. When pure, castor-oil is of a light-yellow color, but when of inferior quality, it has a greenish, and occasionally a brownish, tinge. It is sometimes thick and viscid. Its specific gravity is about 960 (water being taken as 1000). It has a nauseous smell and a disagreeable taste. The principal acid present in it is ricinolic, allied to oleic acid.

The best castor oil is one of the mildest of purgatives. In doses of one or two tea-spoonfuls it forms a gentle laxative, while a dose of a table-spoonful will almost always open the bowels freely. The only objection to the use of castor oil is its disagreeable flavor; some attempt to get over this difficulty by floating the oil on hot coffee, or mixing it with twice its bulk of spiced syrup of rhubarb. It is also much used in the arts as a lubricant for machinery, carriage-wheels, and leather. In Hindostan it is extensively employed as a lamp oil.

The Castor-oil Plant (*Riçinus communis*) is a native of the south of Asia and of Northern Africa, naturalized in the south of Europe and in other warm regions. It belongs to the order Euphorbiaceæ, and has panicled flowers; the fruit a three-celled capsule, with one seed in each cell. The castor-oil plant is often cultivated in gardens in Europe and the U. S., where except in Southern Florida it is only an annual, attaining a height of three to ten feet, highly ornamental by its stately growth, its large, broad, palmate peltate leaves and its purplish hue. In warmer climates it is perennial, and becomes arborescent, attaining even thirty feet in height. From the resemblance of its seeds to an insect called ricinus, it received that name from the Romans. The seeds are oval, and about four lines long. They are chiefly valued for the oil which they yield, on account of which the plant is cultivated in the Levant, Spain, Provence, the Indies, Brazil, and the U. S. Illinois and Missouri are the chief seats of its culture, and St. Louis of the oil manufacture in the U. S.

Castres, an ancient town in the S. of France, department of Tarn, on the river Agout, 34 miles by rail N. E. of Castelnaudary. It is the most populous town in the department, and is the seat of a Protestant consistory, having been one of the strongholds of the early Huguenots. Castres has important manufactures of cassimeres, military clothing, cotton goods, paper, soap, and copper-ware. Pop. 20,520.

Cas'tro (anc. *Mytilene*), a seaport town of Asiatic Turkey, capital of the island of Mytilene, is on its E. coast, 55 miles N. W. of Smyrna. It has a large castle and several churches and mosques. Some remains of the ancient *Mytilene* are visible here. Pop. 6000.

Cas'tro del Ri'o, a town of Spain, in Córdova, on the river Guadajoz, 21 miles S. E. of Córdova. The streets are mostly wide and regular, and lined with well-built houses. It has a spacious church with a high tower, two colleges, two hospitals, and several convents; also manufactures of linen and woollen fabrics, brandy, wine, etc. Pop. 10,261.

Cas'tro Giovan'ni (anc. *Enna*), a town of Sicily, in the province of Caltanisetta, is on a fertile plateau 4000 feet above the level of the sea, 14 miles N. E. of Caltanisetta. Here is a feudal fortress of Saracenic origin. The ancient *Enna* was the site of the most famous temple of Ceres, and was supposed to be a favorite resort of that goddess. Pop. 14,084.

Castrovilla'ri, a fortified town of Italy, in the province of Cosenza, 32 miles N. of Cosenza. It has an old castle, and a trade in silk, manna, and wine. Pop. 10,505.

Castroville, capital of Medina co., Tex. (see map of Texas, ref. 5-G, for location of county), on the Medina River, 25 miles W. S. W. of San Antonio. Pop. in 1870, 515; in 1880, 731.

Cast Steel. See Steel, by A. L. Holley, C. E.

Castue'ra, a town of Spain, in the province of Badajoz, 75 miles E. S. E. of Badajoz, near the river Guadiana. It has manufactures of earthenware and a trade in fruit and wine. Pop. 6869.

Casuari'na, "the cassowary tree," a genus of trees of the order Amentaceæ, sub-order Casuarineæ, mostly natives of Australia. Some of them are large trees, producing hard and heavy timber of excellent quality, which is called beef-wood, from its resemblance to the color of raw beef. One species, the *Casuarina equisetifolia*, grows wild in the South Sea Islands, the peninsula of Malacca, and other places. It is a lofty tree, which is valued in India for its timber, which is very durable and hard. All the trees of this genus have a peculiar appearance, having long, slender creeping or drooping branches, which are jointed, and bear scales instead of leaves. The flowers have neither calyx nor corolla, and the stamens and pistils are in separate flowers.

Casuistry [from the lat. *casus*, "a case"] means the application of juridical methods of reasoning to moral questions, or, better, to special cases of practical morality. It may develop spontaneously as the necessary result of given circumstances. It thus developed among the Jews. As the Greeks never learned the absolute distinction between morals and esthetics, the Jews never knew the absolute distinction between morality and legality. Their moral code and their civil law were one and the same thing. In that preliminary stage of civilization casuistry became necessary to guide people to a strict fulfilment of the law. It can, however, under other circumstances, develop as a disease, as the result of moral decadence, and its latent purpose is then to help people to circumvent the authority of conscience. It thus developed in the Græco-Roman civilization during the first two centuries of the Christian era, when treatises on the right to commit suicide, on the possible collision between the duties of citizenship and friendship, etc., began to engage attention. But its most characteristic development it received from the hands of the Jesuits. Traces of casuistry are met with very early in the history of the Christian Church. It crept into the Church through the sacrament of confession; it found its recognition in the *Libri pœnitentiales*; it moulded the form of the whole mediæval treatment of morals as a chapter of doctrinal theology; and it even lived through the Reformation. (See Melanchthon's "Concilia" and Perkins's "Cases of Conscience.") But all this is simply the casuistry of unripeness, after the Jewish type. Quite otherwise with the folios of Mariana, Molina, Escobar, Lobkowitz, Rosenbaum, etc., the wisdom of the Jesuits. There we have the casuistry of disease, after the Græco-Roman type, flaunting in the open air its purpose of corrupting conscience by its doctrines of probabilism, mental reservation, etc. Clemens Petersen.

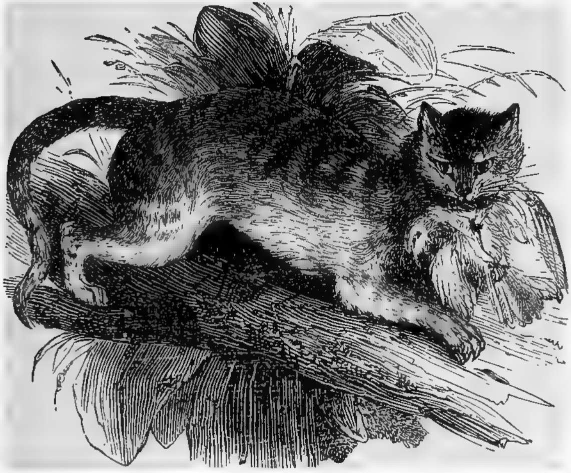
Ca'sus Bel'li (a "case of war," or, in other words, a "case justifying war"), a Latin phrase used to denote an act or event which involves war or justifies its declaration.

Caswell (Alexis), D. D., LL.D., born Jan. 29, 1799; was a professor of mathematics in Brown University from 1828 to 1864, was president of that institution from 1868 to 1872, and one of the corporators of the National Academy of Sciences. Died at Providence, R. I., Jan. 8, 1877.

Caswell (Richard), an American patriot and statesman, born in Maryland Aug. 3, 1729, removed to North Carolina, where he served with distinction against the British, and subsequently became governor of the State. He assisted in framing the Federal Constitution in 1787. Died Nov. 9, 1789.

Cat [a word found in various forms in many Indo-European and in some other languages], a name sometimes extended to the whole family Felidæ, including the lion, tiger, lynx, etc., sometimes limited to the smaller species of that family, and sometimes to the genus *Felis* proper, which is distinguished from the rest of the family by having a longer tail and four molar teeth on each side of the upper jaw, while the others have but three. This genus includes the lion, tiger, and all the larger Felidæ, as well as the domestic cat and the wild-cat of Europe, but not the wild-cat of America, which is a lynx.

It is not easy to say what was the original abode of the domestic cat (*Felis domestica*). It not unfrequently escapes to a wild state, but no properly wild species exactly resembles it. It is asserted that the domestic cat of ancient Egypt was the *Felis maniculata*, a species differing considerably from ours. The cat is scarcely mentioned in the authors of ancient Greece, Rome, and Judæa, and it is known that in the earlier mediæval period of Europe cats were comparatively rare and costly animals. They seem to have been long known in China, which affords a fine variety with a soft and beautiful fur and pendulous ears. It is, however, regarded as probable that the wild-cat of Europe and Asia, though somewhat different anatomically, may be the progenitor of the domestic cat. Among the more remarkable varieties are the Manx or Cornish cat, with a merely rudimentary tail; the Angora cat, with long hair; the Maltese and Chartreuse cats, with a bluish-slate color, etc.



European Wild Cat.

Catacaus′tics [from the Gr. *κατά*, "down" or "back," and *καίω*, "to burn"] are the caustic curves formed by the reflection of the rays of light, and are so called to distinguish them from the diacaustic, which are formed by refracted rays. (See CAUSTIC.)

Cat′acombs [probably from the Gr. *κατά*, "down," and *κύμβη*, a "hollow"], a pit or excavation under ground, employed usually as a receptacle for the dead. The name is applied especially to those at Rome, but also to those of Egypt, Naples, Syracuse, Malta, and other places. Even the quarries under Paris, now used as charnel-houses, are often called by this name. The earliest catacombs of Rome are believed by many to date from the persecution of Nero, and they were probably all finished before the fifth century. It has been held that the catacombs of Rome were originally quarries, but most writers now admit that they were executed principally to serve the purpose of burial-places for the dead, tombs or *loculi* being cut on either side of the long galleries and transverse corridors, which run to great distances through the tufa. Some writers assign them a Jewish origin. They were also places of refuge in times of persecution, and Christian worship was no doubt often held there. Still, the traditions of the "Church in the catacombs," of Pope Stephen's subterranean court, and his final martyrdom there, are thought by many to be greatly exaggerated. The catacombs abound in symbols and inscriptions, mostly of Christian origin and commemorative of the dead. They have been of late explored with much care, and the results are very important in the study of Christian archæology. They are computed to contain about 6,000,000 of dead, and their galleries and corridors would, if stretched out in a straight line, reach from one end of the Italian peninsula to the other. (See BOSIO, "Roma Sotterranea," 1532; PERRET, "Les Catacombes de Rome," 1852–53: ROSSI, "Roma Sotterranea Christiana," 1864 *seq.;* KIP, "The Catacombs of Rome," 1854; NORTHCOTE AND BROWNLAW, "Sotterranea," London, 1879.)

Catala′ni (ANGELICA), a celebrated Italian singer, born at Sinigaglia in 1784. She had a voice of immense volume, range, and flexibility. Having made her *début* in Italy at an early age, she afterward performed with great applause in Paris and London, and amassed large sums of money. She was married to a Frenchman named Valabrègue, with whom she resided some years in Paris. In 1830 she retired from the stage. Died June 13, 1849.

Catalan Language and Literature. See APPENDIX.

Catalau′nian Plain [Lat. *Campi Catalaunici*], the ancient name of the wide plain surrounding Châlons-sur-Marne, in France. On this plain the Roman general Aetius and his ally, Theodoric the Visigoth, gained a great victory over Attila in 451 A. D.

Cat′alepsy [from the Gr. *κατά*, intensive, and *λαμβάνω*, to "take"], a condition in which a person becomes more or less completely unconscious, but does not fall. If standing at the commencement, he remains so during the attack, the countenance retaining the expression the patient wore at the outset. If the limbs of the patient be placed in a new position by attendants, the position is retained. This disease is a rare one, and indeed is probably not so much a peculiar disease as a symptom of other diseases. It has been observed in both sexes, and may occur in insane persons or in those suffering with chorea and other nervous affections. It has been described as sometimes epidemic. The immediate attack is seldom fatal, and is usually short, but may be indefinitely prolonged. Treatment must be addressed to the general condition. Catalepsy is so rare that its character is not well understood.

REVISED BY WILLARD PARKER.

Catali′na, a port of entry of Newfoundland, on the N. side of Trinity Bay, has an excellent harbor, though difficult to approach. It has a lighthouse and a fine Anglican church. Pop. 1300.

Cat′alogue [Gr. *κατάλογος*; Lat. *catalogus*], a list; an enumeration of the names of books, stars, or other things. The term is used to denote a list of the books contained in a library, or of the works kept for sale by a bookseller.

CATALOGUE RAISONNÉ (rȧ-zon-ā′), a French term used in statistics, natural science, bibliography, etc., signifies a catalogue of objects arranged in appropriate classes. For example, books are arranged under their several subjects, with a general abstract of the contents of the works where the title does not sufficiently indicate it, thus serving to direct the reader to the sources of information on any topic. The want of alphabetical arrangement is supplied by an index at the end.

CATALOGUES OF BOOKS.—There is nothing connected with the management of any large public library which can compare in importance with the character of its catalogues of books. However large and select its stores, however able its administration, however accessible its contents to the student, its usefulness will be much diminished if its catalogues be not well arranged, frequently revised, and thoroughly at the command of those who use them. "A library," says Carlyle, "is not worth anything without a catalogue; it is a Polyphemus without any eye in his head; and you must front the difficulties, whatever they may be, of making proper catalogues."

And these difficulties are neither few nor small. "There is," says the late Mr. C. C. Jewett (a most competent authority), "no species of literary labor so arduous and perplexing." Indeed, many of the largest libraries of this country and Europe have entirely abandoned the issue of catalogues; and the trustees of the New York State Library in 1872 contented themselves with issuing a catalogue of the authors whose works are in their library, the names of the authors being arranged under the various subjects treated of. Even this meagre subject-catalogue is a large volume. Not one of the first-class libraries of Europe, it is said, has a complete catalogue; and many of those which are most complete are, from their defective arrangement, of little value to the student.

Catalogues may be arranged in an alphabetical table of the names of books and of their authors. But the same author may have issued books under two names, as White and Albius. It is the librarian's duty to be so well informed in bibliography as to be able to bring the works of such an author under one head, and make all necessary references. Again, the number of anonymous, pseudonymous, apocryphal, and supposititious works is very great. Even Voltaire saw fit to publish works under the names of other famous men. All such matters it is the part of the catalogue to explain. Others, again, prefer to have books catalogued under the heads of the various subjects of which they treat. This plan is of very great use to editors and compilers, and indeed to all literary men. Much discussion has prevailed, especially in France, as to the relative merits of the two plans just referred to; and among the numerous class who prefer the arrangement by subjects there is great difference of opinion as to how the subjects themselves shall be arranged. For example, under the head of theological books, there must be many minor heads to enable the reader conveniently to find in a large library the book he may desire.

The plan of combining into one both the above systems of cataloguing was perfected by Mr. Lloyd P. Smith, the accomplished librarian of the Philadelphia Library. His catalogues are arranged according to subjects, and at the end of the volume is a full alphabetical index, as well of authors as of all the important words of each title. Good judges pronounce his catalogues the best yet published.

In rapidly-growing libraries there is much difficulty and expense in keeping the catalogues up with the times. Various plans have been proposed to overcome the difficulty. The British Museum has catalogues interleaved with blank pages, on which the names of new books are written, and also slip or card catalogues. Mr. Jewett in 1850 brought forward the plan of having the name of each book stereotyped on a separate block, so that it is easy to insert the names of new books in their proper places in a new catalogue without the great expense of setting up type anew for the whole volume.

The present approved plan of keeping up a manuscript catalogue is to write the title of each book on a card, and to keep the cards so prepared, together with those containing the necessary cross references, arranged alphabetically in drawers. (For the subject of general catalogues of books, see Bibliography.) Chas. W. Greene.

Catalo′nia [Sp. *Cataluña*], an old province of Spain, is bounded on the N. by France, on the E. by the Mediterranean, on the S. by Valencia, and on the W. by Aragon. Area, 12,514 square miles. Pop. 1,749,708. Capital, Barcelona. The Pyrenees extend along the northern border of this region, which is extremely mountainous. The highest summits are covered with perpetual snow. The soil of the valleys is fertile, and this is said to be the best cultivated part of Spain. The orange, the olive, the grape, and cereal grains flourish here. The principal rivers are the Ebro and Llobregat. Among its minerals are copper, cobalt, lead, zinc, coal, sulphur, and marble. Catalonia surpasses every other province of Spain in the importance of its manufactures, the chief products of which are cotton, silk, and woollen fabrics, paper, firearms, cordage, and leather. Catalonia is divided into the provinces of Barcelona, Tarragona, Lerida, and Gerona. The Catalans speak a peculiar language, different from the Castilian, and nearly related to the Provençal. They surpass the other Spaniards in energy and industry. This region was in ancient times a Roman province called *Hispania Tarraconensis*. The Goths and Moors successively became masters of it. In 1137 it was united with Aragon by a marriage of the sovereigns, and in 1460 they both were united with Castile by the marriage of Ferdinand and Isabella.

Catal′pa, a genus of trees of the order Bignoniaceæ. The *Catalpa Bignonioides* is indigenous in the Southern U. S., and is planted as an ornamental tree in the Northern States and in Europe. It has large cordate and pointed leaves, and showy flowers in open compound panicles. The fruit is a pod which is often one foot long, and usually remains on the tree all winter. The seeds are winged on each side, the wings cut into a fringe.

Catal′ysis [from the Gr. *κατά*, intensive, and *λύω*, to "dissolve"] is a term applied in chemical physics to a force exerted by one substance upon a second, whereby the latter is subjected to change or decomposition, whilst the former, or acting substance, remains comparatively unaltered, and does not combine with it. The force, indeed, has been ascribed to the mere "action of contact." No satisfactory theory has been brought forward to account for these changes, or to define what the force of catalysis is.

Catamaran′ [said to mean "floating trees" in Singhalese], a sort of raft used by the Hindoos of the Coromandel coast, is formed of three planks or pieces of wood lashed together. The middle piece is longer than the others. The catamaran, which is propelled by a paddle, is used by the people of Madras to maintain communication between the shore and ships where the surf is so violent that ordinary boats are unsafe. The catamaran is also used on the coast of Brazil.

Catamar′ca, a province or department of the Argentine Republic, is bounded on the W. by the Andes. The soil is mostly fertile, producing grain and cotton. Area, 35,760 square miles. Capital, Catamarca. Pop. 79,962.

Catamarca, San Fernando de, the capital of the above province, is about 650 miles N. W. of Buenos Ayres. Pop. 5150.

Catame′nia (plu.), [Gr. from *κατά*, "according to," and *μήν*, "month"], the monthly sanguineous uterine discharges. They commence in hot climates usually from the age of ten or eleven, and considerably later in colder regions. Each period in a state of health commonly lasts from three to six days. The final cessation occurs, with some exceptions, at the age of forty-five or fifty.

Catamount. See Puma.

Cata′nia, a province of Italy, in Sicily, is bounded on the E. by the Mediterranean, on the N. by Messina, on the W. by Caltanisetta, and on the S. by Noto. Area, 1948 square miles. The surface is partly mountainous. Among its prominent features is Mount Etna. Capital, Catania. Pop. in 1881, 563,217.

Catania (anc. *Catana*), a city of Sicily, capital of the above province, is beautifully situated on the E. coast, at the foot of Mount Etna, 31 miles N. N. W. of Syracuse; lat. 37° 28′ N., lon. 15° 5′ E. It presents a noble appearance from the sea, and is internally handsome, being well built, with wide and straight streets, which are paved with lava. Some of the public buildings are also constructed of lava. It has been several times nearly ruined by earthquakes and eruptions of Mount Etna, but it has risen again with greater beauty and splendor, and is now perhaps the finest city of Sicily. The most remarkable edifices are the cathedral, rebuilt after the great earthquake of 1693; the town-hall; the university, founded in 1445; and the grand Benedictine convent and church of San Niccolò. Catania has about fifty churches, several hospitals, and a college of arts. In a fine square adjacent to the cathedral is a statue of an elephant formed of lava. The harbor, which was formerly good, has been partly choked by lava from Mount Etna. This city has manufactures of silk and linen fabrics, and of articles and wares formed of amber and lava. The chief articles of export are grain, wine, silk, olives, manna, figs, soda, and snow from Mount Etna. The ancient *Catana* was founded by the Phœnicians or Greeks, and was nearly as old as Rome. It was taken by the Athenian general Nicias about 413 B. C., and was an important city under the Romans, who adorned it with magnificent edifices. The remains of an aqueduct, a temple of Ceres, and a large amphitheatre are still visible here. Catania was severely injured by earthquakes in 1693, 1783, and 1818. Pop. in 1881, 97,355.

Catanza′ro (formerly called **Calabria Ulteriore II.**), a province of Southern Italy, is bounded on the N. by the province of Cosenza, on the E. by the Gulf of Taranto, on the S. by the province of Reggio, and on the W. by the Mediterranean Sea. Area, 2158 square miles. The soil is fertile and the climate healthy. The chief products are wool, cotton, linen, cheese, butter, hemp, oil, silk, wine, and lumber. Chief town, Catanzaro. Pop. in 1881, 434,217.

Catanza′ro, a city of Italy, in the province of the same name, is finely situated on a mountain near the Gulf of Squillace, 33 miles S. S. E. of Cosenza. It has an old castle of the Norman period, a cathedral, a large college, and a royal academy of sciences. Many of its public buildings were destroyed by the earthquake of 1783. Here are manufactures of velvet and of silk and woollen fabrics. Pop. in 1881, 28,594.

Cataplasm. See Poultice.

Cat′apult [Lat. *catapulta*, from the Gr. *κατά*, intensive, and *πάλλω*, to "hurl"], an engine of war used by the ancients for discharging arrows. We are not able, from any descriptions the ancients have left us, to form any exact idea of either the catapult or the ballista. It appears that in the catapult a rope, suddenly freed from great tension, gave impulse to an arrow placed in a groove. There were great catapults, fixed upon a scaffold with wheels, which were used in sieges, and small ones, carried in the hand, which were employed in the field. Originally, ballistæ were employed to throw stones, and catapults to shoot darts; but the terms were often confounded by the later Roman writers.

Cat′aract [Gr. *καταῤῥάκτης*, from *κατά*, "down," and *ῥήγνυμι*, to "break," so named because the ancients believed that a kind of veil fell down within the eye, obscuring vision], an opaque state of the crystalline lens of the eye, of its capsule, or both. Cataracts are thus lenticular, capsular, or lenticulo-capsular. Various other kinds are enumerated, such as the soft cataract, in which the lens is soft, and sometimes even liquid; the hard cataract, when the lens may be as hard as bone, with many of intermediate consistency. Lamellar cataract affects a limited part of one or more of the lamellæ, or layers of the lens. "Gold-leaf cataract" is of a shining yellow, and contains cholesterine and crystalline degeneration products. Cataract is generally white, but sometimes is brown, black, bluish, silvery, etc. It sometimes has a pearly lustre.

Cataract begins in a gradual impairment of vision, some months generally elapsing before sight is lost. The pupil is sensitive to light and atropia, vision being clearest when the pupil is large. There is no pain or intolerance of light. The patient sees as in a mist, but almost always can perceive at least the presence of light. The pupil on examination is seen to be opaque, but the eye is neither hardened nor softened and the expression of the face is quite natural. One or both eyes may have cataract. It is most frequent in elderly persons, but may occur at any age; children are sometimes born with it. Medical treatment for cataract is useless, but the skilful surgeon can treat the disease often with the happiest results. The operation is either (1) extraction of the lens and its capsule, (2) depression or couching of the same, or (3) laceration with appropriate instruments, with a view of inducing absorption of the diseased part. This last operation is the most common, and often is the only one admissible. Great care should be taken for a long time to prevent inflammatory action. The place of the lens is supplied by a kind of spectacles called cataract glasses. By these means the sight is often to a great degree restored.

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Cataracts and Rapids. The regular slope of the river-bed is sometimes interrupted by more inclined and rocky planes, over which the stream, flowing with increased velocity, forms *rapids*, or by abrupt and nearly perpendicular walls, from which the foaming water descends from rock to rock, or in a single leap, in imposing *cataracts* or picturesque *waterfalls*. Usage, however, often confounds these names. The famous cataracts of the Nile are merely rapids, which impede, but do not entirely prevent, navigation. The Falls of St. Anthony, in the Upper Mississippi, the great falls of the Upper Missouri, and, the grandest of all, the rapids of the St. Lawrence at Long Sault and Lachine, above Montreal, are among the noblest examples in our American rivers.

The highest waterfalls are found in mountainous regions in the upper course of rivers; the largest in their middle course. Among the first, that of the Yosemite, in California, is perhaps the most remarkable. It falls from an almost perpendicular ledge of rock over 2500 feet high to the bottom of the valley of the same name, forming three cataracts, the first descending by a single leap of 1500 feet on a shelf of rock, from which it makes a series of cascades and a final plunge of 450 feet to the base of the precipice. The Keelfoss, in Norway, near the Sogneflord, the highest fall in Europe, has an uninterrupted descent of 2000 feet, and the Cascade of Gavarnie, in the Central Pyrenees, falls from a height of over 1300 feet; the Staubbach, in the Swiss Alps, from a 900-feet wall, and is reduced to spray before reaching the ground. In the Falls of Tequendama, in the Andes of New Granada, the river Bogota, compressed in a chasm thirty feet wide, precipitates itself 560 feet into a deep recess amidst the most gorgeous tropical vegetation.

Among the great cataracts of the middle course of rivers Niagara takes the first rank by the volume of its waters, presenting the grand spectacle of a river over half a mile wide pouring itself in ~~two~~ magnificent sheets from a height of 160 feet into the whirlpool below. The Shoshonee Falls in the Snake River branch of the Columbia in Idaho, the Victoria Falls of the Zambese in the heart of South Africa, the Falls of the Cavery in Southern India, which fall 500 feet in seven magnificent cascades, the newly discovered and splendid Cataract of Kaieteur, in British Guiana, formed by a large affluent of the Essequibo, which jumps in a single foaming sheet of water into a vast basin 740 feet below, the Falls of the Rhine, though but 60 feet high, all are said to equal in picturesque beauty, though not in grandeur, the Falls of Niagara. ARNOLD GUYOT.

Catarrh′ [from the Gr. κατά, "down," and ῥέω, to "flow"], in medical language is a condition characterized by hyperæmia (or congestion) of the blood-vessels of any mucous surface, with great increase of the proper secretion of the part. Thus, there may be catarrh of the nose, the throat, the air-passages, the bowels, the vagina, the bladder, or the urethra; but in popular language "catarrh" designates either a "cold" in general, a "cold in the head," or a chronic catarrh of the posterior nares (nostrils) and throat. Catarrhs in general arise from exposure to cold and wet and to sudden atmospheric changes. They are most common in persons who are ill-fed, and who are not accustomed to out-of-door exercise. The variety of catarrh known as a "cold" is by no means always easy of cure. The popular belief that "a cold must have its run" has some foundation. Hot foot-baths, laxatives, sedatives, demulcents, mild stimulants, or diaphoretics may, however, prove useful in many cases. Judicious exercise, bathing, and life in the open air tend to overcome the morbid inclination to take cold from which some patients suffer. Chronic catarrh of the posterior nostrils is an obstinate disease, best treated by systematic exercise and attention to other hygienic conditions, and by the use of salt water as a nasal douche. (See NOSTRIL DISEASES and THROAT DISEASES.) WILLARD PARKER.

Catasau′qua, R. R. junction, Lehigh co., Pa. (see map of Pennsylvania, ref. 5–I, for location of county), on the Lehigh River, 3 miles N. of Allentown, contains machine-shops, rolling-mills, and several blast-furnaces. Pop. in 1870, 2853; in 1880, 3065.

Catastomidæ. See APPENDIX.

Catas′trophe [Gr. καταστροφή, from καταστρέφω, "to overturn"], the final event of a drama or romance, to which the other events are subsidiary; a disastrous revolution or event; a calamity; an unfortunate conclusion. The term is used by geologists to denote a violent convulsion or physical revolution, causing the elevation or subsidence of portions of the globe, and the destruction of large tribes or multitudes of animals.

Cataw′ba, the name of an excellent wine of a rich muscadine flavor which is produced in various parts of the U. S. It is made of the Catawba grape, which originated probably near the Catawba River in North Carolina. This grape, which is highly esteemed for dessert, is red or copper-colored. The first person who cultivated it extensively for wine was Nicholas Longworth of Cincinnati, whose vineyards covered the southern slopes of the hills in the environs of that city. The Catawba grape flourishes in the Middle, Southern, and Western States. A large quantity of this wine is produced in the Ohio Valley, the climate and soil of which are especially adapted to the culture of the grape. The best sparkling Catawba is considered nearly equal to champagne.

Catawba, or **Great Catawba,** a river of the U. S., rises in McDowell co., N. C., and flows nearly eastward to Iredell co. It afterwards runs southward into South Carolina, and forms the E. boundary of York and Chester counties. Below Rocky Mount it is called the Wateree. Its length from its source to Rocky Mount is 250 miles.

Catawbas, The, one of the eight Indian nations of North America, were first discovered by the Europeans in the seventeenth century. They then occupied the region on both sides of the present boundary-line between North and South Carolina, from the Catawba River to the Yadkin. They numbered about 1500 warriors, were active and brave but not warlike, and lived generally on good terms with their southern neighbors, the Tuscaroras. Their land was frightfully devastated in 1701 by an invasion of the Five Nations, and in 1751 a long and bitter war was waged between them and the Iroquois, which was ended by the friendly offices of the English. A peace was concluded between the contending parties at Albany, under the auspices of the English commissioner for North Carolina and with many curious ceremonies—singing, smoking, etc. In the war between the Carolinians and the Cherokees, in 1760, the Catawbas sided with the former. During the war of the Revolution they joined the Americans, but already at that time their number had considerably decreased. In the present century they have occupied a small reservation on the Catawba River, but they are now nearly extinct.

Cat-Bird (*Turdus felivox*), a bird common in the U. S., is related to the mocking-bird, which it resembles in its vocal powers. It derives its common name from a note or cry which it utters. It occurs in the Middle States as a summer bird of passage, and breeds in gardens or in the vicinity of dwelling-houses. The color of its upper plumage is dark gray or slate-color. It is serviceable to man in devouring insects and worms. It sometimes imitates the song of other birds, and is remarkable for its boldness and vivacity.

Catch, a kind of music for men's voices; a sort of round or fugue intended for convivial parties. This kind of music is chiefly English, and was especially popular in Charles II.'s time. The effect of the best catches is very fine.

Catch-drains, open drains across a declivity to intercept the surface-water. The term is sometimes applied to under-drains across a declivity.

Cateau, Le, or **Cateau-Cambresis,** a town of France, department of Nord, on the river Selle, 14 miles E. S. E. of Cambrai. It is well built, and was formerly fortified. It has manufactures of shawls, merinoes, and calicoes. The important treaty of Cateau-Cambresis was concluded here between Henry II. of France and Philip II. of Spain, in 1559. Pop. 9974.

Catechet′ical Schools, a name given to the ancient Christian schools of theology, of which the principal were those of Alexandria (160–400 A. D.) and Antioch (from 290 A. D. through the fifth century). The most noted teachers in the great school of Alexandria were Clement and Origen.

Cat′echism [from the Gr. κατηχέω, to "sound into" one's ears, to "instruct orally"], an arrangement of questions and answers, generally designed to teach religious doctrine to the young. Catechetic instruction has long prevailed among the Jews, and in the early Christian Church the *catechumens* (or persons receiving instruction preparatory to baptism) constituted, according to several of the Fathers, a separate order in the membership of the Church. This order comprised both the children of believers and adults from heathen society who desired admission into the Church. What would now be called catechisms were used to some extent in those remote times. Catechisms were used in the Middle Ages by the Waldenses, and later by the Bohemian Brethren. It has been said that the catechisms of Luther (1518–29) were the first which received this name, but this point is not quite certain. The Roman Catholic Church had long used catechisms, though called by other names. Kero of St. Gall in the eighth century prepared one of the earliest in the German language. The principal catechisms of later times have been those of Luther (the Exposition of 1518, the Catechism of 1520, the Smaller and Larger Catechism of 1529), still extensively used in the Lutheran Church; Calvin's catechisms, the Smaller and Larger (1536–39); the Heidelberg Catechism (1562), (Reformed); that of Œcolampadius (1545), of Erasmus (1547), of Leo Judæ (1553); the Tridentine Catechism (1566), a standard in the Roman Catholic Church; the Anglican catechisms—the Larger (Latin, 1570), the Shorter or Middle Catechism, and the Smaller, which, with a few changes, is published in the Book of Common Prayer; the British Presbyterian catechisms—the Shorter (1647) and Larger (1648), which, with the Westminster Confession (1646), are standard books with most Presbyterian churches in the U. S. and Great Britain. The Russian Church has a "Primer for Children" (1720) and a "Shorter" and "Longer Catechism" (1839). Besides these may be mentioned the three Wesleyan catechisms prepared by Richard Watson, and the three Methodist Episcopal Church catechisms (New York, 1852). The number of symbolical or authorized standard catechisms of the various churches is quite large, besides an immense number of private or unauthorized works of the kind.

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Cat'echu [etymology uncertain], a material employed in tanning leather, as a coloring-matter, and medicinally as an astringent. The catechu of commerce is derived from East Indian trees, such as the catechu tree (*Acacia Catechu*); also from the areca-palm and various other trees. It is known in India by the name *kutt* (our cutch). The heart-wood of the former (now naturalized in Jamaica) yields catechu by cutting it into chips and boiling in water, straining the liquid from time to time, and adding fresh chips, till the extract is of sufficient consistence to be poured into moulds of a square or circular shape; or when of the thickness of tar it is allowed to harden, and is formed into balls about the size of oranges. The catechu manufacturers in India move to different parts of the country at different seasons, and erect huts in the jungles, where they carry on their operations. The catechu tree abounds in Bombay and Bengal and in Burmah and Siam, and is a small thorny tree, with a roundish head. Its sapwood is yellow, the heart dark red. Catechu is brittle, soluble in water, and possesses an astringent taste, but no odor. It affords permanent colors, and is employed in the dyeing of blacks, browns, fawns, drabs, and greens. It contains much tannin, which is of a peculiar kind, called mimo-tannic acid, also catechuic acid, which can be isolated in white silky crystals. This latter acid is often called catechine, and is of important use when catechu is employed as a dyestuff. It is sometimes adulterated with earthy substances, but its solubility in water and alcohol at once show their presence. The catechu of the betel-nut is obtained by boiling first the nuts, and then the extract. A first boiling of the nuts yields a black catechu, called kassu; and a second boiling, after the nuts are dried, a yellowish kind, called coury, which is the best. The former appears in commerce under the name of Ceylon catechu, in circular flat cakes. Gambir may be regarded as a kind of catechu, and is frequently called "pale catechu." Kino is sometimes confounded with catechu, which it much resembles. (See GAMBIR and TANNIC ACID.)

Catechu'men [Gr. κατηχούμενος], a person who is learning the elements of any science, but especially one who is receiving instruction preparatory to admission into the Christian Church. Catechumens were anciently divided into three, or, as some writers say, four classes. The probation commonly lasted from two to three years, although it was frequently much shorter. It was assumed that the children of Christian parents required less instruction than Jewish converts, and Jewish converts less than the heathen.

Cat'egory [from the Gr. κατηγορέω, to "accuse," and hence to "affirm strongly;" Lat. *prædicamentum*]. In philosophical terminology the categories are the ultimate classes in which all objects of knowledge can be systematically arranged. Philosophy and science, acknowledging the impossibility of knowing all things individually, reduce objects to classes; and when we gain knowledge of the class, we have a formal or general knowledge of its constituent objects. This attempt to render knowledge in some sense universal has been made in the philosophy of all ages, and has given rise to various systems of categories—literally, things that may be affirmed. Aristotle seems to have been the first of the Greeks to make anything like a complete classification of them. He makes them ten in number—viz. substance, quantity, quality, relation, place, time, position, possession, action, passivity. This system was unquestioningly received for a long time, but modern criticism has shown that there may be many predicates which could not be contained in any of these categories. Accordingly, Kant and others have attempted to make better classes. Kant makes twelve categories, in four classes of three species each—viz., singularity, plurality, and universality; reality, unreality, and indefiniteness; substance, dependence, and reaction; possibility, existence, and necessity. Various other arrangements have been proposed, but criticism has shown that thus far, perhaps, none are perfect. It is remarkable that the categories of the Hindoo philosopher Kanâda are almost identical with those of Aristotle. Kanâda probably lived before the time of Aristotle. (See MAX MÜLLER's paper on "Indian Logic," appended to ARCHBISHOP THOMSON's "Laws of Thought.")

Cate'na [Lat. *catena*, a "chain"], in biblical literature, is a commentary made up of selections from various writers. The number of catenæ is very considerable, and some are of great antiquity. Perhaps the most celebrated is the "Catena Aurea" (*i. e.* "Golden Chain") of Thomas Aquinas.

Cat'enary [from the Lat. *catena*, a "chain"], the curve formed by a cord or flexible chain of uniform density and size when suspended or allowed to hang freely from two fixed points. This curve was first noticed by Galileo, but he imagined it to be the same as the parabola. Its true nature was first demonstrated by James Bernoulli. It has several remarkable properties, one of which is that its centre of gravity is lower than that of any curve of equal perimeter and with the same fixed points for its extremities. It is interesting on account of the light it throws on the theory of arches, and by reason of its application to the construction of suspension bridges.

Cat'erpillar. See ENTOMOLOGY, by PROF. SANBORN TENNEY, A. M.

Catesby (MARK), F. R. S., an English naturalist and artist, born in 1679. He visited America in 1710, during the war between the Carolinians and the Catawbas on the one side and the Tuscaroras on the other, and after his return to England published a "Natural History of Carolina, Florida, etc.," with colored figures drawn and etched by himself. Died Dec. 24, 1749.

Cat'fish (*Pimelodus*), a name applied to numerous fishes of the family Siluridæ in the U. S. and among English-speaking peoples. The North American fresh-water species belong to the genera *Amiurus*, *Ichthœlurus*, *Hopladelus*, and *Noturus*. They are also called bullheads and pouts. Catfishes have been taken in the Mississippi weighing nearly two hundred pounds. The sea-catfishes are *Ariopsis felis* and *Ælurichthys marinus*.

Cat'gut, a material employed for the strings of violins and other musical instruments, for the cords used by clockmakers, bow-strings, fishing-lines, and for belt-stitching in mills, etc. It is generally prepared from the intestines of sheep, and sometimes from those of the horse and ass. It is prepared by an elaborate process, and preserved from putrefaction by treating it with a dilute solution of alkali. The best violin-strings are manufactured in Italy, and are called Roman strings.

Ca'tha, a genus of plants of the natural order Celastraceæ. The *Catha edulis*, which the Arabs call *khât*, is a shrub, a native of Arabia, having narcotic and stimulating leaves, which are eaten by the Arabs. They also make a decoction of the leaves, which is used as a beverage.

Cath'ari [Gr. Καθαροί, the "pure"], a name applied at different times to various sects of Christians, such as the Novatians of the third century, and to the Albigenses, Patarenes, Waldenses, and others in the twelfth century. The name is analogous to "Puritans," and was apparently in some cases assumed, and in others ironically conferred in consequence of their professed aim at greater purity of life than was ordinarily attained. The Cathari proper were Dualists, and were perhaps of Slavonic, possibly of remote Gnostic, origin. They appeared in Italy in the eleventh century, and attained their greatest prosperity in Southern France, where they were confounded with the Albigenses, and were exterminated with them in the thirteenth century. The strict Cathari held no property, abstained from marriage, war, and the killing of animals, and rejected water-baptism. (See MAITLAND, "Facts and Documents on the History of the Albigenses and Waldenses," and SCHMIDT, "Histoire et Doctrine de la Secte des Cathares," 1849.)

Catharine de' Medici [Fr. *Catherine de Médicis*], queen of France, was born at Florence in 1519. She was a daughter of the duke of Urbino, who was a nephew of Pope Leo X. She was married in 1533 to a son of Francis I. of France, who ascended the throne as Henry II. in 1547. On the death of her son, Francis II., in 1560, she became regent of France during the minority of Charles IX., who was her son. She was ambitious, crafty, and perfidious, and made bad use of her power. Her intrigues promoted the civil or religious war by which France was for many years afflicted. She also appears to have been one of the instigators of the massacre of St. Bartholomew (Aug., 1572, though the exact extent of her participation is uncertain. Died Jan. 5, 1589. (See EUGENIO ALBERI, "Vita di Caterina de' Medici," 1834.)

Catharine Howard. See HENRY VIII.

Cath'arine [Russ. *Ekaterina*] **I.,** empress of Russia, was born of poor parents at Ringen, near Dorpat, in Livonia, April 15, 1684. Her first husband was a subaltern Swedish officer. She was taken a captive by the Russians in 1702, and was married to Peter the Great in 1711. Peter, having invaded Turkey in 1711, was reduced by want of provisions to a critical position, from which he was extricated by Catharine, who bribed the Turkish vizier. She was crowned as empress in 1724, and died May 17, 1727. Her daughter Elizabeth became empress.

Catharine II., empress of Russia, born at Stettin May 2, 1729, was a daughter of the prince of Anhalt-Zerbst. She was married in 1745 to Peter, a nephew and heir of Elizabeth, empress of Russia. They soon quarrelled and became estranged from each other. On the death of Elizabeth, in 1761, he ascended the throne as Peter III. In July, 1762, he was assassinated by conspirators, of whom Catharine was probably an accomplice, and she assumed sovereign power, for which she was qualified by superior talents; but she was a woman of very dissolute character. She administered the government with energy and success, and increased both the extent and power of the empire. She co-operated with Austria and Prussia in the partition of Poland in 1772, and in the second partition of 1793. The Russians were victorious in a war against the Turks, which was ended by the treaty of Kainardji in 1774. She was a liberal patron of scientific men. She died Nov. 17, 1796, and was succeeded by her son, Paul I. "Her capacity," says Lord Brougham, "was of an exalted order. Her judgment was clear and sure. The history of princes affords few examples of such force of character on a throne perverted to the working of so much mischief." (*Statesmen of the Time of George III.*) (See TOOKE, "History of Catherine II.," 1803; CASTERA, "Vie de Catherine II.," 1796; TANNENBERG, "Leben Catherinens II.," 1797.)

Catharine of Aragon, queen of England, a daughter of Ferdinand and Isabella of Castile, was born Dec. 5, 1485. In 1501 she was married to Arthur, who was the eldest son of Henry VII. of England, and who died in 1502. She was married in 1509 to Arthur's brother, Henry VIII., who was six years younger than herself. She gave birth in 1516 to a daughter, Mary, who became queen. The king, who had conceived a passion for Anne Boleyn about 1527, expressed doubts of the legality of his marriage with Catharine, and applied to the pope for a divorce. The disagreement between the pope and Henry VIII. on this subject was one of the causes of the prevalence of Protestantism in England. Cranmer declared the marriage void in 1533. She died Jan. 7, 1536.

Catharine of Braganza, the queen of Charles II. of England, born in 1638, was a daughter of John IV., king of Portugal, and brought in dower Tangiers and Bombay. She had been religiously bred, and the licentious customs of the English court she found strange. After the death of Charles (1685) she returned to Portugal in 1693, and was made regent by her brother Pedro in 1704. Died Dec. 31, 1705.

Catharine of Valois, queen of Henry V. of England and daughter of Charles VI. of France, was born Oct. 27, 1401. Her hand, together with the right of succession to the French throne, was given to Henry by the treaty of Troyes. After the death of the king, Catharine became the wife of Owen Tudor, a Welsh gentleman. She died Jan. 3, 1437.

Catharine Parr, the sixth wife of Henry VIII. of England, was born in 1513. She was married to Lord Latimer, and after his death became, in 1543, the queen of Henry VIII. She was a woman of considerable learning and no little tact. After the death of the king she was married to Sir Thomas Seymour. Died Sept. 30, 1548.

Cathar'tes Au'ra, the turkey-buzzard, a vulture which is so called from its close resemblance to the common turkey. It mostly inhabits North America, but is sometimes found in Jamaica, where it is called the John crow. The adult bird measures about two feet and a half in length, and is six feet between the tips of the wings. The general color of the plumage is black mingled with brown. Turkey-buzzards as scavengers are of much service to man, devouring all refuse substances that are injurious to health. When gorged they perch themselves on some neighboring tree, where they sit with their wings half open, apparently too lazy to hold them in their proper position. They do not construct much of a nest, but generally deposit their eggs in some hollow tree or log. Another species, *Cathartes atratus,* commonly known as the carrion crow or black vulture, is smaller than the above, and is found in the Southern States. In the Southern towns, especially Charleston and Savannah, many saunter about the market-places, or, if the weather be cool, perch on the chimney-tops, the heat from which they greatly enjoy. Both species are protected by law, and are in an almost perfect state of domestication. (See CATHARTIDÆ, in APPENDIX.)

Cathartes Aura.

Cathar'tics [from the Gr. καθαίρω, to "purify"], a name at first given to medicines supposed to purify the body from the matter of disease, assumed by the ancients to exist in cases of acute disorder, and to require to be thrown off by the excretions. Ultimately, the term cathartics became limited to remedies acting on the bowels, which are popularly called purgatives. Among the principal cathartics are aloes, colocynth, rhubarb, scammony, jalap, senna, Epsom and Rochelle salts, and castor oil. Sulphur and cream of tartar form a useful mild laxative; magnesia is also administered in cases of indigestion with acidity. The resin of podophyllum (may-apple) is now sometimes used. The most agreeable of all cathartic medicines is the effervescent solution of citrate of magnesia. Croton oil and elaterium belong to a dangerous class of cathartics, as also does the favorite remedy of the ancients, the black hellebore. The number of cathartics is great.

Cathar'tin is the supposed active principle in senna. It can be isolated as a yellowish-red uncrystallizable substance, which is deliquescent, and has a very bitter taste, a characteristic odor, and purging powers, causing nausea and griping. Three grains of cathartin are a full dose. It is not much used, and is perhaps not a definite compound. The same name is given to a purgative principle obtained from buckthorn berries.

Cathay. See KATHAY.

Cath'cart, EARLS OF (1814), Viscounts Cathcart and Barons Greenock (United Kingdom, 1807), Barons Cathcart (Scotland, 1447).—ALAN FREDERICK CATHCART, third earl, born Nov. 15, 1828, succeeded his father July 16, 1859.

Cathcart (WILLIAM SHAW), EARL OF, a British general and diplomatist, born Sept. 17, 1755. He became a major-general in 1794, and was sent on a mission to the court of Russia in 1805. He commanded the land forces which, with aid of the fleet, captured Copenhagen in 1807. In 1813 he was sent as ambassador to St. Petersburg. He was raised to the rank of earl in 1814. His eldest son, Charles

Murray, born in 1783, became a general, and inherited the title of earl. Died June 17, 1843.

Cathe'dral [from Gr. *καθέδρα*, a "chair," a "seat"], the principal church of a diocese, in which is the *cathedra* or throne of the bishop. It is the parish church of the whole diocese. The difference between a cathedral and a collegiate church consists chiefly in the fact that the former is the see of a bishop. The governing body of a cathedral is called the dean and chapter—*i. e.* the dean and canons. In the Anglican Church all the members of the cathedrals, except the dean, are styled canons, and their seat in the cathedral is called their *stall.* Among the remarkable cathedrals of the world are the Duomo at Florence, the cathedral of Milan, that of Notre Dame in Paris, the Strasburg cathedral, St. Paul's in London, and St. Patrick's in New York City. The church of St. John Lateran in Rome is the cathedral or episcopal church of the pope.

Catherine, SAINT, of Alexandria in Egypt, is supposed to have suffered martyrdom early in the fourth century. The whole story, however, is very obscure.

Cath'eter [Gr. *καθετρ*, from *καθιημι*, to "send down" or "thrust into"], in surgery, the name of various instruments used for passing along mucous canals. It is, however, generally applied to tubes through which fluids may pass, and which may give exit to the accumulated contents of such organs as the urinary bladder. The ancients made catheters of copper. In the ninth century silver was substituted by the Arabian surgeons, and still generally used. The urinary catheter for the male varies in length from ten to twelve inches; the female catheter need not be more than four or five inches, and is nearly straight. For the male urethra most surgeons prefer an instrument straight to within the last few inches of its length; the latter should be curved into the segment of a small circle. Others, however, use a double curve. A vertebrated catheter, consisting of short, hollow joints of silver, united into a continuous flexible tube, is often extremely useful. Flexible catheters of gum elastic are used either alone or supported on a wire. Great tact and care are required in introducing catheters into the urinary bladder. It must not be done by force, but by gentle management. Violence in the operation may cause serious injury. REVISED BY WILLARD PARKER.

Cathlam'et, capital of Wahkiakum co., Wash. Ter. (see map of Washington Territory, ref. 5–B, for location of county). Pop. in 1880, 133.

Cathode. See ELECTRICITY, BY PRES. HENRY MORTON, PH. D.

Catholic or **United Copts,** that portion of the Coptic Church in Egypt which acknowledges the supremacy of the pope. They number about 13,000. (See COPTS.)

Cath'olic Apostol'ic Church, The, is the name of a body of Christians popularly known as the **Irvingites,** being followers of the Rev. Edward Irving, who died in 1834. They are distinguished by their claim to the exercise of apostolic gifts, such as prophecy, the use of unknown tongues, and the miraculous healing of disease. They receive only the Apostles', the Nicene, and the Athanasian creeds; their officers are called apostles, prophets, evangelists, angels, pastors, deacons, under-deacons, and deaconesses; they are ritualists, imitating closely the service of the Roman Catholic Church, professing to select all that is desirable from all Christian churches. This sect originated in London, but it is found in small numbers in most Protestant countries. (See IRVING, EDWARD.)

Cath'olic [Gr. *καθολικός*, "universal," from *κατά*, "throughout," and ὅλος, "all"] **Church** is not found in ancient Greek, but is first used by Polybius ("Hist." vi. 5.3) in the sense of "general;" first used of the Church by Ignatius of Antioch ("Ad Smyrnæos," chap. viii.). The phrase Catholic Church is equivalent to "universal church," and cannot properly be limited to any particular sect or body. It was once employed to distinguish the Christian Church from the Jewish, the latter being restricted to a single nation, while the former was intended for the world. Afterwards, it served to mark the difference between the so-called orthodox Church and the sects which sprang from it, such as the Arians, Gnostics, etc. The name has been especially claimed by the Church of Rome. Protestant divines have been careful to deny its applicability, yet the term Catholic is still popularly used as synonymous with Roman Catholic. (See ROMAN CATHOLICS.)

Cath'olic Emancipa'tion, in British history, the measure enacted April 13, 1829, by which the political disabilities previously resting upon Roman Catholics were chiefly removed. These disabilities weighed most heavily upon the Roman Catholics of Ireland, and the history of the oppressions of Irish Catholics is almost identical with the history of English rule in Ireland, for these oppressions had their origin quite as much in political and social as in religious prejudice.

After the subjugation of Ireland in 1691 by the forces of William III., the whole people were disarmed; priests were banished the country; no Roman Catholic could act as guardian for any child; after 1704 a son turning Protestant could dispossess his father and take his estate; a Catholic heir to landed property was to be set aside in favor of the next Protestant heir; no office, military or civil, could be held by a Roman Catholic; he could not vote or marry a Protestant wife; his son might force him to settle an allowance upon him (the son) at the discretion of a court of chancery; no Roman Catholic could practise law or teach school; no Protestant lawyer could marry a Catholic wife; a priest marrying a Catholic and Protestant was to be hanged. Many of these measures became obsolete in practice, and more were repealed by the Irish Parliament of 1790; and at the union (1800) Mr. Pitt pledged himself to secure an act of emancipation, but through the opposition of George III. he failed. Subsequently, in consequence of the agitation of O'Connell and the Catholic Association, the subject was again taken up, was brought forward in Parliament by Mr. Peel Mar. 5, 1829, and was carried by large majorities in both houses. The only disabilities left upon Catholics were their exclusion from the regency, the chancellorship of England or Ireland, the viceroyship of Ireland, and from the offices and patronage of the Anglican Church, the universities and the Church schools; the prohibition of episcopal titles, the public use of clerical insignia, the extension of monasticism, and the increase of the number of Jesuits. These latter prohibitions are, however, practically overlooked.

Cath'olic Epis'tles, the name given to certain epistles of the New Testament addressed not to particular churches or individuals, but to the Church universal or to a large and indefinite circle of readers. Originally the Catholic Epistles comprised only the first Epistle of John and the first of Peter, but as early as the fourth century the term was applied also to the Epistle of James, of Jude, the second of Peter, and the second and third of John. These seven thus constitute the Catholic Epistles.

Cathol'icos, the title of the patriarchs or chief ecclesiastics in the hierarchy of the Armenian Church, and also of the prelates of the Christians of Georgia and Mingrelia.

Cat'iline [Lat. *Catilina*], (LUCIUS SERGIUS), a famous Roman demagogue and conspirator, born about 108 B. C. In his youth he was a partisan of Sulla in the civil war. He was elected prætor in 68 B. C., and afterwards aspired to the office of consul. He was notorious for his crimes, and was ruined in fortune, but his talents and his audacity combined to render him a popular favorite of a large party, many of which were insolvent debtors and desperate adventurers. Having been defeated in the election for consul, he formed a conspiracy against the state. It appears that he and his numerous accomplices proposed to massacre the senators and the friends of order, and to involve Rome in a general conflagration. The leaders of this plot met on the 6th of Nov., 63 B. C., and made arrangements for its speedy execution; but the secret was revealed by Fulvia, the mistress of one of the conspirators, who were baffled by the vigilance and energy of Cicero. On the 8th of November, Cicero uttered in the senate his first oration against Catiline, who was present and attempted to reply, but his voice was drowned by cries of "Traitor!" and "Parricide!" Catiline left Rome in the next night, and went to the camp of Manlius, who was his accomplice and was at the head of an army in Etruria. Lentulus and other conspirators who remained in Rome were put to death in Dec., 63 B. C. The army of the senate encountered that of Catiline near Pistoria (now Pistoia) in 62 B. C. He stimulated the courage of his soldiers with an eloquent harangue, and a desperate battle ensued, in which Catiline was defeated and killed, with about 3000 of his partisans. (See SALLUST, "Bellum Catilinarium;" ROSE, "History of Catiline's Conspiracy," 1813; CICERO, "Orationes in Catilinam.")

Cat'kin, or **A'ment** (*amentum*), in botany, a term applied to a form of inflorescence of which the willow, poplar, birch, and alder afford examples. It is a close spike of numerous small, unisexual flowers, destitute of calyx and corolla, and furnished with scale-like bracts. The trees which bear catkins from the natural order Amentaceæ.

Cat'lettsburg, R. R. junction, capital of Boyd co., Ky. (see map of Kentucky, ref. 2–K, for location of county), on the Ohio River, at the mouth of the Big Sandy, about 150 miles E. N. E. of Frankfort. It has a trade in lumber, various manufactures, and a State normal school. Pop in 1870, 1019; in 1880, 1225.

Catlin (GEORGE), an American traveller and artist, born in Wilkesbarre, Pa., in 1796. He passed many years among the North American Indians, and published "Illustrations of the Manners, Customs, and Condition of the North American Indians," with engravings (2 vols., 1841). He exhibited in Europe his Indian gallery and collection. Died in Jersey City Dec. 23, 1872, aged seventy-eight.

Cat′mint, or **Cat′nip** (*Nepeta Cataria*), an herbaceous plant of the natural order Labiatæ, is a native of Europe, and is a common weed in the U. S., but not indigenous here. It has cordate and crenate leaves, which are whitish, downy underneath, and emit a peculiar odor. Cats are extremely fond of this plant, which they eat with avidity and signs of excitement.

Cato (Dionysius), a Latin moralist of the third century, of whom nothing is known, is the reputed author of a small volume of moral precepts, entitled "Disticha de Moribus ad Filium," which was a popular book in the Middle Ages. Each precept is expressed in two hexameter verses. Great difference of opinion exists respecting the merit of this work.

Cato (Marcus Porcius), often called Cato Censorius (*i. e.* "Cato the Censor"), a celebrated Roman statesman and patriot, born of a plebeian family at Tusculum in 234 B. C. He was surnamed the Elder ("Major"), to distinguish him from his great-grandson, Cato Uticensis. As a young man he fought against Hannibal in the second Punic war, after the end of which he settled upon a small Sabine farm, adopted a simple and frugal mode of life, and became a model of austere and pristine Roman virtue. Having removed to Rome, he gained distinction as an advocate in the courts of justice, and was elected prætor in 198 B. C. He was chosen consul in 195, and commanded an army in Spain, where he displayed superior military talents, and was so successful that he received a triumph on his return to Rome. In the year 184 he was elected censor, in which capacity he acted with uncommon rigor. He was a zealous asserter of old-fashioned principles, and opposed the growing tendency to luxury, and all innovations, good or bad. In 191 he acted as a military tribune in the war against Antiochus, and contributed his part to deliver Greece from the encroachments of the East and bring her into closer and more intimate relations with the West. Greece was at that time possessed of a much more developed and much more refined, but also much more artificial and much more corrupted, culture, and she could not fail in exercising a decisive influence on her conquerors. Cato saw it, and did his utmost to resist the invasion of Greek manners, tastes, ideas, and vices; but in vain. He was an implacable enemy of Carthage, and often repeated in the senate the phrase *Delenda est Carthago* ("Carthage must be destroyed"). He wrote, besides other works, a treatise on agriculture ("De Re Rustica"), which is extant, and contains much curious information on the domestic habits of the Romans of his age. Of his "Origines," a kind of history of Rome, only a few fragments have come down to us. Died in 149 B. C. His "Life" was written by Cornelius Nepos, Plutarch, and Aurelius Victor, but some of the most intimate notes on his character and opinions are found in the works of Cicero and Livy.

Cato (Marcus Porcius), surnamed the Younger and Uticensis (*i. e.* "of Utica"), an eminent Roman patriot and statesman, born in 95 B. C., was a great-grandson of the preceding. He studied and adopted the doctrines and discipline of the Stoic philosophers. In 72 B. C. he served in the campaign against Spartacus. Having been elected quæstor (treasurer), he effected some reforms in the treasury department. He became tribune of the people in 63 B. C., and heartily co-operated with Cicero, who was then consul, in his efforts to defeat the treason of Catiline and his accomplices. He opposed the triumvirs, Cæsar, Pompey, and Crassus, after they had formed a coalition. In 54 B. C. he was chosen prætor, and used his power to prevent bribery in elections. He was an uncompromising opponent of corruption, and inflexible in his adherence to what he considered the right and the patriotic policy. As a candidate for the consulship he was defeated, because he declined to gain votes by bribery and other means which were customary, but not strictly right. In the civil war which began about 49 B. C. he adhered to the side of the senate and Pompey. He was not present at the battle of Pharsalia, soon after which he was appointed commander of the army in Africa, but he resigned the command to Scipio. The republican cause having been ruined by the defeat of that army at Thapsus in 46 B. C., Cato killed himself at Utica in the same year. Like his great-grandfather and the whole family to which he belonged, he was a man of sour temper, unconquerable pride, and despotic habits. But the roughness and uncouthness of his nature had been considerably softened by his adoption of Stoicism, and he was regarded as a model of pure and disinterested virtue. (See Drumann, "Geschichte Roms;" Plutarch, "Life of Cato the Younger.")

Catoosa Springs, a saline chalybeate spring of Catoosa co., Ga. There are accommodations for several hundred visitors, and the springs are extensively patronized in the summer.

Catoptrics denotes that subdivision of geometrical optics which treats of the phenomena of light produced by the falling of a ray of light upon the surface of a body and its being reflected from it. (See Reflection of Light.)

Cats [Lat. *Catsius*], (Jacob), an eminent Dutch poet born at Brouwershaven, in Zealand, in 1577. He studied law, which he practised. He also filled several high civil offices. He was grand-pensionary of Holland from 1636 to 1648, when he became keeper of the grand seal. His poems were very popular. He wrote "Moral Emblems," fables, songs, allegories, etc., which are distinguished by simplicity of style and good moral tendency. Died in 1660. (See Alsche, "Commentatio de J. Catsio," 1828.)

Cat's Eye, a beautiful variety of chalcedonic quartz of various shades of greenish-gray or brownish-red. It displays, when polished, a peculiar pearly opalescence (chatoyance) or floating internal light, much resembling the mutable reflections exhibited by the contracted pupil of the eye of a cat. This results from the parallel arrangement of the minute fibres of the mineral or of the fibres of amianthus or asbestos which it contains. It is obtained chiefly in Ceylon, and is found in Scotland. It is used in jewelry, and is cut *en cabochon.*

Cats′kill, capital of Greene co., N. Y. (see map of New York, ref. 6–J, for location of county), on R. R. and the W. bank of the Hudson River, at the mouth of Catskill Creek, 34 miles below Albany, and 109 miles by rail N. of New York. Pop. in 1870, 3791; in 1880, 4320. The Hudson River R. R. passes on the other side of the river.

Catskill Group, the uppermost division of the Devonian system in America. It was named from the Catskill Mountains, which were supposed to be formed of these rocks, but are now known to be mainly composed of strata of the Chemung group. The Catskill rocks are best seen in the northern counties of Pennsylvania—Tioga, Bradford, Potter, etc. They are mainly red sandstones and shales, and contain as characteristic fossils the scales and bones of large ganoid fishes.

Catskill Mountains, of New York, a group of the great Appalachian system, included mostly in Greene county. The highest summit, Hunter Mountain, has an altitude of 4050 feet. The summits of the mountains command extensive and beautiful prospects. The completion of several mountain-railroads which penetrate the very heart of this group has opened up this section to the great tide of summer travel, and the Catskill Mountains are rapidly becoming a favorite summer resort. Many large and elegant mountain-houses have been erected on the eastern terraces. The view at sunrise from these mountain-houses is magnificent and beautiful in the highest degree. The scenery of this group is diversified by cascades, rocky precipices, small lakes, and deep ravines. Generally, not only the slopes, but also the tops, of these mountains are well wooded, and easy roads and elegant promenades carry the visitor from one beautiful point to another.

Cat's-Tail Grass, a name of the *Phleum pratense.* (See Timothy.)

Cat Tail, or **Cat's Tail** (*Typha latifolia*), an aquatic herbaceous plant of the order Typhaceæ, is indigenous in the U. S. and Europe. It bears flowers in a long and very dense cylindrical spike terminating the stem. Its leaves are of late employed with success in France as a material for paper-making.

Cat′taro, a seaport-town of Austria, in Dalmatia, on the Gulf of Cattaro, about 37 miles S. E. of Ragusa. It is situated at the base of a steep limestone hill, is strongly fortified, and is surrounded with walls. It has a castle on a precipitous rock, a cathedral, and several churches. It was formerly the capital of a small republic of the same name. Pop. 5088.

Cat′taro, Boc′ca di (*i. e.* "Gulf of"), a tortuous inlet of the Adriatic, at the S. extremity of the coast of Dalmatia, is 30 miles long. It is protected from winds by high mountains on several sides, and forms the best harbor in the Adriatic. The entrance from the sea into this gulf is about 1½ miles wide.

Cat′tegat, or **Kattegat** (anc. *Codanus Sinus*), a part of the ocean which separates Denmark from Sweden and washes the eastern side of Jutland. It communicates with the Baltic by three channels—the Great Belt, the Little Belt, and the Sound. On the other side the Skager-Rack connects it with the German Ocean. It is about 150 miles long and 85 miles wide. Dangerous sand-banks occur in it.

Cattell′ (Alexander G.), born in Salem, N. J., Feb. 12, 1816. He became a successful merchant of Philadelphia in 1846, becoming president of the Corn Exchange and of the Corn Exchange Bank. In 1855 he removed to Merchantville, N. J., and was U. S. Senator from N. J. 1866–71.

Cattell (William Cassiday), D. D., a brother of the preceding, was born at Salem, N. J., Aug. 30, 1827, graduated at Princeton College in 1848, at Princeton Theological Seminary in 1852, became professor of ancient languages at Lafayette College in 1855, pastor of a Presbyterian church at Harrisburg, Pa., in 1860, and was president of Lafayette College, 1864–83. His administration of the affairs of the college was marked by energy and success.

Cat′tle [Old Eng. *catel*, "chattels," "goods," because in ancient times a man's cattle were his principal goods], a collective term which in its widest sense includes all domestic animals, and in the usage of some writers includes also deer and other wild grazing animals. In America, however, its application is limited very generally to beasts of the species *Bos taurus*, the domestic ox, the "neat cattle" or "black cattle" of British writers. There are many varieties or "breeds" of cattle, some of which, in Southern Asia, are distinguished by a large hump or mass of fat upon the shoulders. The original wild stock from which cattle are descended is not well known. The principal breeds in the U. S. are of British origin. The old "native" stock is of extremely mixed descent, but of late years much attention has been paid, with the best results, to the rearing of pure-blooded and "grade" stock. The best are the "short-horn" or "Durham" breed, which produce excellent beef-cattle, and are extensively reared in the U. S., chiefly for fattening purposes; the "Herefords," for working oxen and beef; the beautiful "Devons;" the "Ayrshires," prized for milking qualities; the "Jerseys" or "Alderneys," which yield extremely rich and excellent milk. The continent of Europe has many fine breeds which are little known in the U. S., though the "Dutch" and "Holstein" cattle have been introduced. The Texas cattle are descended chiefly from Spanish stock. (See Johnson's "Household Treasury," also the article United States Meat Production, in this work.)

Cattol′ica, a town of Sicily, in the province of Girgenti, 14 miles N. W. of the city of Girgenti. It has productive sulphur-mines. Pop. 5749.

Catul′lus (Valerius), a Roman lyric poet of high reputation, was born at or near Verona about 87 B. C. He became in early life a resident of Rome, and enjoyed the society of Cicero and Cæsar. He was the first Roman who excelled in lyric poetry. He wrote, besides numerous odes and epigrams, a heroic or narrative poem entitled "The Nuptials of Peleus and Thetis," his longest work, and a poem called "Atys." The date of his death is unknown. One hundred and sixteen of his poems are extant. They are admired for the exquisite grace and beauty of their style, but are grossly licentious. Died about 47 B. C.

Cat′ulus (Quintus Lutatius), a Roman general and writer. He was chosen consul and a colleague of Caius Marius in 102 B. C. Catulus and Marius commanded two armies, which united and defeated the Cimbri near Vercelli in 101 B. C. He was a partisan of Sulla in the civil war. Having been condemned to death by the Marian party, he killed himself in 87 B. C. His works are lost except two epigrams.

Catulus (Quintus Lutatius), a son of the preceding, was a conservative and meritorious statesman. He became consul in 78 B. C., and censor in the year 65. Cicero applied to him the epithet "*clarissimus*" ("illustrious"). Died in 60 B. C.

Cau′ca, a river of South America, rises in the Andes and flows nearly northward through Popayan, Cauca, and Antioquía. After a course of 600 miles it enters the Magdalena in lat. 9° 25′ N. The valley of the Cauca is one of the most fertile and populous districts of South America.

Cauca, a state of the republic of Colombia. The surface is partly mountainous. Area, 257,462 English square miles. It is traversed by the river Cauca. Capital, Popayan. Pop. 435,078.

Cauca′sian (*i. e.* "pertaining to Caucasus"), a term somewhat loosely employed to designate the principal white races of mankind. The Circassians and Georgians dwelling at the foot of Mount Caucasus have been taken as the type of the Caucasian race, and suggested the name. According to Blumenbach, the Caucasian race is the principal of the five divisions of the human family, and the original stock from which the other races have sprung. It also forms one of the three varieties of Cuvier. It comprises the most enlightened and powerful nations of the earth, including, besides the Aryan races (see Arya), the Hebrews, Phœnicians, and Arabs. But the inhabitants of the Caucasus, so long held to be types of the European variety, are now by some excluded from it altogether, and classed with the Mongols. The question of their relationship is a very obscure one. The basis upon which the theory of the Caucasian type was formed is thus stated by Latham: "Blumenbach had a solitary Georgian skull, and that skull was the finest in his collection, that of a Greek being the next. Hence it was taken as the type of the skull of the more organized divisions of our species. More than this, it gave its name to the type, and introduced the term *Caucasian*. Never has a single head done more harm to science than was done in the way of posthumous mischief by this well-shaped head of a female from Georgia." As commonly used, the term Caucasian is objectionable, as confounding under one name nations (as, for example, the Arabs and Germans) who have at best a very remote relationship; while it has often led to a still greater error—that of separating, on trivial and superficial grounds, nations who are unquestionably closely related, such as the dark-complexioned Hindoos and the light-complexioned Teutons and Celts. It is as if a botanist, instead of classifying fruits according to their internal structure and essential nature, should divide them into classes according to their color, putting the yellow fruits into one division, the red into another, and so on.

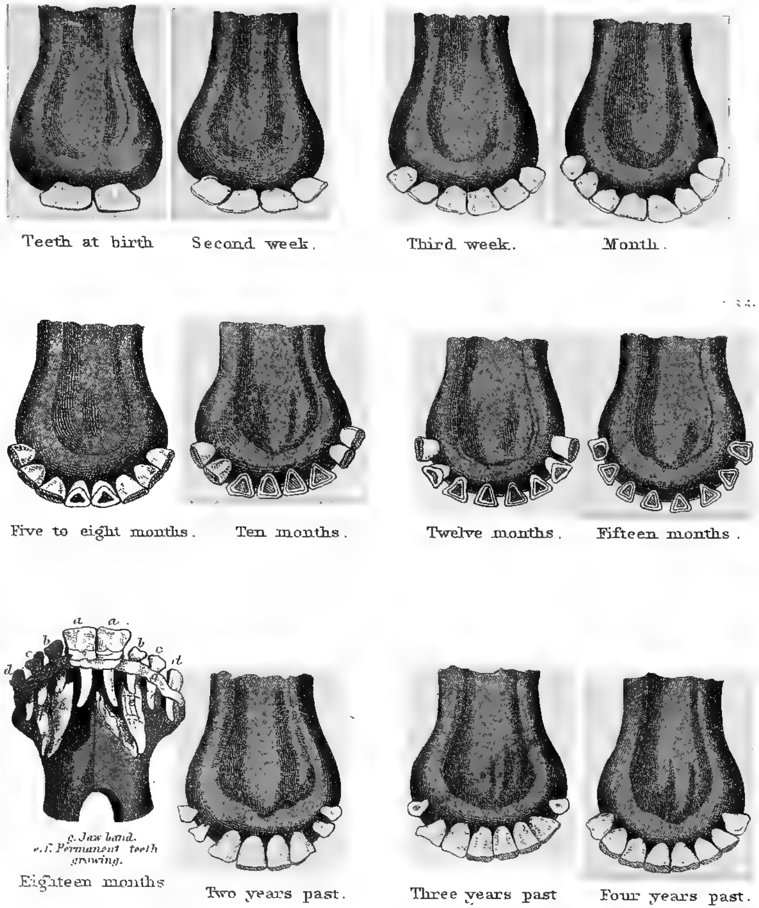
Cauca′sian Prov′inces, or **Cauca′sia,** a portion of the Russian empire, situated on both sides of the central chain of the Caucasus. It is bounded on the E. by the Caspian Sea, and on the W. by the Black Sea, being partly in Europe and partly in Asia. The European portion, called Cis-Caucasia, comprises Circassia, Caucasus, and Daghestan (area, 87,069 sq. m.; pop. 2,168,904). The Asiatic part, called Trans-Caucasia, comprises Georgia, Mingrelia, and Russian Armenia (area, 85,756 sq. m.; pop. 3,472,353). (For the physical geography of this region, see Caucasus.)

Cau′casus [Gr. ὁ Καύκασος or ὁ Καύκασις], an important and lofty mountain-range which extends between the Black Sea and the Caspian, and forms part of the boundary between Europe and Asia. It is 690 miles long, and extends from the Peninsula of Taman on the Black Sea, in an E. S. E. direction, to the peninsula of Apsheron on the Caspian. Connected with this central chain are several branches or transverse ridges on both sides. The culminating point of the Caucasus is Mount Elboorz, which is near the middle of the central chain, and has an altitude of about 18,570 feet. Its base is 7660 above the sea-level. The next highest is Mount Kasbek, 16,552 feet, east of which is the Dariel Pass. This is said to be the only pass by which carriages can cross the Caucasus. The highest summits of this chain are formed of trachyte or porphyry, below which occur granite, syenite, etc. Limestone, slate, and other stratified rocks appear at the base and on the sides of these mountains. The limit of perpetual snow is here about 11,000 feet above the level of the sea. Some parts of the Caucasus are destitute of trees, but the secondary ranges near the Black Sea are covered with magnificent forests of oak, beech, ash, maple, and walnut. The cereal grains flourish 7000 feet above the level of the sea, and the lower valleys produce rice, cotton, indigo, and the grape. The principal rivers that rise among these mountains are the Kooban, Koor, and Terek. The scenery of this region is said to be very beautiful and picturesque. Among its minerals are copper, iron, and lead. The inhabitants of the Caucasus comprise a variety of tribes, who speak different languages and are subject to Russia. Among these tribes are the Circassians, Georgians, and Lesghians. They are noted for their love of freedom; and to maintain their independence they waged a long war against the Russian invaders, which was terminated by the capture of their leader, Schamyl, in 1859. The Caucasus Mountains have been celebrated from a remote antiquity. From them the finest physical type of man derives its name, the Caucasian race. (See Caucasian.)

Caucasus, Indian. See Hindoo-Koosh.

Cauchy (Augustin Louis), a French mathematician, born in Paris in 1789. He gained a prize of the Institute in 1815 for his "Memoir on the Theory of Waves." He became a member of the Academy of Sciences and professor of mechanics in the Polytechnic School in 1816. He published, besides other works, "Lectures on the Differential Calculus" (1826), and succeeded Biot as professor of astronomy in 1848. Died in 1857.

Cau′cus, a meeting of legislators or citizens for the selection of candidates to be supported at a pending election, or to shape and direct political movements of whatever kind. The word is of American coinage, and Boston gave it being about a century ago, during the popular discontent and agitation which culminated in our fathers' Revolutionary struggle—Boston, the cradle and focus of



Teeth at birth. Second week. Third week. Month.

Five to eight months. Ten months. Twelve months. Fifteen months.

Eighteen months. Two years past. Three years past. Four years past.

a
a
b
b
c
c
d
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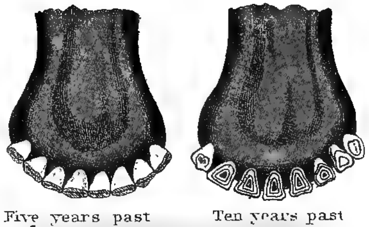
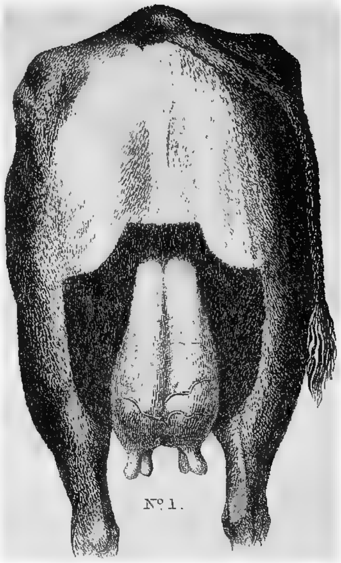
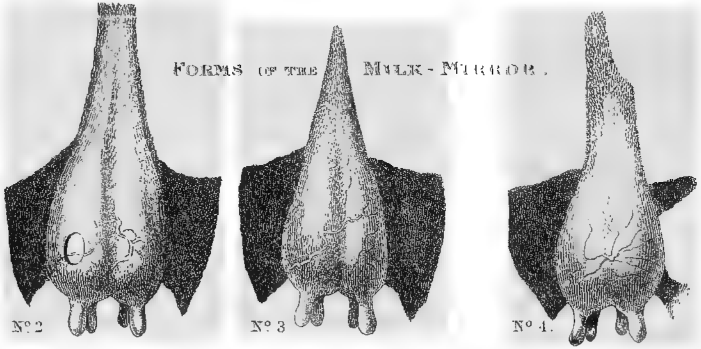
e
f
g
g. Jaw band.
e. f. Permanent teeth growing.



Five years past. Ten years past.





FORMS OF THE MILK-MIRROR.

COW'S TEETH AT DIFFERENT AGES.

this agitation, being then a straggling maritime village, mainly supported by commerce and the seaboard fisheries, which gave importance to the arts subsidiary to navigation. The *calkers* of vessels were thus relatively numerous; they were robust, active citizens in the prime of life, and they were enlisted, heart and soul, in the patriot cause. Their work was done at the North End, where but few houses had yet been built, and their dwellings were mainly in that neighborhood. If they had a place of meeting as a craft, it would naturally be chosen for their political gatherings as well; and the Tories or loyalists, seeing these convened at the calkers' head-quarters, would call them *calkers'* meetings, implying that none but low-bred mechanics and their like were hostile to the royal cause. *Caucus*—at first a corruption of *calkers*—thus became the received designation of a political meeting, especially if held with closed doors. The word first appears in the diary of John Adams, under date of Feb., 1763, as follows: "This day found that the *Caucus Club* meets at certain times in the garret of Tom Dawes, adjutant of the Boston (militia) regiment." Adams adds that the town-officers and representatives were first chosen in this club before they were elected in town meeting. Gordon's "History of the Revolution" asserts that the caucus dates back at least to 1725, and that Samuel Adams's father and some twenty others devised and employed it to concentrate the power of the town in their own hands. He adds that Samuel Adams was first made representative of Boston through the instrumentality of the caucus, which thenceforth formed an important part of the machinery whereby the Revolution was incited and maintained.

That the majority of a legislative body should hold a caucus for the selection of the officers of that body cannot be reasonably gainsaid, the minority being at perfect liberty to do likewise; while any member of the majority, dissatisfied with its choice, may claim and exercise, if he will, the right to bolt. But when, about 1804, a caucus of the Republican (Jeffersonian) members of Congress was held expressly to recommend persons to be supported at the polls by Republicans living in districts represented by Federalists, thus giving to the people of those districts no voice in the selection of their candidates, the legitimacy of the assumption involved in such nominations was gravely questioned. Yet the candidates of the caucus continued to be chosen—with docility, if not with alacrity—until 1824, when the system broke down ignominiously upon William H. Crawford of Georgia being nominated for President, with Albert Gallatin of Pennsylvania for Vice-President. This ticket was badly defeated, the friends of John Quincy Adams, General Andrew Jackson, and Henry Clay, forming two-thirds of those elected to either House, uniting in a public recommendation that the fiat of the caucus be disregarded—in fact, defied. Mr. Crawford received less than a fourth of the electoral votes; the vote standing Jackson 99, Adams 84, Crawford 41, Clay 37. This sent the election to the House of Representatives, which elected Adams by a coalition of the supporters of Adams and Clay; the vote standing—for Adams, 13 States; Jackson, 7; Crawford, 4. This was the last caucus of members of Congress which assumed to nominate candidates for the people, and legislative caucuses with like purposes have also been discarded by all parties, though caucuses continue to be held for the choice of candidates to be supported by the body whose members make the nomination.

The first nominating national convention was held in 1832 by the Anti-Masons, who presented William Wirt of Maryland for President, with Nathaniel Ellmaker of Pennsylvania for Vice-President. In 1836 the Democrats held a like convention, which nominated Martin Van Buren of New York for President, with Richard M. Johnson of Kentucky for Vice-President. The Whigs held their first national convention at Harrisburg in Dec., 1839, and presented General William Henry Harrison of Ohio for President, with John Tyler of Virginia for Vice-President. These were elected over Van Buren and Richard M. Johnson, the Democratic incumbents, who had triumphed four years previously. Each and every national party has since selected its candidates mainly by a delegated convention.

But this in time develops abuses, especially in the case of a party whose nomination all but ensures an election; and the latest fashion is that called "the Crawford county (Pennsylvania) system," whereby all the members of a party residing in a designated district are invited to attend a poll in their respective precincts and cast a ballot directly for sheriff, clerk, etc., he who polls the largest vote for any office being the whole party's candidate for that post. But such preliminary elections, being unsanctioned by law, are often corrupted by systematic frauds; and it is manifest that, while a caucus may serve for the choice of Speaker, clerk, etc., of a legislative body, or even of U. S. Senators by a legislature, a perfect mode of selecting candidates for the popular suffrage has not yet been devised.

HORACE GREELEY.

Caudebec, a handsome seaport town of France, on the right bank of the Seine, 26 miles E. of Havre, was formerly fortified. It has a remarkable Gothic church built in the fifteenth century, and manufactures of cotton stuffs. Pop. 2219.

Caudebec-les-Elbeuf, a town of France, department of Seine-Inférieure, on the river Oison, 12 miles S. of Rouen. It has manufactures of cloth. Pop. 11,290.

Caude'te, a town of Spain, in Murcia, 50 miles E. S. E. of Albacete, was formerly fortified. Here are some Roman remains. Pop. 6413.

Cau'dex, a Latin word signifying a "trunk of a tree," was also a botanical term applied by Linnæus to the axis of vegetation, or the woody centre around which the leafy organs are arranged. He called the stem *caudex ascendens*, and the root *caudex descendens*.

Cau'dine Forks [Lat. *Furculæ Caudinæ*], two narrow mountain-gorges or defiles near the town of Caudium, in ancient Samnium. They are celebrated in connection with a humiliating disaster which the Roman army suffered in 321 B. C. A large army commanded by the consuls Titus Veturius and Spurius Postumius were marching against the Samnites. According to Livy, this army, supposing the Samnites to be far distant, marched through one gorge or pass into a small valley enclosed by high mountains, and soon found that both of the passes were blocked up with trees and stones. The Romans were compelled by famine to surrender unconditionally to Caius Pontius, the Samnite general, who required them to pass under the yoke, and then permitted them to return to Rome. Caudium was on the Appian Way, 21 Roman miles E. of Capua. Niebuhr expresses an opinion that the Romans must have been defeated in battle before they were shut up between the two passes, and Cicero twice alludes to the battle and defeat of the Romans at Caudium. In one place he says, "Cum male pugnatum ad Caudium esset." (*De Officiis*, iii., 30.)

Caul. See OMENTUM.

Caulaincourt, de (ARMAND AUGUSTIN LOUIS), duke of Vicenza, a celebrated French diplomatist of the first empire, born at Caulincourt, a village in the department of Somme, France, Dec. 9, 1772, died in Paris Feb. 19, 1827. He entered the army in 1787, was made a general in 1805, and was in 1807 sent as ambassador to St. Petersburg. His position there was in the beginning rather difficult, as the Russian nobility believed him implicated in the capture of the prince of Enghien and declined to hold any intercourse with him. The emperor Alexander, however, who had great confidence in him, fully exonerated him. Unable to prevent the breach between Alexander and Napoleon, he resigned his position in 1811, but was in 1813 made minister of foreign affairs, and was as such present at the Congress of Chatillon, 1814. It was due to his influence on Alexander that the island of Elba was granted to Napoleon. During the Hundred Days he was again minister of foreign affairs. Under the Bourbons he lived in retirement.

Cau'liflower [Sp. *coliflor;* Ger. *Blumenkohl, i. e.* "flowering cole"], a highly-prized variety of the cabbage (*Brassica oleracea*). The cauliflower differs from the other varieties of its species, its leaves being not fit for use. The parts eaten are the flower-buds and the stalks of the plant transformed by cultivation, and forming a compact mass, generally of a white color. There are many sub-varieties which are more tender than the ordinary forms, and require protection during winter. The seed is sown in hot-beds, that the plants may be ready for planting out in spring. Later sowings are made in the open ground. The cauliflower requires a moist, rich, loamy soil, with abundance of manure, and careful cultivation.

Cau'line [from Lat. *caulis*, a "stem"], a botanical term applied to any parts or organs which grow on the stem of a plant. Leaves which arise directly from the stems are called *cauline*, to distinguish them from radical leaves.

Caulo'nia, an ancient Greek city and seaport of Italy, in Bruttium, between Locri and the Gulf of Scyllacium. It was an important city about 500 B. C. According to Porphyry, Pythagoras sought refuge in Caulonia after his expulsion from Crotona. The people of Caulonia formed a league with those of Crotona and Sybaris. In 389 B. C. Dionysius the Elder invaded Magna Græcia with a large army, and besieged Caulonia, which he took. He then removed the inhabitants to Syracuse.

Caulop′teris, a generic name for the stems of fossil tree-ferns found in the carboniferous and triassic measures. They are hollow, and covered with markings similar to the leaf-scars on recent tree-ferns. Twelve species have been described.

Caus, de (Salomon), a French engineer, born in Normandy, is considered by his countrymen as one of the inventors of the steam-engine. He published in 1615 a work on motive-powers entitled "Les Raisons des Forces mouvantes," etc., which gives a theorem on the expansion and condensation of steam. He is supposed to have died about 1630.

Cau′sa, a Latin word extensively used by the ancient Romans as a legal and political term. Its meanings and applications were nearly the same as those of the word *cause* in English. It signified in law a "lawsuit," a "judicial process;" in politics, the measures or principles adopted by one party and opposed by another; in general, a subject, affair, reason, etc.; efficient cause, or that which produces any effect.

Cause, in law, an action at law or suit in equity or in a court of probate. It is found in such connections as the following: "matrimonial cause," "testamentary cause," "calendar of causes," "title of a cause," etc. etc.

Cause, in Ontology (which see), means in general any principle which in any way whatever embraces the Ground (which see) or Reason (which see) why anything diverse from itself exists. The principle correspondent with *this* principle is called Effect (see that article), and the relation which exists between cause and effect is *causality.*

Causes have been divided into five classes (four by Aristotle): I. The *efficient* or operative cause. Its activity may be intransitive—that is, *immanent*—or transitive or transient—that is, *emanent.* The *efficient* cause is by pre-eminence *the* cause, and is usually meant if the word *cause* is not qualified. There may be *requisites* or *conditions,* even to the degree of *sine qua non,* and there may be *occasion,* but these ideas are not to be confounded, as they often are, with that of cause. Efficient causes are subdivided into primary and secondary; universal or general, and particular; principal and instrumental; univocal and equivocal; causes *per se* and *per accidens;* adequate and inadequate; free and necessary; physical and moral; proximate, remote, and ultimate; relative and absolute. There is in the train of causes a *subordination,* and this is Material or Formal (which see).

The ontological principles deduced are: There is no effect without a cause; out of nothing nothing comes; nothing can be the efficient cause of itself; two things cannot be the reciprocal cause of each other; the effect and the cause are *always* proportioned to each other; whatever is in the effect must in some sense be in the cause; the cause of the cause is also the cause of the effect; the same causes always produce the same effects; the cause must be present, either immediately or mediately, with that which it effects.

II. The Material; III. The Formal; IV. The Exemplary (Plato); and V. The Final Cause.

The names most distinguished in connection with the philosophical theories of cause are—Heraclitus and Protagoras (denial of the notion), Plato (idea, matter, operative principle; immediately evident, free and physical; conditional and absolute), Aristotle (fourfold division; first cause of motion), Bruno (principle, internal; cause, external; first cause, final), Hobbes (potency and act), Descartes (assistance), De la Forge, Malebranche (occasional causes), Spinoza (adequate cause; cause of divine acts identical with cause of divine existence), Locke (appearance of changes), Leibnitz (pre-established harmony), Hume, Brown (observation of sequence, habit, not by, but *after,* natural instinct, apart from reason, blind belief), Kant (a fundamental, synthetical, *a priori* judgment, a postulate of pure reason, category of relation), Reid, Stewart (intuition), De Biran, Cousin (self-consciousness, personal causation), Fichte (positings of the Ego, self-originated subjective modification), Schelling, Hegel (spontaneity, all *being* has in it the internal impulse and power to *become*), Hamilton (the conditioned; mental impotence), Schopenhauer (the occasion for the phenomenon of Will). Among later points made, the most important is that each sphere of nature is controlled by a specific modification of the law of causality. All the views are reducible to two: the conception of cause is either *a priori* or *a posteriori,* and each of these is either original or derivative. In the application of the idea of cause arise the terms causal principle, causal judgment, causal nexus, causal connection, causal union, causal relation.

One of the most specious and widely accepted fallacies is that *cause precedes* effect. Cause and effect are absolute correlates, so that in point of *time* cause cannot be *before* effect, but the two sides of the relation come into simultaneous being. Nor can cause, as such, exist without effect. As a term of relation, cause is as dependent on effect as effect on cause. The order of priority is therefore purely logical and mental. Nor is it true that a thing must be (*in time*) *before* it becomes a cause. It is only necessary that it shall be *when* it becomes a cause. Hence the thoughts of an eternal mind, the acts of an eternal being, may be eternal. In the world about us all that *becomes* cause *exists in deed* before it *becomes cause,* but the reason of this is that every source of cause, in our sphere, is also an effect, and must *be* as an effect before it can *act* as a cause. Nevertheless, it becomes cause strictly *simultaneously with* the effect, not *before* it. The true conception of cause therefore is demonstrably not that of sequence in time, as Hume contends, but the one we have given—to wit, that cause is that which contains the reason of the effect, and hence that the relation is a necessary one, and is as certain where we cannot observe its result as where we can. Innumerable instances can be given of the invariable sequence, *in time,* of one thing which is not the effect of another.

That in virtue of which a causal agent can become cause, we call power. Some of the postulates which hold good as to cause and effect in the *inorganic* world are not demonstrably valid in the organic, and seem to fail entirely in the sphere of freedom and of intellect. So complete is the mind's recognition of the nature of cause that on a statement of any number of purely *hypothetical cases* it will at once decide which of the two terms is cause, which is effect, if the statement is such as to help the mind to see which of the terms must contain the reason of the other. C. P. Krauth.

Caus′tic [from the Gr. *καίω,* to "burn"], a term applied to substances which exert a disintegrating or destructive effect upon animal tissues. They usually produce a sensation as of burning, whence the name. "Lunar caustic" is the silver-nitrate, so called because *luna* (the "moon") is the old alchemical name for silver. Caustic lime, potash, soda, and magnesia are these substances when pure, so called to distinguish them from their less active carbonates. Many other chemical reagents are used in surgery as caustics, notably the nitric, chromic, and arsenious acids.

Caustic, in optics, is a term applied to curved lines and surfaces formed by a series of points where (from the intersection of reflected or refracted rays) the heat and light are most intense. Reflected rays produce catacaustics—refracted rays, diacaustics. The study of caustic surfaces and curves is of the greatest importance in the construction of lenses and mirrors. For example, it has been found that the caustic by reflection from a paraboloid of revolution is reduced to a point when the incident rays are parallel to the axis of the paraboloid. For this reason parabolic reflectors have been introduced with great success into many optical instruments.

Cau′tery [Gr. *καυτήριον,* a "branding-iron"], in surgery, the application of a white-hot iron or of a moxa. It is otherwise called "actual cautery," to distinguish it from "potential cautery," or the application of a chemical reagent as a caustic. "Cautery" is also the small iron instrument which is heated and applied in this operation. The actual cautery is useful in destroying certain morbid and gangrenous tissues, in staying hæmorrhages, and in relieving severe local pain. It has a valuable derivative effect in many cases, and when properly applied produces comparatively little pain. It is sometimes used to produce a slight, and sometimes a profound local effect.

Cau′tion [from the Lat. *caveo, cautum,* to "be on one's guard"], a legal term derived from the Roman law, and employed in the admiralty courts. It is substantially equivalent in meaning to security or bail. When security is given under oath, it is called "juratory caution." The word *caution* is employed in the same general sense in Scotch law.

Cavaignac (Godefroy), a French republican journalist, son of Jean Baptiste Cavaignac (1762–1829), who figured in the Revolution, born in Paris in 1801. He was driven into exile in 1835, returned in 1841, and became one of the editors of "La Réforme." He was one of the most popular leaders of the liberal party. Died May 5, 1845.

Cavaignac (Louis Eugéne), an eminent French general and statesman, brother of the preceding, was born in Paris Oct. 15, 1802. He served with distinction in Algeria, to which he was sent in 1832, became a colonel in 1841, and governor of the province of Oran in 1847. In Mar., 1848, he was appointed governor-general of Algeria, and in the next month was invited by Lamartine to come to Paris and defend the government against the mob. He reached that capital on the 17th of May, and was then appointed minister of war. He displayed much energy, skill, and presence of mind in his operations against the Socialists and Communists, who began a great insurrection in Paris June 23, and were defeated in a battle which lasted three days. About the 28th of June he was chosen *chef du pouvoir exécutif*, or president of the republic, by the National Assembly. He was a moderate republican, and used his power with clemency. In the autumn of 1848 he was a candidate for the office of president, and received 1,448,302 votes, but was defeated by Louis Napoleon. He retired from power on the 20th of Dec., and took his seat in the National Assembly. He was excluded from political life by the *coup-d'état* of Dec., 1851, and by his refusal to take the oath of allegiance to Napoleon III. Died Oct. 28, 1857. (See HENRI MONTFORT, "Biographie du Général Cavaignac," 1848.)

Cavaillon (anc. *Cabellio*), a town of France, department of Vaucluse, on the river Durance, 16 miles S. E. of Avignon. It has an old cathedral and remains of a Roman triumphal arch. Here are manufactures of silk twist and vermicelli. Pop. 8034. *Cabellio* was a city of the ancient Cavares, and Pliny calls it an *oppidum Latinum.*

Cavalier′ [Sp. *caballero;* It. *cavaliere*, from the Lat. *caballus*, a "horse"], an Anglicized French word, signifies a horseman, a knight, an armed horseman, a gentleman (attendant on a lady), a gallant, a soldier who fights on horseback. In English history it is applied to the royalist party which fought for Charles I. against the Roundheads. *Cavalier* is the French for the knight in the game of chess.

CAVALIER, in fortification of the old school, is a defence-work constructed on the *terre-plein* or level ground of a bastion. It rises to a height varying from eight to twelve feet above the rampart, and has a parapet about six feet high. Its uses are to command any rising ground held by the enemy within cannon shot, and to guard the curtain, or plain wall between two bastions, from being enfiladed.

Cavalier (JOHN), (1679–81 (Morel says 1685) 1740), often styled the "Baker's boy of Anduze," because at one time apprenticed to that trade, was the son of a Protestant peasant of the Cevennes, of the village of Ribaute near Anduze (Gard), and in his early youth served as a shepherd lad or herdsman. When the Cevenol uprising in defence of the Protestant religious rights broke out in Languedoc in 1702, Cavalier, who had fled in 1701 for safety to Geneva, returned to share the lot of his persecuted brethren, and was soon after recognized as their military commander-in-chief. Such was his instinctive military genius that although he knew nothing more of tactics than what he had picked up by watching the drill of the militia of his district in the streets of his native town, he soon had his rude volunteers under a rigid system of discipline, such as Martinet would have envied, and made them a match for triple (if not quintuple) their number of the very best regulars opposed to them. His grand tactics were unexceptionable, and his handling of troops on the field of battle perfection itself. He could make them perform with resultive effect the most complicated evolutions under the severest fire, demonstrating that he was one of the rarest of mortal phenomena, uniting a power of control, instruction, and influence such as scarcely any general on record has proved equal to. Very shortly after he first exercised any command he undoubtedly became by election or unanimous choice commander-in-chief (commandant-général) of all the Camisard or Cevenol insurgents in arms. Michelet and others question this fact, and attribute the chieftainship to the charming or exquisite Roland, but the facts as set forth by Morel (i., vii., viii.), and the language used by Roland himself, who addresses Cavalier as "commandant les troupes religionaires, ou il se trouvera, en Languedoc," would set the question at rest, were it not further established by his possession of absolute power of life and death in all cases upon his own personal judgment, without calling a council of war. That he never abused this enormous prerogative, at the same time that he did exercise it, testifies to a remarkable self-control in a young man of twenty. In the organization of the Cevenol forces Cavalier was called upon to draw upon the almost obsolete resources of the past as to weapons, as well as to improvise them until his men were armed with the best firearms of the day, captured from his adversaries. He even improvised cannon, but never had time to bring them into the field.

To enter closely into all the details of the career of this Cromwell in miniature, or of a mountain-warfare which under his supreme command did not last over two years, is impossible within the space accorded. His greatest and most glorious engagement was that of Nages (16th April, 1704), which was deemed of sufficient importance by the celebrated engineer and map-maker, Cassini, for a special indication upon his map of the district in which it occurred. Upon this field, surprised through the physical prostration of his men, and no fault of his own, and surrounded by six or seven to his one, Cavalier extricated himself, and in so far defeated the finest soldiery in France that he foiled all the plans of their best commanders. His tactics were not only astonishing in their precision, but sufficiently admirable in their originality to extort the praise of his adversaries; and, if such a thing were possible, the military capacity of this comparative youth exceeded the heroic courage and unsurpassable devotion of the troops he had made and commanded. Although he enjoyed the triumph of treating with Villars, the superb representative of the magnificent Louis XIV., Cavalier certainly betrayed his trust in that he capitulated under stipulations for his own personal benefit, without insisting upon reliable guarantees to ensure the maintenance of the treaty he extorted in behalf of his religious brethren. There is no question but that Villars and Louis both deceived the Cevenol leader, more loyal to his pledges than either marshal or king. Moreover, Louis wounded his pride in a personal interview, and alarmed him for his personal safety. Like Prince Eugène, he quitted the French service for that of his enemies, and with that prince and the duke of Savoy took part in the invasion of France in 1707; and it is questionable if either imperial prince or royal duke inspired more apprehension to the government authorities than the former Cevenol-peasant-generalissimo. From the Dutch he passed into the British service, and remained in it until his death in 1740. He distinguished himself at Almanza (25th April, 1707), where his regiment, composed of Cevenol refugees, was opposed to a French organization in which the Huguenots recognized a portion of their former persecutors. Thereupon this mutual recognition led to such a fearful conflict with the bayonet, that only three hundred of the combatants survived. This is according to the statement of the impassible bigot the duke of Berwick, who never could recall the circumstance without horror. Morel (i., 389) says, "This (Cavalier's) terrible Camisard regiment rushed with the bayonet on the Franco-Spanish army, and made the balance of victory tremble."

The distinguished Malesherbes, after a full consideration of the character of Cavalier, pronounces him "one of the rarest characters which history presents for our contemplation." Villars, no better judge, concedes his vast military capacity. His treating with Cavalier as equal with equal would attest the latter's influence, had we not the marshal's very words to establish the fact. The same is admitted in more or less eloquent language by all the historians of this struggle for religious freedom. Whether Cavalier needed only a wider stage to demonstrate his worthiness to rank with the most distinguished commanders of olden or modern times, or whether his lights were not strong enough to illuminate a vaster space, he had no opportunity to determine. That he did not rise higher and more quickly than he did in the English army is easily explained. William of Orange preferred purely professional soldiers, and his very sense of religious inspiration doubtless marred his prospects, even under the succeeding monarch, Anne. That he was deemed worthy of confidence is shown by his elevation to the rank of major-general in the British service, and his appointment as governor of Jersey, one of the Channel Islands, an outpost of her dominions and nearest their most dangerous enemy. In this position he died in 1740.

Without *one* man—an obscure citizen of Nijni-Novgorod—Kosma Minin, a butcher, "distinguished by nothing but a sound head (strong common sense) and a brave, honest, unselfish heart," Russia, in 1611–12, would have become a Swedish or a Polish possession; and without another one, an equally obscure man, this John Cavalier, a peasant, imbued with instinctive capacity for war and the government of men, France, in 1704, would have acquired such authority in Europe, and resultively in America, that the preponderance of the Latin race would not have been a question for Napoleon III. to attempt to solve, and fail in solving, as in Mexico. Indeed, Cavalier's career exemplifies the rule of great events depending on "small things." The Cevenol uprising and his successes in Languedoc attracted to the south, into Languedoc, 10,000 to 20,000 veteran infantry, besides dragoons, and a large body of artillery, the latter of no use in the mountains of the Cevennes, but sorely needed, to the east, on the Rhone, and to the north, in Flanders. A cabal of women aggravated the evil as regarded the Roman Catholic cause by sending the favored Villeroy where men and a man were most needed, and a man, Villars, into Languedoc. This alone made Blenheim a possibility. Had no Cavalier arisen, Villars would have been in Flanders to prevent Marlborough's flank march into Germany, or to remedy Marson's and Tallard's blunders, there, in 1704. It is admitted that the effect of the Cevenol-Huguenot insurrection, in which Cavalier was the prominent figure, had a momentous effect on the fortunes of the war elsewhere, on the prospects of Louis XIV., and on the future of France.

J. WATTS DE PEYSTER.

Cavalry [from *caballus*, a "horse"], that class of troops which serve mounted. It is recognized in modern warfare as one of the three great arms of service, and in earlier times, when war consisted more of predatory expeditions than of regular campaigns, it occupied the chief place. But even among the ancients it appears that this arm was not used to any extent in the earliest wars of which we have any record. The Egyptians, who were the first to organize a standing army, had no cavalry, its place being supplied by armed chariots. It is true that, on the monuments left by this people, pictures of mounted men are to be found, but there is every reason to suppose that these men were used only as messengers or couriers. Later, the Carthaginians, who contended with the Romans for the conquest of the world, in the organization of their armies gave a prominent place to the cavalry, which was made up of the most noble and distinguished citizens. Besides this body of picked troops, furnished by the city, Carthage employed vast numbers of Numidian horsemen. Such fine riders were these latter that they rode not only barebacked, as did all cavalry at first, but without bridles, guiding their horses in all their evolutions with the voice alone. It was to the great superiority of his cavalry that Hannibal, in his memorable campaigns against the Romans, was chiefly indebted for his success. His first five battles show the reliance he placed on this arm, and the efficiency with which he used it. At Cannæ his cavalry turned the issue of the day, and he owed his defeat at Zama to the superiority of Scipio's horse. In Asia an organized army was established among the Medes and Persians about 700 B. C., and in this the lancers, archers, and cavalry were placed in separate divisions. This force was rendered effective under Cyrus, and its main strength consisted in its cavalry. Leaving the East, which was the nursery of arms, as of arts, and turning to the West, we come to the military systems of Macedonia and Greece as the first organized, and upon which most others of antiquity were formed. In their armies both infantry and cavalry were used. The latter, as well as the former, was divided into heavy and light, and there was also another class which fought either mounted or on foot. In the heavy, which was composed of citizens, both horse and rider were clad in mail. Their arms were long spears pointed at both ends. Mercenaries armed with javelins and arrows made up the light cavalry. These wore no mail, nor did their horses, which in all cases were ridden barebacked. The organization of the Greek cavalry approached that of modern times in many particulars. Their *ile*, corresponding to our troop, consisted of 64 men; the *hipparchy*, equivalent to our regiment, contained 512; while their largest formation, an *epitagma*, had 4096, being about equal to a modern division of eight regiments. Philip and Alexander employed cavalry with great success, especially the latter, who was indebted to this arm for many of his most splendid victories. He won that of the Granicus with his cavalry, and in his two great battles with Darius, those of Issus and Arbela, his judicious use of his horse secured the victory, though he had in the latter not more than 8000 to oppose to 40,000 of the Persians. Among the Romans, even as early as the time of Romulus, each of the three tribes was required to furnish, besides its quota of infantry, 100 horse. In addition to this legionary cavalry there were 300 which constituted the body-guard of the king. In the formation of the legion it was customary to allow one mounted man to every ten of foot. Thus, the numbers to make up the legion, as at first constituted, were 3000 infantry and 300 cavalry. Servius Tullius increased these numbers to 4000 infantry and 400 cavalry, and he raised his cavalry to 2400 men. This force was made up, as with the Greeks, of the most noble citizens. The Roman cavalry was trained to fight on foot as well as mounted, and the light-armed infantry would sometimes spring up behind the horsemen, dismounting when the enemy was reached. Horses were furnished by the state. The cavalry was generally divided into ten parts; thus, when 300 of this arm were attached to a legion, they were divided into ten *turmæ* or troops, and were formed in three, or sometimes six, ranks. Their defensive arms were helmet, cuirass, and shield; their offensive, a sword fit for striking only, a dagger, and a lance. Cæsar found that the Gauls used for their cavalry a very broad sword, suitable for cut and thrust. The order of battle among the Romans, though changed at different periods in many particulars, always preserved the system of keeping the flanks covered by cavalry. Sometimes a strong force of this arm was stationed in rear of the centre, which was always held by a Roman legion; and on the repulse of the enemy the infantry opened to allow the cavalry to pass through in pursuit. On the march the head and rear of the column were protected by cavalry. After the fall of the Roman empire the different nations which had for so many ages waged war, either as allies or enemies of Rome, having learned from their great mistress much of the art of war, as well as many of the blessings of civilization, organized military systems so soon as they had established permanent governments. Thus grew up the feudal system of the Middle Ages, in which the mail-clad knights, with their men-at-arms, made up the great body of cavalry and constituted the chief strength of all armies in the field. Their arms consisted of lance, battle-axe, and sword, the latter being generally straight and double-edged. Later, the Germans borrowed the curved sword from the Saracens, and they too invented the spur. In the earlier stages of the cavalry service, as has been mentioned, saddles were not used, but these were subsequently introduced, the first being a mere cushion, which has been developed into the almost countless styles of saddles now in use. During the wars of the Middle Ages the cavalry were used in heavy masses, which by their mere weight and superiority in arms could generally ride down the ill-armed and lighter infantry; but with the invention of gunpowder a new era in warfare commenced. The changes worked by this new and powerful agent were very gradual, for it was used for many years only for heavy artillery. As soon, however, as it was applied to small-arms, the whole system of warfare underwent a radical change. Heavy defensive armor was discarded as useless; strategy and tactics overcame mere weight of numbers, and war became a science. To be enabled to perform the great movements dictated by strategy, and to employ properly the tactics requisite on a battle-field, it was necessary to have disciplined troops; and from this need grew up the standing armies of modern times. In all of these cavalry occupies a prominent position, as a glance at the various military systems of modern times will show. In Prussia the army grew out of the body-guard established by the elector Frederick I. This force was increased and disciplined under his successors, especially the great elector, and Frederick III. had a body of 36,000 admirable troops. But it was to Frederick the Great that the army owed its discipline, its organization, and its fame. Soon after his accession to the throne he issued his military regulations, and in his efforts to perfect the efficiency of his army he paid special attention to his cavalry. To his reign belong two of the ablest and most brilliant cavalry leaders of history—Ziethen, who formed the Prussian hussars; and Seidlitz, who framed the cavalry tactics. So desirous was Frederick to bring this arm of the service to the highest perfection that he called to his aid the most distinguished Hungarian cavalry officers to drill and discipline his troops; and so efficient did they become that under the great leaders just named they gained some of his most important victories. Some of these battles give the happiest illustration of the efficiency of cavalry when properly used and ably handled. In that of Rossbach, Seidlitz threw his troopers against the French columns, broke them, and never allowed them to rally again. So brilliant were his services on this field that Frederick conferred on him the order of the Black Eagle—the highest mark of favor—and made him lieutenant-general. On the bloody field of Zorndorf it was reserved for the same gallant leader to save the day, for when the Prussian infantry gave way he charged the advancing Russians, broke both their cavalry and infantry, and sabred thousands of them. Ziethen, too, Frederick's other great leader of cavalry, contributed largely to the success of the Prussian army in Frederick's campaigns, especially on the field of Torgau, which was won by him.

The Prussian cavalry has well sustained the reputation it won during the wars of Frederick the Great, and it has been regarded as among the finest in the world. It is divided into cuirassier, dragoon, hussar, and Uhlan regiments. The first are armed with long straight swords; the others, with curved sabres, pistols, and carbines for dragoons, and lances for Uhlans. Each regiment is made up of 616 men—636 in those of the guards—and is composed of four squadrons.

The Austrian cavalry is made up of the same class of troops as the Prussians, but there are some differences in arms and organization. The dragoons carry long carbines, and in the Austrian service the regiments are also larger than in the Prussian. The cuirassier and dragoon regiments contain six squadrons and 1294 men; the light-horse and hussar regiments have eight squadrons, and their strength in war is 2044 men. The Uhlan regiments have the same formation and arms as the last named, while they carry also a lance.

Among the French the cavalry is divided into cuirassiers, carbiniers, dragoons, lancers, *chasseurs à cheval*, hussars, and *chasseurs d'Afrique*. The regiments are made up of five squadrons, to which number one can be added in time of war. Their arms are very similar to those of the Prussians. The French cavalry seems to owe its origin to Charles VII., who about the middle of the fifteenth century took into his pay fifteen companies, as they were called, each of 500 men. In the reign of Louis XII. the cavalry appears to have been first organized in a separate body, with its own general officers and staff. Napoleon used his cavalry with terrific effect, and he called to its command some of his most distinguished lieutenants, though the ablest in this arm of the service was Murat. The battle of Marengo was converted from a defeat into a victory by the charge of Kellermann at the head of a small force of cavalry; and one of the most extraordinary exploits ever achieved by this arm was performed as Napoleon approached Madrid in 1808. Near the city, in the mountain-pass of Sorno-Sierra, were posted 20,000 men and 16 guns, which force checked the advance of the French. The emperor, after a personal reconnaissance, ordered a small body of Polish lancers to charge the formidable works, which they did with complete success. This is one of the most striking instances on record to show not only what can actually be accomplished by cavalry when properly directed, but the powerful moral effect produced by this arm when used with celerity and boldness.

The cavalry of England consists of life guards, which are cuirassier regiments, composed of eight troops of fifty to sixty men each—arms, straight sword; dragoon guards, same strength as life guards—arms, straight sword, pistols, and carbine; heavy and light cavalry—arms, sabre, pistols, and carbine; and lancers—arms, sabre, pistols, and lance. The English cavalry is the best in the world, having proved itself generally superior in the field.

The organization of the cavalry in the smaller states of Europe is very similar to that of the great powers already given, and we therefore do not deem it necessary to enter into details regarding it. In the East, too, especially among the Turks, an effort is being made to conform to European organization, armament, and drill. The khedive of Egypt is making rapid progress in this direction, and he has in his service several American officers who served either in the Confederate or Federal armies during the late civil war.

In the U. S. military system the organization of the cavalry is, with some slight modifications, the same general one which prevails in Europe. A regiment consists of ten companies or troops of sixty-four men each; two troops form a squadron. All the cavalry in the U. S. should be classed as dragoons, their arms being sabre, pistol, and carbine. During the war, when large masses of cavalry were brought together they were formed into brigades, divisions, and corps, a brigade being composed of several—generally four or five—regiments; a division, of two or more brigades; and a corps of all the divisions serving with any army. When in active service it is usual to attach batteries of horse artillery to the cavalry, allowing generally one battery to each brigade. The cannoneers are all mounted for this service, and the guns used are usually light rifled pieces, though occasionally the light howitzer is employed. As an illustration of the organization of the cavalry in this country when in the field, we append a tabular statement of the formation of the cavalry corps of the Army of the Potomac, and that of the Army of Northern Virginia, in the campaign of 1864:

Cavalry Corps Army of the Potomac.

First Division, commanded by Gen. Torbert.

	Regiments.		Regiments.
First Brig., Brig.-Gen. Custer.	1st Michigan. 5th Michigan. 6th Michigan. 7th Michigan.	*Reserve Brig.*, Brig.-Gen. Merritt.	1st U. S. Cav. 2d U. S. Cav. 5th U. S. Cav. 6th U. S. Cav. 1st New York. 6th Pa.
Second Brig., Col. Devin.	4th New York. 6th New York. 9th New York. 17th Pa.		

Second Division, commanded by Gen. Gregg.

First Brig., Gen. Davies.	1st New Jersey. 1st Mass. 1st Pa. 6th Ohio.	*Second Brig.*, Col. Gregg.	1st Maine. 2d Pa. 4th Pa. 8th Pa. 13th Pa. 16th Pa.

Third Division, commanded by Brig.-Gen. J. H. Wilson.

First Brig., Col. McIntosh.	1st Conn. 2d New York. 5th New York. 2d Ohio. 18th Pa. 3d New Jersey.	*Second Brig.*, Col. Chapman. Detachment from	1st N. H. 1st Vermont. 3d Indiana. 8th New York. 22d New York. 8th Illinois. 10th New York.

Kautz's Division, commanded by Brig.-Gen. A. V. Kautz.

First Brig., Col. R. M. West.	5th Pa. 3d New York.	*Second Brig.*, Col. S. P. Spear.	11th Pa. 1st D. C. Cav.

Horse Artillery attached to Cavalry Corps.

Randall's	Battery,	Cos.	H and I,	1st	U. S.	Artillery.
Pennington's	"	"	M,	2d	"	"
Williston's	"	"	—	—	——	——
Dennisson's	"	"	—	—	——	——
Heaton's	"	"	B and C,	2d	U. S.	Artillery.
Fitzhugh's	"	"	E,	4th	"	"
Ransom's	Battery,	Co.	C,	3d	U. S.	Artillery.
Maynardin's	"	"	K,	1st	"	"
King's	"		—	—	——	——

Attached to Kautz's Division.

Horse Battery, Co. B, 1st U. S. Artillery.

By this official return of the cavalry serving with Gen. Grant in his operations before Richmond, and which fell into the hands of the Confederates, it appears that the corps consisted of forty-one regiments, nine brigades, and four divisions. The total effective of nineteen regiments is given, making an average of 431 to each regiment. Putting each of the other regiments at the same strength, the whole force present for duty would amount to 17,641. To these troops were attached twelve batteries, mostly of six guns each.

The cavalry corps of the Army of Northern Virginia at this time was constituted as follows:

Cavalry Corps Army of Northern Virginia.

First Division, Maj.-Gen. Wade Hampton.

	Regiments.		Regiments.
Butler's Brig.	4th S. C. 5th S. C. 6th S. C.	*Rosser's Brig.*	7th Virginia. 11th Virginia. 12th Virginia. White's Batt.
Young's Brig.	Cobb Legion. Phillips Leg'n Jeff. Davis L. 7th Georgia. Millen's Batt. Love's Batt.		

Second Division, Maj.-Gen. Fitzhugh Lee.

Wickham's B'g.	1st Virginia. 2d Virginia. 3d Virginia. 4th Virginia.	*Lomax's Brig.*	5th Virginia. 6th Virginia. 15th Virginia.

Third Division, Maj.-Gen. William H. F. Lee.

Garden's Brig.	1st N. C. 2d N. C. 3d N. C. 5th N. C.	*Chambliss' Brig.*	9th Virginia. 10th Virginia. 13th Virginia.

Horse Artillery attached to Cavalry Corps.

Breathitt's Battery	.........4 guns.	Shumaker's Battery	.......4 guns.
Hart's "	.........4 "	McGregor's "	.......4 "
Thompson's "	.........4 "		

This was the organization of the cavalry of the Army of Northern Virginia in May, 1864. Later in the campaign two other small brigades, those of Brigadier-generals Gary and Dearing, were added to it, but the second division was transferred to the Valley of Virginia, as was Rosser's brigade of the first division. One other battery, Graham's, was added to the artillery. The field return of Aug. 31, 1864, gives the "total effective" at 5907, and embraced the first and third divisions, with Dearing's brigade, the second division having moved to the Valley.

During the war the cavalry was used on both sides to picket all approaches, to cover all movements, to protect advances or retreats, and to make reconnaissances. The character of the ground on which the armies operated prevented as active participation in the great battles of the contest as is usual in European warfare, but the history of the late war, when fully and impartially written, will show that on both sides this arm was not inferior in courage, discipline, soldiership, and achievements to any other.

During this war, however, the cavalry arm was not employed in the same manner or with the same effect as it has been in European armies in the great battles. In point of fact, as one of the "three arms," it was comparatively ineffective on the great battlefields. Cavalry charges in actual battle were seldom made, except in cavalry-combats, although on a few occasions they were employed against infantry. Most of the notions prevailing on the subject were found inapplicable to the actual conditions. Hence, the use of cavalry was little more than to serve as mounted infantry; that is, for the purpose of conveying men rapidly from point to point, for the purpose of striking some sudden isolated blow or making what is called a *raid*. In most of the battles, however, the cavalry were dismounted and fought as infantry, often taking an important part. Two most notable instances of the kind occurred—one at the fight at Ream's Station, Aug. 25, 1864, where the dismounted Confederate cavalry carried a line of breastworks held by infantry; the other at Five Forks, where the Federal cavalry performed the same feat. During the war there were many instances in which dismounted cavalry fought with the constancy and discipline of the best infantry, and despite the circumstances which prevented their use in heavy masses on the great battlefields of the civil war, many of the most gallant actions in that contest were performed by this arm of the service. The circumstances under which the war was fought, particularly the topographical features of the battlefields, were such as to make it difficult to bring cavalry to bear in mass.

WADE HAMPTON.

Cav′an, a county of Ireland, in Ulster, has an area of 746 square miles, with Fermanagh and Monaghan counties on the N. E., and Leitrim, Longford, Westmeath, and Meath on the W. and S. The surface is partly hilly and partly occupied by bogs. It is drained by the rivers Erne and Woodford. About three-fourths of the land is arable, but the soil is mostly poor, except near the rivers. Among the rocks found here are clay-slate, gray-wacke, and carboniferous strata. It contains coal, iron, copper, and lead. There are many mineral springs, and numerous highly picturesque lakes. There are some linen manufactures. The county returns two members to Parliament. The principal towns are Cavan, Cootehill, Belturbet, and Bailieborough. Capital, Cavan. Pop. in 1881, 129,008.

Cavan, a town of Ireland, capital of the above county, is situated in a fertile vale on the railway from Dublin to Enniskillen, 65 miles N. W. of Dublin. It is mostly ill-built, but has a fine public garden. Pop. 3532.

Cava′nas, or **Cabanas,** a port of Cuba, on the N. W. coast, 38 miles S. W. of Havana. Here is a deep bay which affords anchorage for several hundred ships.

Cavani′lles y Cen′ti (Don Antonio), a prominent Spanish historian, born at Coruña, in Galicia, in 1805, became in 1841 a member of the Royal Academy of History, and soon after also a member of the Academy of Moral and Political Sciences. His "History of Spain" (5 vols., 1860–64, not finished) is among the best historical works of Spanish literature. Died in 1864.

Cavarze′re, a town of Italy, in the province of Venetia, on the river Adige, 25 miles S. W. of Venice. It has an active trade in silk, cattle, and firewood. Pop. with suburbs, 11,903.

Cavati′na [It.], a short operatic air, differing from the aria in consisting only of one part, and that more in the form of a song. Many composers, however, disregard this difference.

Cave, or **Cav′ern** [Lat. *caverna*, from *cavus*, "hollow;" Fr. *caverne*], a hollow place beneath the surface of the earth. Natural caves have been produced by the upheaval of the strata, by water, or by both combined. The eroding power of water has formed caverns in the courses of rivers and on the coast-line of the sea.

By far the greater number of caves are found in limestone, and they are here formed by the solution of the stone by atmospheric water, which always contains carbonic acid. The most extensive caves known are subterranean water-courses which have been excavated in limestone by the dissolving power of the stream or streams which flow or have flowed through them. They especially abound in the oolitic limestone, which on this account is sometimes called by geologists "cavernous limestone." Next to limestone, caves are mostly found in the strata containing rock-salt, a substance easily removed by water. They are also sometimes met with in igneous rocks; the cave of Fingal, in Staffa, is formed in basalt, and in some places recent lava contains large caverns, formed by the running out of liquid lava from a mass cooled and solidified around it. Many caves have a calcareous lining, giving them a gorgeous appearance. Sometimes this deposit is pure white, and has, when the cave is lighted up, a wonderful richness and transparency. It is, however, generally colored. To incrustations descending from the roof like icicles the name stalactite is given; those rising from the floor are stalagmites. Sometimes the stalactite meets the ascending stalagmite and forms a column, as if to support the roof. The material of the stalactites and stalagmites originates as follows: The superficial soil, acted upon by moisture and air, evolves carbonic acid, which is dissolved by rain-water, which, permeating the calcareous strata, has the power of taking up lime, until from evaporation the excess of carbonic acid and water is parted with, when the lime returns to its solid state and forms a crust. Caves are inhabited by peculiar species of fishes (such as the blind fish of the Mammoth Cave), by remarkable reptiles (such as the *Proteus*), and by various characteristic insects and crustaceans. They also have an interest from the occurrence, in many, of fossil remains under the incrustations of the floor, frequently concreted into a firm breccia. They belong to the pleistocene period, when Europe was inhabited by hyænas, bears, and lions. Portions of other animals were dragged into their dens as food. In this way the bones of herbivorous animals are mixed with those of the beasts of prey; they have a gnawed appearance, similar to what is produced on bones by the hyæna. Remains of thirty-three species of mammals and five of birds have been discovered in the caves of the British Islands, of which about one-half still survive in Europe, Asia, Africa, and perhaps in America, for the cave-bear has been pronounced to be identical with the living grizzly bear. Among the mammals are species of ox, deer, horse, wolf, dog, fox, bat, hippopotamus, rhinoceros, hyæna, bear, and lion. It is confidently asserted by some geologists that the bones of men are also found in these caves, in circumstances showing that man was coeval with the cave-bear and the mammoth, and lived before the glacial period. The most famous ossiferous cavern in Great Britain is at Kirkdale, 25 miles from York. Ossiferous caves occur in many parts of the globe. The fossils of those in Australia show that the fauna of the pleistocene period in that country had a remarkable resemblance to that of the present day. The remains are chiefly those of kangaroos and other marsupials. The caves of Brazil have yielded many interesting remains.

Revised by J. S. Newberry.

Cave (Edward), an English printer, born at Newton in 1691, was the founder of the "Gentleman's Magazine," first issued in 1731. He was a friend and patron of Dr. Johnson. Died in 1754.

Cave (William), an English scholar and writer, born in Leicestershire in Dec., 1637. He became canon of Windsor in 1684, and vicar of Isleworth in 1690. He published "Primitive Christianity" (1672), a "History of Christ and the Apostles" (1675), and "Lives of the Fathers of the Church in the Fourth Century" (1682), which were highly esteemed. Died Aug. 4, 1713.

Ca′veat [Lat. "let him beware"]. This word is used in law in two senses. (1) A notice given to a court or judge to stay the performance of certain acts, judicial or ministerial. It is used to prevent the enrolment of a decree in chancery, or the issuing of a commission of lunacy, or the grant of letters testamentary to an executor. (2) In patent law it has a statutory effect. It is filed in the office of the commissioner of patents. An inventor makes use of it to obtain time to perfect his invention. It should set forth the design, and pray protection of the inventor's right until the invention is matured. The caveat is filed in the confidential archives of the patent office, and preserved in secresy. It is operative for one year after its filing. When, however, an application is made within the year by another person for a patent interfering with the caveat, it is treated as confidential, and notice given by mail to the caveator, who must thereupon file his specifications prepared for a patent within three months from the time of mailing the notice, added to the time usually required for the transmission of mail-matter from Washington to the caveator. Resident aliens, under certain regulations, may avail themselves of the privilege of a caveat. (See section 40 of chap. 230 of "Laws of Congress," 1870.)

Ca′veat Emp′tor ("let the purchaser beware"). This is an important rule in the law of sales of personal property. Its general meaning is, that a purchaser must judge for himself of the quality of goods purchased. He will accordingly have no remedy against the seller if the goods turn out to be of an inferior character and of much less value than the price paid. The common law of England differs widely from the civil or Roman law, where the rule prevailed that a "sound price warrants a sound article." The rule (*caveat emptor*) must be confined to the *quality* of the goods. In the case of failure of the *title* to chattels sold by a person in possession, there is, according to the American decisions, an action against the seller, on the theory of an implied warranty. To the general doctrine of "caveat emptor" there are important qualifications. (1) The rule does not extend to cases of fraud. Where there is positive or active fraud, this is extremely clear. There is more doubt in the case where there is only concealment on the part of the seller. A distinction has here been taken between intrinsic and extrinsic defects. The latter would refer to cases where external circumstances affect the value of a chattel, as the outbreak of war or the conclusion of peace. The rule in such cases is that concealment is not a legal fraud, unless there is an active attempt to mislead. In the case of intrinsic defects there is great diversity of opinion. Some authors of repute hold that "the seller may allow the buyer to cheat himself *ad libitum*, but that he must use no effort to mislead." It is to be regretted that a view of the law should be taken so widely at variance with the dictates of common morality, and an effort should be made to find some satisfactory ground upon which they can be reconciled. It is believed that the seller is bound, *in law*, to disclose any facts within his knowledge of the nature referred to which cannot be discerned by the exercise of ordinary observation and good judgment on the part of the buyer, and which materially affect the value of the chattel in ordinary estimation. To use a familiar illustration, if a seller knew that a horse which he exposed for sale in the ordinary manner had a secret defect not discernible by a careful purchaser, it would be a fraud on his part not to disclose it. Of course, this conclusion would not be arrived at if he expressly stated that the sale was "with all faults," etc.

(2) When a sale is made by a manufacturer for a special purpose, the better opinion is that the rule in question has no application. In other words, there is an implied warranty that the chattel is reasonably fit for the purpose for which it is bought. Some authorities of weight maintain that there is an implied warranty in all sales by manufacturers that there is no defect in the *process of manufacturing*, though they would not extend the doctrine to the materials used. (3) Wherever the reason on which the rule is founded fails, the rule itself gives way. The only rational ground of the doctrine of *caveat emptor* is, that when a purchaser has an opportunity to examine goods he should act in the way in which a prudent man usually manages his affairs, and should notice such defects as he may be able to discover. Where there is no such opportunity for inspection, or where the seller takes the burden of selection upon himself, there is no room for the application of the rule. Accordingly, it does not apply to a true sale by sample; that is, where the bulk of the commodity is not present. In this case, the seller impliedly warrants that the bulk of the commodity is equal to the sample. The purchaser must examine the sample for himself. If, however, that course is not open to him, the bulk of the commodity must be equal to the *apparent* qualities of the sample. Thus, if an article like madder were sold by a sample contained in a sealed bottle, the bulk must equal the sample as it appears to the eye. The same general rule would apply to so called executory contracts of sale, as where goods are sold at sea "to arrive" at a prescribed time. In the special case where the selection is made by the seller, the rule also fails. The distinction is put by one of the English judges in an apt form. He says: If the buyer says to the seller, "Sell me *a* gray horse to ride," there must be a horse supplied which the purchaser can ride. If, however, he had said, "Sell me *that* gray horse to ride," pointing to a particular animal, there would be no remedy, in the absence of fraud, if the horse were unfit to ride. In these cases another view might be taken. There is really no contract if the stipulated article is not supplied, the minds of the parties not having met. It seems very clear that if A proposes to sell B wheat by sample, and he furnishes on delivery wheat that does not correspond with the sample, there has been no agreement to buy the thing furnished, and it may accordingly be returned to A when its true character is discovered. (4) There is an exception to the rule in American law resting upon peculiar grounds, and it may be maintained though there be no fraud or other special circumstances. This is the sale of provisions for *domestic use*. There is an implied warranty that the goods are wholesome. The exception is not extended to sales by one dealer to another. It may be added that there is a corresponding rule (*caveat venditor*) applicable to the seller, who is bound in like manner to be on his guard in dealing with the purchaser, though this would also give way in cases of fraud. An instance is where the buyer, having learned that a war has ended, takes advantage of his superior knowledge to make purchases. Such a purchase would be legally valid, though if he misled the seller the fraud would vitiate the transaction. (See also, on this subject, SALES.) T. W. DWIGHT.

Cavendish (HENRY), an eminent English chemist and philosopher, born at Nice Oct. 10, 1731, was a son of Lord Charles Cavendish and a grandson of the duke of Devonshire. He was a man of eccentric and unsocial habits, who devoted himself exclusively to science. From an uncle who died about 1773 he inherited a very large fortune. As a chemical philosopher he occupies the first rank. He was one of the founders of pneumatic chemistry, ascertained the proportions of oxygen and nitrogen in common air in 1783, and discovered the composition of water in 1784 by burning oxygen and hydrogen in a glass vessel. He was profoundly versed in geometry and mathematics. In 1803 he was chosen an associate of the French Institute. He died in London without issue Feb. 24, 1810, and left a fortune of one million pounds sterling. (See G. WILSON, "Life of H. Cavendish.")

Cavendish Experiment, an experiment for determining the mean density of the earth. (See DENSITY OF THE EARTH.)

Cave Spring, on R. R., Floyd co., Ga., 15 miles S. W. of Rome (see map of Georgia, ref. 2–F, for location of county), is the seat of the State asylum for deaf-mutes, and has an extensive cavern and a medicinal spring. It is also the seat of Harn School for young men. Pop. in 1880, 835.

Ca′very, or **Cauv′ery** (anc. *Chaberis*), a river of India, in the Deccan, rises near lat. 13° N. and lon. 76° E. It flows south-eastward through Mysore, and after a course of about 470 miles enters the sea by many mouths. Its delta is mostly in the district of Tanjore. It is eminently available for irrigation and useful in agriculture.

Caviare, kav′iar or kaveer′, the prepared and salted roe of the sturgeon, made chiefly in Russia, the Caspian fishery alone sometimes yielding several hundred tons annually. There are six or seven species of sturgeon caught for their yield of caviare—species chiefly living in the Caspian and Black seas and their tributary streams. The roe of the sterlet (*Acipenser ruthenus*) is the best, and its caviare is reserved for the imperial court. Caviare is proverbially disagreeable to the uneducated palate, though highly esteemed by the initiated. It is now manufactured quite extensively in the U. S.

Cavi′te, a fortified seaport-town of Luzon, one of the Philippine Islands, is on the Bay of Manila, 3 miles S. W. of the city of Manila. It was formerly the chief naval dépôt of the Spanish possessions in the East. Here is a manufactory of cigars. Pop. about 6500.

Cavour′, di (CAMILLO BENSO), COUNT, an illustrious Italian statesman, born Aug. 1, 1810, of an aristocratic Piedmontese family, the son of the marchese Michele di Cavour and his wife Adelaide Syllon d'Allamar, an accomplished Swiss lady. Camillo, a younger son, was destined for the army. In the military academy at Turin he showed such proficiency in mathematical studies that he was made an engineer officer at the age of sixteen and given responsible commands. Military life was repugnant to his tastes, and he entertained radical opinions which he did not hesitate to utter, and thereby displeased the king, Charles Albert. He therefore left the army in 1831, and turned his attention to agriculture, taking part also in the reform agitations of the time. He pursued a zealous inquiry into social and industrial questions, visiting England and France for that purpose. He was one of the founders of the "Associazione Agraria," an energetic reform society, and started the liberal journal "Il Risorgimento" in 1847. When in 1848 the liberal party came into power and a constitutional frame of government was accorded to Sardinia, Cavour stood at the head of the moderate republican press, and, elected to the Chamber, he took an important part in the debates, supporting the moderate ministry of D'Azeglio and opposing the violent demands of the Left, whereby he lost in great measure his popularity. In 1850 he was appointed minister of commerce, in 1851 of finance, and in 1852 became premier, accomplishing a fusion of the Right Centre with the Left Centre under Ratazzi. From that time forth he conducted the policy of Italy, bringing about finally its political consolidation amid stormy internal commotions and foreign complications. He promoted free trade and religious toleration and opposed the encroachments of the papal power. His idea was, "A free Church in a free State." Full freedom should be secured for the Church in all spiritual affairs, and for the State in all civil affairs. The radicals, who proposed to confiscate all the estates of the Church, he opposed as decidedly as the Ultramontanists, who hoped to make the State a mere tool in the hands of the Church. The grand aim of his diplomacy was to promote the union of the Italian peoples and the liberation of Italy from foreign domination, and his first moves in that direction were the formation of an alliance with France and England and the participation in the Crimean war. When the audacious scheme proved successful, an Austrian diplomatist said, with good reason, that it was a pistol-shot fired in the face of Austria. At the Congress of Paris he succeeded in bringing the Italian question on the *tapis*. He thus provoked the hostility of Austria, which invaded Italy in April, 1859. The Austrians were defeated, and obtained peace by ceding Lombardy, which was annexed to the Sardinian states. Cavour resigned office in July, 1859, because he disapproved the treaty of Villafranca, but he resumed the position of prime minister in Jan., 1860. In consequence of the victories of Garibaldi and the general uprising of Italian patriots in 1859 and 1860, nearly all Italy was liberated and united. Cavour was prime minister of the new kingdom of Italy when he died on the 6th of June, 1861. He was never married. He left the reputation of being one of the greatest statesmen of modern times. (See "Reminiscences of the Life of Cavour," translated from the French by EDWARD ROMILLY; also EDWARD DICEY, "Cavour, a Memoir.")

Ca′vy, the name of various South American tailless rodent mammals, closely related to the porcupine family, and by most naturalists referred to the Hystricidæ, but by others to the family Cavidæ, differing from the hare family in the want of clavicles, and in having the incisors situated not in the manner characteristic of the hares. There are four molar teeth in each jaw, and in the genus *Cavia* these are compound; there are four toes on each of the fore feet, and three on the hind feet, the feet not being webbed. The females have only two teats. One species, *Cavia Cobaya*, has long been domesticated as a pet and plaything of children. It is called the "restless cavy," or more frequently the "Guinea pig," although it is neither a pig nor a native of Guinea. The Guinea pig multiplies with rapidity, producing young ones when only two months old, and afterwards at intervals of two months, from four to twelve in a litter. This fecundity serves for the preservation of the race in a wild state, the little animal being very defenceless. The other species are very numerous in parts of South America.

Cawker City, on Central Branch division of the Missouri Pacific R. R., Mitchell co., Kan. (see map of Kansas, ref. 4–F, for location of county), is favorably situated at the junction of the two branches of the Solomon River. It has a high school and a very fair local trade. Pop. in 1880, 1039; in 1885, 960.

Cawnpoor′, or **Cawnpore,** a town of Hindostan, on the right bank of the Ganges, which is here nearly a mile wide, about 96 miles S. W. of Lucknow; lat. 26° 29′ N., lon. 80° 25′ E. It is an important British military station, having cantonments which accommodate about 7000 men. It is not well built, and contains few remarkable public edifices. Connected with the cantonments are several hundred bungalows for the officers, which are fitted up luxuriously and have large gardens. During the mutiny of the Sepoys in 1857, Nana Sahib massacred here a number of English captives, including women and children. Pop. in 1881, 119,603.

Caxamarca, or **Cajamarca,** kå-hå-mår′kå (*i. e.* a "place of frost"), a department of Peru, is bounded on the N. by Ecuador, on the E. by Amazonas, on the S. by Libertad, and on the W. by Libertad and Piura. The department, with the exception of the extreme N., is crossed by mountain-ranges, in consequence of which the climate is cool and pleasant. It is irrigated by the Marañon, which flows along its eastern boundary. All products of the tropics and the temperate zones are raised here, as wheat, barley, potatoes, tobacco, etc. Chief town, Caxamarca. Pop. 213,391.

Caxamar′ca, or **Cajamarca,** a town of Peru, capital of a province of its own name, is near the eastern foot of the Andes, about 83 miles N. N. E. of Trujillo. It has several churches, and manufactures of cutlery and woollen cloth. Silver-mines have been opened in the vicinity. Caxamarca is celebrated in the history of the Spanish conquest. The ruined palace in which Pizarro confined the inca Atahualpa is still to be seen. Pop. 7215.

Caxatam′bo, or **Cajatambo,** a town of Peru, capital of a province of its own name, is on the W. slope of the Andes, 140 miles N. of Lima. Pop. 1897.

Cax′ton (William), an English merchant, born in Kent about 1422, was the first to introduce printing into England. In 1464 he was employed to negotiate a treaty of commerce between Edward IV. of England and the duke of Burgundy. He translated from the French a "History of Troy," which he printed probably in 1471, but perhaps earlier. This is said to be the first book ever printed in the English language. After he had resided for some time at the court of the duchess of Burgundy, he returned to England and established a printing-office in Westminster in 1476, where he printed several other books. Died about 1492.

Cayam′be, or **Cayambe-Urcu′,** a mountain in Ecuador, a peak of the Colombian Andes, is directly under the equator, and about 45 miles N. E. of Quito. It has a beautiful conical form, and an altitude of 19,386 feet. It is covered with perpetual snow, and forms one of the most remarkable landmarks on the globe.

Cayenne, a seaport-town of South America, capital of French Guiana, is on the Atlantic, and on an island of its own name at the mouth of the Cayenne River; lat. 4° 56′ N., lon. 52° 13′ W. It has a shallow harbor, and is defended by a fort and batteries. Considerable quantities of coffee, sugar, cotton, indigo, and cacao are exported from this place. The imports are French wines, spirits, liqueurs, and vinegar, silk and cotton stuffs, tobacco, hardware, glass, earthenware, and clothing, preserved meat, fish, vegetables, maize, flour, hay, etc. For many years the import trade has been steadily increasing, and the export trade is steadily decreasing. Pop. 7632. Cayenne Island is about 30 miles in circumference, and is separated by a narrow channel from the mainland. Cayenne is a penal colony to which criminal offenders are transported. The town shows a corresponding character. It has no hotel, no theatre, no place of amusement of any kind. Everything, with the exception of bread and wine, is very dear, and, though the town is nicely laid out and well built, it is very unhealthy. Yellow-fever and other fevers often attack the residents, probably originating from the vast swamps which surround it on two sides.

Cayenne Pepper. See Capsicum.

Cayes, a seaport-town of Hayti, on its southern coast, 92 miles W. S. W. of Port-au-Prince. Pop. 3000.

Cay′man, kī′man [a word belonging to the Guinau language of South America] is either the distinctive appellation of some or the common name for all the Crocodilidæ of South America and the West Indies. The genus *Alligator* is by some naturalists divided into three genera, to one of which the name *Caiman* is given. The eye-browed cayman (*Alligator palpebrosus*), to which the name cayman is applied in Guinea, is not the largest of its tribe. The three bony plates which form each eyebrow, projecting as large knobs, and the scarcely webbed feet, constitute the characters of the genus or sub-genus *Caiman,* to which belong also *Alligator trigonatus* and *Alligator gibbiceps.*

Caymans, The, three small islands in the Caribbean Sea, belonging to Great Britain, 130 miles N. W. of Jamaica. They have few inhabitants, and chiefly produce turtles.

Cayuga, a post-town of Ontario (Canada), capital of Haldimand co., is on R. R. and Grand River, which is navigable, 14 miles from its entrance into Lake Erie and 25 miles S. of Hamilton. It has a heavy trade in grain and plaster. Pop. in 1881, 830.

Cayuga Lake, a beautiful lake of New York, forms the boundary between Cayuga and Seneca counties, and is about 38 miles long. Its width varies from one to three miles, and its greatest depth is supposed to be above 500 feet. The surface is 387 feet above the level of the sea. Its banks are formed of Silurian and Devonian rocks. Whitefish and many other species of fish are caught in it. Steamboats ply daily between Cayuga Bridge and Ithaca, which is at the head of the lake. The outlet of this lake flows into Seneca River, which separates Central from Western New York.

Cayugas. See Six Nations.

Cazalès (Edmond de), born at Grenade-sur-Garonne, in the department of Haute-Garonne, Aug. 31, 1804, died at Rennes Jan. 28, 1876. He studied law and received some appointment at the tribunal of Provins. But his interest was entirely occupied by the religious questions of the time—the possibility of effecting a reconciliation between the Roman Catholic Church and the French Revolution. In 1829 he gave up the legal career; in 1843 he took holy orders; in 1845 he was appointed director of the ecclesiastical seminary of Montauban: in 1848 he took a prominent part in political affairs, and again in 1871–72. Besides a great number of articles in various periodicals, and some devotional books, he published "Étude historique et critique sur l'Allemagne contemporaine" (Paris, 1853) and "Nos manx et leurs remèdes" (Paris, 1874), which latter book attracted much attention.

Caza′lia de la Sier′ra, a town of Spain, province of Seville, 39 miles N. N. E. of the city of Seville. It is on a declivity of the Sierra Morena, and in a district which abounds in silver, copper, iron, and marble. It has manufactures of linen, machinery, etc. Here are several ruined villas and Roman and Arabic antiquities. Pop. 8322.

Cazem′be, or **Kazembe,** the name of a country in the S. E. of Africa. It is between Lake Tanganyika and the river Zambesi, but its limits are not definitely known. Its fortified capital, Lucenda, is between lat. 8° and 9° S., and between lon. 28° and 29° E. The soil is well watered and fertile. Among the chief productions are maize, manioc or cassava, sugar, palm wine, ivory, copper, and sesamum.

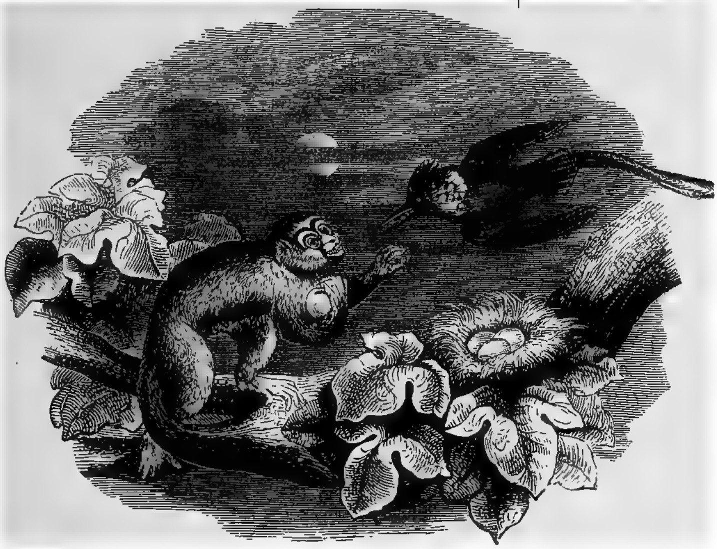
Cazenovia, R. R. junction, Madison co., N. Y. (see map of New York, ref. 5–G, for location of county), is on a small lake 18 miles S. E. of Syracuse. It is the seat of Central New York Conference Seminary and has various manufactures. Pop. in 1870, 1718; in 1880, 1918.

Ceano′thus America′nus, New Jersey Tea, or **Red Root,** a shrubby plant of the order Celastraceæ, is a native of the U. S. It is about two feet high, and has ovate, serrate leaves, which were used as a substitute for tea during the Revolutionary war. It has small white flowers in clusters, which are crowded in dense panicles. The beautiful native shrubs called in California wild lilac belong to this genus.

Ceará, or **Ciará,** a maritime province in the N. E. of Brazil, has a coast-line of nearly 350 miles. Area, 36,887 square miles. Pop. in 1876, 721,686. Gold, copper, and iron are found here. Ceará is covered by fine forests, and produces balsams and resins. Capital, Fortaleza.

Ce′bes [Gr. Κέβης], sometimes written **Kebes,** a Greek philosopher, born at Thebes, was a disciple and friend of Socrates. One of his works, entitled "Pinax" (the "Tablet or Picture"), is extant. It is a dialogue on human life, which is highly commended, and has been translated into many languages.

Ceb'idæ [Gr. *κῆβος*, a "monkey"], a family of American monkeys characterized by the want of an external bony auditory meatus, widely separated nostrils, and thirty-six teeth (molars, $\frac{3}{3}$; pre-molars, $\frac{3}{3}$). They represent in tropical America the monkeys of the Old World. They feed chiefly on fruits, but also on eggs, insects, worms, and mollusks.



Cebus, or Sajou Monkey.

Cebu, Philippine Islands. See Zebu.

Cecidomyi'a [from the Gr. *κηκίδιον*, a "gall-nut," and *μυῖα*, a "fly"], a genus of two-winged insects of the gnat and mosquito family, having downy wings, which are horizontal when at rest; antennæ as long as the body, with joints and whorls of hairs at the joints; long legs, and the first joint of the tarsi very short. The species are numerous, of small size, but some of them are very important on account of the ravages which their maggots effect in grain crops. *Cecidomyia cerealis*, called the barley midge, a brownish-red fly with silvery wings, of which the maggot is vermilion-colored, is very destructive to barley and spelt. The maggots live in families between the stalk and the sheath of the leaf, abstracting the juice of the plant. The wheat-fly and the Hessian-fly belong to this genus. Some of the species of *Cecidomyia* deposit their eggs on the young buds of trees, which the larvæ transform into galls.

Cecil (Rev. Richard), an eminent evangelical clergyman of the Church of England, born in London in 1748, died in 1810. He was a devout, fervent Christian, and an impassioned pulpit orator. His works were published (London, 1811) in 4 vols. 8vo. The fourth volume, containing his "Remains," is considered the most valuable. There is also an American edition (New York, 1845) in 3 vols. 8vo.

Cecil, Lord Robert. See Salisbury, Marquis of.

Cecil. See Burleigh.

Cecil'ia, Saint, a Roman virgin who is supposed to have suffered martyrdom in the second or third century. She is regarded as the patroness of musicians and the inventor of the organ. Numerous musical societies in Europe and elsewhere have been named after her. Raphael, Domenichino, and other great artists painted pictures of her, and Dryden wrote a celebrated "Ode for St. Cecilia's Day," which is the 22d of November.

Cecilius. See Cæcilius.

Cecro'pia, a genus of trees of the order Artocarpaceæ. The *Cecropia peltata*, a very common tree of the West Indies and South America, is sometimes called trumpet-wood and snake-wood, and is remarkable for its hollow stem and branches, with merely membranous partitions at the joints. The small branches, after removing these partitions, are made into wind instruments. The wood is very light, readily takes fire by friction against hard wood, and is much used by the Indians for procuring fire. The fruit is agreeable, and resembles a mulberry. The trunk and branches yield a large quantity of saline matter, employed by planters in the purification of sugar. The bark is strong and fibrous, and is used for cordage. It is also astringent, and is employed in diarrhœa and gonorrhœa. The juice yields caoutchouc.

Cecro'pia Moth, a lepidopterous insect of the family Bombycidæ, and nearly related to the silkworm. The systematic arrangement of this family is unsettled, but of the numerous names proposed for this insect perhaps *Platysamia cecropia* is the best. This is the largest North American moth yet known. When expanded it often measures six inches and a half across. It is of a dusky-gray color, variegated with white, black, and various neutral tints. It appears in the U. S. in June, and is a most striking and beautiful object. Its larva is over three inches long, of a light-green color, with red and yellow warts armed with bristles. The cocoon is of a very strong silk, which is abundant in quantity, but cannot be reeled. It has, however, been carded and spun into an excellent thread, and but for the delicate character of the larvæ, which are hard to raise, it would become an important article of commerce. The *Telea polyphemus*, an American relative of this moth, has attracted much attention from the excellence of its silk and the hardiness of its young. The ailanthus silkworm of China also closely resembles the larva of the cecropia moth. From the fact that the common silkworm has become subject to several destructive diseases, the scientific world is much interested in the effort to find another silkworm which shall be hardy and productive of useful cocoons.

Ce'crops, or **Kekrops** [Gr. Κέκρωψ], a semi-fabulous hero of the Pelasgian race, was called the first king and legislator of Attica. According to tradition, he instituted marriage and instructed the Athenians in agriculture, navigation, religion, etc. The people of Attica were sometimes called Cecropidæ.

Ce'dar [Gr. *κέδρος*; Lat. *cedrus*; Fr. *cèdre*], the common name of several species of evergreen trees of the order Coniferæ. They afford durable and valuable timber. The name red cedar is given to the *Juniperus Virginiana*, a native of the U. S., which is prized for its durable, compact, and odorous wood, and is used by cabinet-makers. It grows mostly in dry and sterile soils. In the Western States it attains the height of seventy feet or more, but in the Eastern States it is a small tree. The American white cedar (*Cupressus thyoïdes*), an evergreen tree, abounds in the swamps of the U. S., and grows from thirty to seventy feet high. The timber of this tree will remain for a long time under water without decaying, and is an excellent material for posts of fences and for shingles. Various other coniferous trees are called cedars in the U. S. The name white cedar is given in America to the wood of *Cupressus thyoïdes* and *Thuya occidentalis*—the latter throughout the Northern States. The cedar of Lebanon is the true and original cedar. It is not, like the American cedars, related to cypress, but to the pine and larch, the foliage resembling that of the latter, but evergreen as in the former. The cones are similar to those of larch, but are larger and very broad. *Cedrus*, the cedar genus, consists of three species, which are by some supposed to be geographical varieties of one—viz. *Cedrus Libani*, confined to Lebanon, the Caucasus, etc.; *C. Atlantica*, of the Atlas Mountains; and *C. Deodara*, the deodar of the Himalayas. The character of the light reddish, fragrant, and durable timber is the same in all these. They thrive in England, and even in Scotland, but not in any part of the Atlantic U. S. They may be expected to flourish on our Pacific coast. Of the celebrated cedars on Mount Lebanon, eleven groves still remain. The famous B'Sherreh grove is three-quarters of a mile in circumference, and contains about 400 trees, young and old. Perhaps a dozen of these are very old; the largest, 63 feet in girth, is thought by some to have attained the age of 2000 years. The name of cedar is also applied to the wood of a few trees which are not related to the Coniferæ, the color and odor being somewhat similar. Spanish cedar, of which cigar-boxes are made, and which is used for wardrobes and sometimes for lead-pencils (as a substitute for red cedar), is the wood of *Cedrala odorata*, a West Indian tree of the mahogany family.

Cedar Creek, in the N. part of Virginia, rises in Shenandoah co., and enters the North Fork of the Shenandoah about 4 miles below Strasburg. On this creek the army of Gen. Sheridan was encamped when, Oct. 19, 1864, during Sheridan's absence, it was surprised at daylight, at Alacken, by the Confederate army under Gen. Early, its left flank turned and driven in confusion, the remainder of the army retiring, yet in good order. Gen. Wright, in command at the time, after having succeeded in restoring something like order among the surprised troops, seeing that the position they had fallen back to was an exposed one, ordered a general retreat, to enable him to restore communications. The retreat was conducted in good order, and Gen. Wright had halted and restored his line when, at 10 A. M., Gen. Sheridan, who had heard of the disaster at Winchester, arrived on the field. He was informed by Gen. Wright of the dispositions made by him, to which Sheridan gave his approval. The pursuit by the Confederate army had ceased, the men being occupied plundering the camps of the Eighth and Nineteenth corps. Gen. Sheridan arrived, then, to find that his army had been surprised and routed; but he found that the worst was over, the line reformed, and the army not demoralized. His presence lent an inspiring effect, so that, after making his line as compact as possible, an attack made upon it at 1 P. M. was successfully repulsed. At 3 P. M., after making some charges with his cavalry, he attacked the Confederates with great vigor, driving and routing them, and capturing over fifty pieces of artillery, including twenty of his own lost in the morning, about 2000 prisoners, and releasing many of our men captured in the morning. The cavalry drove them still farther next day, the 20th, and during that night Early retreated, and the military operations in the Shenandoah Valley were at an end.

Cedar Falls, a city and R. R. centre of Black Hawk co., Ia. (see map of Iowa, ref. 4–I, for location of county), on Cedar River, has a State normal school and several mills and other manufactories. Pop. in 1870, 3070; in 1880, 3020; in 1885, 3385.

Cedar Island, in the township of East Hampton, Suffolk co., N. Y., at the entrance to Sag Harbor, Long Island; lat. 41° 02′ 26″ N., lon. 72° 15′ 19″ W., has a granite lighthouse, with a fixed white light 34 feet above the sea.

Cedar Keys, on R. R., a seaport of Levy co., Fla. (see map of Florida, ref. 2–E, for location of county), on the Gulf of Mexico and on Way Key, a small island, 154 miles from Fernandina. Its harbor is formed by a group of keys, or small islands, which give name to the town. It has a lighthouse on Seahorse Key; lat. 29° 05′ 49″ N., lon. 83° 04′ 46″ W. It shows a revolving light 75 feet above the sea. The lumber-trade is the chief industry. Pop. not in census of 1880.

Cedar Mountain, Va., about 2 miles W. of Mitchell's Station, Culpeper co., on the Orange Alexandria and Manassas R. R., was the scene of a desperate and sanguinary conflict on the 9th of Aug., 1862, between the forces of Gens. Pope and Jackson, in which the Federal forces under the immediate command of Gen. Banks were outnumbered and defeated with a loss of nearly 2000 in killed, wounded, and missing, and a large quantity of war material; the Confederate loss was about 1300.

Cedar Mountains, of South Africa, are in Cape Colony. This range extends nearly parallel with the Atlantic, and is near the meridian of 19° E. The highest summits of it rise about 6590 feet above the level of the sea. They are partly covered with forests of cedar.

Cedar Rapids, a city and R. R. centre of Linn co., Ia. (see map of Iowa, ref. 5–J, for location of county), on Cedar River, 219 miles W. of Chicago, 310 miles N. of St. Louis, Mo., and 265 miles S. of St. Paul. It is the headquarters of the Iowa R. R. Land Company, and other land and coal companies, of the Sioux City and Pacific R. R., and of the Burlington Cedar Rapids and Northern R. R., and all its branches. The machine-shops of the latter company employ about 500 men. It has a valuable water-power, a very large oatmeal and pearl-barley manufactory, flouring-mills, steam-bakery, foundries, planing-mills, manufactories of furniture, confectionery, paper, oil and lint, beer, woollens, knit goods, agricultural tools, wagons, carriages, door-latches, etc. Pork-packing is very extensively carried on. The wholesale trade is important. The city is lighted with gas and electric light, and supplied with water by the Holly system. Pop. in 1870, 5940; in 1880, 10,104; in 1885, 15,426.

F. McClelland, Ed. "Times."

Cedar (or **Red Cedar**) **River,** of Iowa, rises in the S. part of Minnesota. It flows nearly south-eastward through Mitchell, Floyd, Bremer, Black Hawk, Benton, Linn, and Cedar counties of Iowa. Then turning to the S. W., it enters the Iowa River. Total length estimated at 350 miles.

Cedar Springs, on R. R., Spartanburg co., S. C. (see map of South Carolina, ref. 4–C, for location of county), contains the State institution for the deaf, dumb, and blind, founded in 1849. Pop. not in census of 1880.

Ce′dartown, capital of Polk co., Ga. (see map of Georgia, ref. 2–F, for location of county), about 60 miles W. N. W. of Atlanta. Pop. in 1870, 323; in 1880, 843.

Cedrela′ceæ [from *Cedrela*, one of the genera], a natural order of exogenous trees and shrubs, very nearly allied to Meliaceæ, and chiefly distinguished by the winged seeds, numerous in each cell of the fruit, which is a capsule. The known species are few, all tropical or sub-tropical, most of them trees valuable for their timber. To this order belong mahogany, satin-wood, toon, Barbadoes cedar, the yellow-wood of New South Wales, etc.

Cefalù (anc. *Cephalœdium*), a town of Sicily, in the province of Palermo, situated on the Mediterranean, 40 miles E. S. E. of Palermo. Here is a fine cathedral of Norman architecture. The town is situated at the foot of a mountain or high rock, on which are the ruins of an ancient Phœnician structure and of a Saracenic castle. It has marble-quarries and sardine-fisheries. Pop. in 1881, 14,173.

Ceglie, chȧ′lyȧ, a town of Italy, province of Lecce, 23 miles W. of Brindisi. It has several churches, one of which is collegiate, and two annual fairs. Pop. 11,261.

Cehegin, thȧ-ȧ-Heen′, a town of Spain, in the province of Murcia, 35 miles W. N. W. of the city of Murcia. It has manufactures of cloth, paper, soap, and pottery, and a trade in wine and fruits. It is partly built of marble quarried in the vicinity. Pop. 9760.

Ceil′ing [perhaps from the Fr. *ciel*, "heaven," referring to its vaulted shape, and possibly to the blue color and stars of gold common in mediæval ceilings], the covering or upper surface of a room. Ceilings among the ancients were usually flat, but crossed at right angles by beams, forming square *lacunæ* or panels, often ornamented with rich designs. Similar ceilings were common in Middle-Age structures, but the arched ceiling, barrel-vaulted, made of "cants" or a succession of flat surfaces, plastered, wainscoted, ribbed, plain, gilt, embossed, or otherwise ornamented, was a much more common form than in ancient Rome, where, however, arched ceilings were not unknown.

Cel′andine (*Chelidonium*), a genus of herbs of the order Papaveraceæ. The common celandine (*Chelidonium majus*) is a perennial, with yellow flowers in simple umbels, frequent in waste places in most parts of Europe and in the U. S. The root, stem, and leaves have a disagreeable smell, and are full of a yellow juice which is very acrid. Celandine in medicine is a drastic purgative, and in large doses an active poison; in small doses it is said to be useful in scrofulous diseases, disease of the glands, etc. The fresh juice, applied to warts, sometimes removes them.

Celano Lake. See Fucino.

Celastra′ceæ, a natural order of exogenous shrubs, having simple leaves and seeds furnished with arils. They have acrid properties, sometimes stimulant. Two genera of this order, *Celastrus* and *Euonymus* (spindle tree), are natives of the U. S. (See Euonymus.) The *Celastrus scandens*, called bittersweet or waxwork, has five stamens and alternate serrate leaves. The orange-colored pod and seeds, enclosed in a scarlet aril, are ornamental in autumn.

Cel′ebes [native, *Negree-Orang-Boogis*], a large island of the Malay Archipelago, is about 75 miles E. of Borneo, from which it is separated by Macassar Strait. It extends from lat. 1° 50′ N. to 5° 30′ S., and is mostly included between lon. 119° and 125° E. It has a very irregular form, being divided by deep bays into four peninsulas, one of which (called Menado) is about 400 miles long and very narrow. These peninsulas are formed by chains of mountains radiating from the central part of the island. The highest summit rises about 7000 feet above the level of the sea. Though the area of Celebes is only 72,647 square miles, it has a coast-line of nearly 2500 miles. The peninsula of Menado is bounded on the N. by the Sea of Celebes, and on the S. by the Bay of Tomini. The two southern peninsulas are separated by the large bay of Boni. The vegetation is luxuriant, and the island is partly covered with forests of oak, teak, palm, cedar, and upas trees, and partly by vast grassy champaigns which are used in common by the natives. The nutmeg, the clove, and the bamboo also flourish here. Among the minerals are gold, copper, tin, and iron. Coffee, rice, sugar, indigo, and manioc are cultivated. Chief town, Macassar. Celebes is partly occupied by a race called Boogis, who are strong and well built, revengeful in character, and fond of the chase. The tribe of Wadjus are an intelligent race who pursue commerce; the Arafuras inhabit the central regions, and are the aborigines of this archipelago. This island was visited by the Portuguese in 1512. The Dutch expelled the Portuguese in 1660, and planted there colonies, which they still possess. Pop. of Celebes in 1880, 614,356, and of Menado, 217,377.

Cel′ery, a plant of the order Umbelliferæ. The common celery (*Apium graveolens*) is found wild in most parts of Europe, in wet saline soils. The wild plant, called smallage, has a stem about two feet high, a slender root, a penetrating odor, and a bitterish acrid taste. By cultivation its taste becomes agreeably sweetish and aromatic, and either the leaf-stalks increase in thickness or the root-stalk assumes a form resembling that of the turnip. The latter variety is called *celeriac*. The stalks of the former variety, blanched, are used as a salad or to impart flavor to soups, etc. They contain sugar, mucilage, starch, and a substance resembling manna-sugar, which sometimes acts as a stimulant on the urino-genital organs. The blanching of the stalks is accomplished by drawing up earth to the plants, which are transplanted from the seed-bed into richly-manured trenches, and as they grow the trenches are filled, and the earth finally raised into ridges. Another species (*Apium australe*) grows abundantly in wet places about Cape Horn and in Staten Land. It is a large and luxuriant plant, and is described as wholesome, and nearly equal in its wild state to garden celery.

Céleste (Madame), a danseuse, born in Paris Aug. 6, 1814, became in childhood a pupil at the Royal Academy of Music. When fifteen years old she came to the U. S., and soon after married a Mr. Elliot. After her husband's death she went to England, where she met with great professional success. She subsequently passed several years in the U. S. (1834–37 and 1865–68), where she was received with the greatest enthusiasm. The greater part of her life was passed in England, where she was successful as an actress and a theatrical manager. D. Feb. 20, 1882.

Cel′estine [from the Lat. *cœlum*, the "sky," in allusion to its color], a mineral which is essentially sulphate of strontia, with occasional mixture of sulphate of baryta and carbonate of lime in small proportions. Its color is often a beautiful indigo-blue. It resembles heavy spar, but is not quite equal to it in specific gravity. Fine specimens of crystallized celestine are found in Sicily. It is useful as a source of strontia. The finest crystals of celestine are found on Strontian Island, Lake Erie.

Cel′estine (or **Cœlesti′nus**) **I.,** Saint, a native of Rome, became pope in 422 A. D. He promoted the meeting of a council which deposed Nestorius. He died in 432, and was succeeded by Sixtus III.—Celestine II., Pope, originally Guido di Castello, was born in Tuscany. He succeeded Innocent II. in 1143, and died in 1144.—Celestine III. (Giacinto Orsini) was elected pope in 1191 as the successor of Clement III. He promoted the first Crusade, and excommunicated Leopold, duke of Austria, for detaining Richard Cœur de Lion in prison. He died in 1198, aged about ninety-two years.—Celestine IV. (Goffredo Castiglione) succeeded Pope Gregory IX. in Sept., 1241, but he died in October of the same year.—Celestine V., Saint (Pietro da Murrone or Morone), Pope, was born at Apulia in 1215. He was elected July 5, 1294, as the successor of Nicholas IV. Before that event he had founded an order of hermits called Celestines (which see). He abdicated the office Dec. 13, 1294, and was succeeded by Boniface VIII. Died May 19, 1296.

Cel′estines, an order of hermits or monks founded in 1264 by Pietro da Murrone, who became Pope Celestine V. This order spread rapidly in France, Italy, and Germany between 1264 and 1400, but it is now nearly extinct. These monks followed the rule of Saint Benedict, and preferred a contemplative life.

Cel′ibacy [from the Lat. *cœlebs*, an "unmarried man"], the condition of a person never married; applied often to the voluntary life of abstinence from marriage assumed by religious devotees and the clergy of some churches, such as the Roman Catholic. Practised in ancient Rome in the case of the vestal virgins, in Judæa by the Essenes, and in the East by the priests of Booddhism, it is probable that it took its origin in the belief that the material body is the source of evil and the prison of the soul; while the passages of Saint Paul recommending the celibate condition as desirable during the stormy years which preceded the destruction of Jerusalem were used among early Christians as authority for advocating religious celibacy. Accordingly, virginity was held in peculiar honor in the early Church. But it is certain from the inscriptions found in the catacombs, from passages in the canon law, and from the positive testimony of history that celibacy was not enforced, even among the higher clergy. For centuries this matter was a subject of discussion in the councils. The Council of Tours (566) suspended from their functions for one year all secular priests and deacons with wives; but in 692 the Council of Constantinople allowed priests and deacons to marry once only; and in parts of the Greek Church their marriage is compulsory, though bishops and patriarchs are celibates. In the West, decretals were from time to time issued against the marriage of the clergy, leading to many struggles within the Church. These struggles culminated in the eleventh century, and the point was finally settled by the vigor and determination of Gregory VII. in 1074, positively forbidding the marriage of the clergy. The Council of Trent (1593) finally set at rest the controversy by imposing the same prohibition. There is, however, an exception made in favor of priests and deacons of the Eastern rites, who are allowed to retain their wives if married before ordination. (See "History of Sacerdotal Celibacy," by Henry C. Lea, 1867.)

Celi′na, R. R. junction, capital of Mercer co., O. (see map of Ohio, ref. 4–C, for location of county), is on the N. W. bank of the Great Reservoir. It has several manufactories. Pop. in 1870, 859; in 1880, 1346.

Celina, capital of Clay co., Tenn. (see map of Tennessee, ref. 5–G, for location of county), on the Cumberland River, at the mouth of the Obey. Pop. not in census.

Cell [Lat. *cella*], a term applied in anatomy primarily to lacunæ in tissues of any kind, such as the air-vesicles in the lungs, the minute sacs in which fats are contained, and the hollows in cancellated bone. But of late the term especially designates the simplest of the histological elements of which animals and plants are built up, some of the lowest plants and animals (*Protococcus*, *Gregarina*) consisting of single cells and their contents, and many others consisting of a mere aggregation of cells. The animal or vegetable character of these low forms can only be determined by careful observation of their functions (see Animal), but it is observed that animal structures have more generally an interstitial substance lying between the constituent cells; while plants often have their cells packed together with no intermediate substance, or with only air between. This intermediate substance, when fluid, plastic, and nutritive, is called a *blastema;* when solid, it is a *matrix*.

Cells are propagated (1) by division of the parent cell; (2) by free formation within the parent cell, the contents assuming the cell-form, and ultimately escaping from the original cell—a process observed especially in the lower plants; and (3) by free formation in a fluid plasma, as observed chiefly in animal life.

The primary form of the cell is spherical or nearly so, but by mutual pressure and by other conditions (some of them unexplained by science) their shape is often modified, especially in the solid tissues; cells which are stellate, spindle-shaped, flat, conical, etc. being well known to every observer. The cell consists usually of a membranous "cell-wall" enclosing "cell-contents," which are fluid, granular, or solid. The diameter of animal cells varies (without noticing exceptional cases) between $\frac{1}{1000}$th and $\frac{1}{2000}$th of an inch. Vegetable cells are sometimes much smaller and often much larger than animal cells (from $\frac{1}{30}$th to $\frac{1}{5000}$th of an inch). The vegetable cell-wall is of cellulose, a non-nitrogenous substance; the animal cell is of some nitrogenized protein compound. The vegetable cell-wall is lined by a peculiar layer called the primordial utricle.

The "cell-contents" usually contain a "nucleus," which is regarded by many theorists as the essential part of the cell. Thus, Schultze says: "The cell is only the protoplasm surrounding a nucleus;" but on the other hand it has been demonstrated that the nucleus is not always present in the cell, and it is believed by some that it is not an essential element. Sometimes there are several nuclei in a cell. Each nucleus is a hollow spheroid, often containing one or more round "nucleoli," but the nucleolus is by no means a constant element. Animal cells may contain water, salts, pigments, various secretion or excretion compounds, oils, fats, and granules of various kinds, etc. Vegetable cells may contain salts, water, oils, resin, starch, sugar; and all these substances (except excretive matters, water, and the salts) are produced, it is believed, in great part, through the agency of cells. It is known that a great part of the functional activity of organized bodies is carried on by means of cells, such as excretion, secretion, absorption, etc. The ovum, the spermatozoon, the pollen grain, is but a cell. Many animal cells are ciliated, or provided with a vibratile tail or cilium, which assists by its motion in some most important functions. Cells are also in many cases so transformed and metamorphosed that it is difficult to recognize them at all as cells; for example, the muscle-fibres, the tubules of dentine in the teeth, wood-fibre, flax and other vegetable fibre, hollow tubes and vessels, etc., are held to be transformed cells; and in some such cases the nucleus is yet visible. It is generally believed that the cell is the ultimate structural element of all organized tissues, though this is denied by some recent biologists. The red blood-corpuscle is at present not generally regarded as a true cell, but the white corpuscle is undoubtedly so. It is regarded as identical with the tissue-cell, the pus-cell, the mucus-cell, and the colostrum corpuscle; and the whole group have been named "leucocytes." (See KÖLLIKER, "Human Histology;" LEYDIG, "Lehrbuch der Histologie;" VIRCHOW, "Cellular Pathology;" TYSON, "Cell Doctrine;" BURNETT, "The Cell;" and the works of VON MOHL, BRÜCKE, UNGER, REMAK, and HAECKEL.) CHAS. W. GREENE.

Cel'le, or **Zelle,** a town of Germany, in Hanover, is on a sandy plain on the river Aller at the head of navigation, and on the Hanover and Brunswick Railway, 22 miles N. E. of Hanover. Here is a noted government breeding stud. It has an old castle, a gymnasium, and a library of 60,000 volumes; also manufactures of wax candles, printers' ink, thread and yarn, pianofortes, tobacco, matches, etc. Pop. in 1880, 18,800.

Celli'ni (BENVENUTO), a celebrated Italian artist, born at Florence in 1500. He was a skilful engraver, goldworker, and sculptor. He was in Rome in 1527 when it was attacked by the army of Constable Bourbon, and according to his own statement he killed that commander on that occasion. He was a man of passionate and quarrelsome temper, and much inclined to egotism. Among his patrons were Pope Clement VII., Francis I. of France, and Cosimo de' Medici. He worked in Rome, Paris, and Florence, produced, besides other works, a bronze of "Perseus with the head of Medusa." His interesting autobiography is translated into German by Goethe and into English by Roscoe (1822). Died Feb. 25, 1571.

Cel'lular Tis'sue, more properly **Are'olar Tis'sue,** in animals, is the soft, elastic, filamentous substance which underlies the skin and the serous and mucous membranes, and which fills the spaces between muscles and between their fibres, and indeed surrounds almost all important organs, such as nerves, glands, blood-vessels, etc., throughout the body. It normally contains a small quantity of serous fluid, which in certain diseased conditions becomes increased, constituting anasarca, a form of dropsy.—Cellular tissue in botany is simply non-vascular substance composed entirely of untransformed cells. It forms the soft substance of plants, and is called parenchyma.

Cel'luloid. See APPENDIX.

Cel'lulose ($C_{18}H_{30}O_{15}$) is the term applied to the substance which forms the mass of the cell-membranes of plants. Cellulose forms the framework or skeleton of all plants; next to water it is the most abundant substance in the vegetable kingdom. During the early stages of the development of the plant the cell-walls consist entirely of cellulose, but as the plant grows the walls become incrusted with resins, coloring-matters, etc. Some tissues consist almost entirely of cellulose, as the pith of the Chinese rice-paper plant (the *Æschynomene paludosa*, or perhaps the *Aralia papyrifera*) and the vegetable ivory. Cotton, linen, hemp, and unsized paper consist of almost pure cellulose.

The following percentages of cellulose are found in some of the most common vegetable matters in the air-dry state:

	Per cent.		Per cent.
Potato tubers	1.1	Red clover hay	34.
Wheat kernels	3.0	Timothy hay	23.
Maize kernels	5.5	Oat straw	40.
Oat kernels	10.3	Wheat straw	48.
Buckwheat kernels	15.0	Rye straw	54.

Cellulose is said to exist in the animal kingdom in the mantle of Mollusca (Tunicata) and the integuments of insects and Crustacea. It is more probable, however, that these tissues consist of the nitrogenized body CHITIN (which see). Virchow (*Compt. Rend.*, xxxvi., 492, 860) found cellulose in degenerated human spleen and in the brain. De Luca (*Compt. Rend.*, lii., 102, lvii., 43) found cellulose in the skin of the silkworm and of the serpent.

Preparation.—Owing to the insolubility of cellulose in water, alcohol, ether, dilute alkalies, and dilute acids, it is generally prepared by subjecting vegetable tissues to the successive action of these agents, by which all foreign substances—sugar, starch, gum, resins, oils, fats, etc.—are removed. It may then be bleached by the action of chlorine water. Thus prepared, it retains more or less perfectly the structure from which it was obtained. Skeleton leaves, which are made up into the beautiful "phantom bouquets," consist of nearly pure cellulose. They are prepared either (1) by boiling the leaves in a dilute solution of caustic soda till the epidermis and parenchyma separate readily, removing them to a vessel of cold water, and carefully rubbing them with the fingers, and then bleaching by immersion in a solution of hypochlorite of lime, to which a little acid has been added; or (2) by adding to a pint of nitric acid, of a specific gravity of 1.1, an ounce of chlorate of potassa in fine powder, and suspending the leaves in the mixture for ten to twenty days. They are then thoroughly washed, and dried between sheets of blotting-paper. In the conversion of rags, straw, wood, etc. into paper the cellulose is rendered nearly pure by treatment with caustic soda, hypochlorite of lime, and sulphuric acid. Swedish filter-paper is almost chemically pure cellulose. Common paper receives an addition of a considerable proportion of kaolin (china clay), and is sized on the surface. (See PAPER.) In bleaching the textile fibres cotton, flax, and hemp the process has for its object the purification of the fibrous cellulose by the removal of resinous and coloring matters. (See BLEACHING.)

Composition.—Cellulose usually contains about 10 per cent. of moisture, which may be removed by drying. It then contains, in 100 parts, carbon 44.44, hydrogen 6.17, oxygen 49.39. Its composition is represented by the formula $C_{18}H_{30}O_{15}$. This is also the composition of starch, a body possessing totally different properties. Sugar and gum are nearly allied to cellulose in composition. All these bodies are called *carbohydrates*, because they consist of carbon in combination with hydrogen and oxygen in the proportions in which they exist in water, H_2O.

Properties.—When pure, cellulose is fibrous or spongy, white, and translucent, and often silky. Under the microscope the fibrous varieties appear like spun glass. It is tough and elastic. Its specific gravity is 1.5. When pure it is unalterable in the air, but when associated with albuminous and other easily alterable bodies, it gradually decomposes (decays) in moist air, undergoing a slow combustion, and changing to a yellow or brown friable substance called touchwood, and finally to humus. (See DECAY, PUTREFACTION, PRESERVATION OF TIMBER.) Cellulose is insoluble in water, alcohol, ether, and oils—both volatile and fixed. It is not sensibly affected by boiling in water, unless it has been derived from a very soft or imperfectly developed portion of a plant, when it becomes pulpy; and in the case of cellulose from Iceland moss, which is easily disintegrated and finally converted into soluble dextrine. Mulder observed that on boiling Swedish filter-paper with water under pressure at 400° F. a little glucose was produced.

Solution of Cellulose.—An ammoniacal solution of oxide of copper was discovered by Schweitzer to dissolve cellulose without changing its character. The solvent is prepared by dissolving hydrated oxide of copper in ammonia, or partially immersing copper turnings in ammonia. The cellulose is precipitated from the solution in amorphous flakes by boiling, diluting, or the addition of acids in excess. By dipping paper or cotton or linen fabrics in the copper ammonia solution, and then passing them between rolls, they are rendered waterproof. Several layers of such sheets or cloths pressed together form an artificial wood of great strength. A plastic mass can be prepared of this material suitable for the manufacture of water-pipes, gas-pipes, hats, clothing, boats, etc.

Action of Acids, etc.—Cold dilute acids and alkalies have little action on cellulose. Long boiling with dilute hydrochloric or sulphuric acid converts cellulose into glucose. In concentrated hydrochloric and sulphuric acids it dissolves, exhibiting different products according to the temperature and the duration of the treatment: (1) disaggregated, dissolved cellulose, precipitated by dilution; (2) an amyloid body; (3) dextrine, which differs from starch dextrine in having little action on polarized light. Strong boiling hydrochloric acid converts it into a fine powder, without change of composition. Boiled for a short time with dilute sulphuric acid, it is converted into a pulpy mass, still exhibiting the composition of cellulose, and not sensibly soluble in water. By dipping unsized paper for a few seconds into a mixture of 2 volumes of sulphuric acid and 1 volume of water, and then thoroughly washing with water and dilute ammonia, it is converted into "parchment-paper," a substance of the appearance and properties of animal parchment. Neumann proposes to make cotton and linen fabrics stronger, more compact, and waterproof by subjecting them to the above treatment and pressing between rolls. Parchment-paper is an excellent material for the septa used in dialysis. (See ENDOSMOSIS.) If cellulose is ground with concentrated sulphuric acid, without allowing the mixture to become heated, it forms a pasty mass, which when largely diluted deposits an amorphous body which is blued by iodine, and is hence called *amyloid*. Longer digestion with sulphuric acid converts cellulose into dextrine, and, on diluting with water and boiling, into glucose. Strong nitric acid, or a mixture of nitric and sulphuric acids, or of nitre and sulphuric acid, converts cellulose into nitro-substitution products, such as GUN COTTON (which see). Moist chlorine gas and warm solutions of hypochlorites rapidly cause the oxidation of cellulose. For this reason care must be observed in bleaching paper-stock and fabrics by chlorine. (See BLEACHING and ANTICHLORE.)

Cellulose in its more compact forms is not rendered blue by iodine until it has been disintegrated by sulphuric acid or caustic alkalies. Some lichens and algæ—Iceland moss, for example—give the blue color after being boiled with water. Caustic alkalies disintegrate cellulose very slowly, except when heated under pressure to about 400° F., when hydrogen is evolved, and methylic alcohol (wood-naphtha), formate, acetate, propionate, and carbonate of potassa are formed. No carbon is set free. By heating cellulose with a mixture of potassic and sodic hydrates, at a temperature of 400° to 500° F., for several hours, it is converted into OXALIC ACID (which see). Cellulose is immediately blackened by fluoride of boron, being carbonized. Heated in close vessels, cellulose, in all its forms, undergoes destructive distillation, yielding charcoal, which remains behind, and combustible gases, tar, and a mixture of water, acetic acid, and methylic alcohol, all of which distil over. (See ACETIC ACID, CHARCOAL, and TAR.)

Digestibility of Cellulose.—Although wood and straw are not easily digestible by most animals, the cellulose of young and succulent stems, leaves, and fruits is digested to a large extent; and therefore cellulose, which forms a large proportion of the food of herbivorous animals, contributes directly to their nutrition. *Fungin* from fungi, and *medullin* from the pith of various trees, are mere modifications of cellulose. *Hordein* from barley is a mixture of cellulose with starch and a nitrogenized body. C. F. CHANDLER.

Cel'sius (ANDERS), a Swedish mathematician, born Nov. 27, 1701, was the nephew of Olof Celsius, professor of theology at Upsala and author of "Hierobotanicon." His father was professor of mathematics at Upsala, and at the same university Anders became professor of astronomy in 1730—a position which he left in 1732 in order to pursue the study of astronomy where he could have the advantages of an observatory and instruments. He remained some time at Nuremberg with Doppelmayer, in which city he published "Observationes luminis borealis." He then visited Rome, determining with greater exactitude the meridian drawn by Bianchini and Maraldi. Here he made observations upon the intensity of light, and established the true size of the ancient Roman lineal measures. In 1734 he went to Paris, and with Maupertuis went to Lapland to determine the measure of a degree of latitude. He afterwards returned to Upsala, wrote "De observationibus pro figura telluris determinanda in Gallia" (1738), and worked out a theory regarding Jupiter's satellites. At his instance the observatory at Upsala was constructed. The centigrade division of the thermometer, called sometimes the Celsius scale, which divides the difference of temperature between freezing and boiling water into one hundred equal parts, was first proposed by Celsius. Died April 25, 1744.

Cel'sus, a celebrated writer who lived about 150–170 A. D., and is supposed by some to have been an Epicurean philosopher, mentioned by Lucian as his friend. He may, however, not improbably have been another person of the same name. He was the reputed author of a work against Christianity and Judaism entitled Λόγος ἀληθής, a "True Discourse," which is not extant, but some fragments of it have been preserved by Origen, who to confute it wrote a book, "Contra Celsum." These fragments indicate ingenuity and a talent for sophistry. But his objections are not generally regarded by Christian students as very formidable, though he has brought forward some acknowledged difficulties. The effect of his argument is marred by his sophistries, and especially by his calumnious spirit.

Celsus (AURELIUS CORNELIUS), an eminent Latin medical writer who is supposed to have lived at Rome in the reign of Augustus. The events of his life are mostly unknown, except that he wrote works on various subjects, including philosophy and rhetoric. These are all lost except his excellent work on medicine, "De Medicina," in eight books, the style of which is remarkably elegant and pure. He adopted most of the medical doctrines of Hippocrates. (See F. VALORI, "Dissertatio de A. C. Celso," 1835.)

Celt [Welsh, *cellt*, a "flint"], the name given by archæologists of Europe to certain instruments of stone or bronze which were used by pre-historic peoples. Similar stone tools are found in the U. S., but are not often called "celts." They are generally of a kind of chisel shape, but vary greatly in this respect, some being extremely rude and simple; others, especially the bronze ones, are sometimes ornamented with some taste with cut lines. In length they vary from two inches to two feet. They often had handles, and seem to have served for axes and domestic utensils, as well as for weapons of war and the chase.

Celtibe'ri, or **Celtibe'rians**, an ancient and powerful people who inhabited the northern or north-eastern part of Spain. They were supposed to have been a mixture of indigenous Iberians with Celtic people who came from Gaul. Their country was called *Celtiberia* (Gr. Κελτιβηρία). They were a warlike nation, and were subdued by Hannibal with great difficulty. In the Second Punic war they fought for the Carthaginians. They made a brave and long resistance to the Romans, who conquered them about 143–133 B. C., and they renewed the war under Sertorius. Among their chief towns were Segobriga and Numantia. Celtiberia proper comprised the south-western part of Aragon, Cuenca, Soria, and the greater part of Burgos, but the name was sometimes applied by the Romans to a larger region.

Celts, or **Kelts** [Lat. *Celtæ;* Gr. Κέλται], one of the great divisions of the Indo-European family of mankind, itself divided into at least two groups—the Western, Erse, or Gaelic Celts (now marked by the use of the Irish, Gaelic, and Manx languages), and the Cymric or Kymric Celts, to whom belong the Welsh and Armorican (extant) and the Cornish (extinct) languages. But the Celtic blood is much more widely diffused than those relics of their language would seem to indicate. Certain critics hold that the Cimbri and Cimmerii were Cymric Celts. Almost all France (Gallia) was inhabited by Celts. The Belgæ are thought to have been partially Cymric, as the ancient Britons undoubtedly were. The name *Celtiberi* indicates that in Spain the Celtic was probably long ago mixed with the Basque or Iberian blood. Northern Italy was long so entirely Celtic as to be called Cisalpine Gaul. The Celts under Brennus invaded Greece. In Asia Minor they settled and gave name to Galatia. In Germany the Boii gave name to Bohemia and Bavaria. In Great Britain the Cymri long had sway in Cornwall, Cumberland, and Strathclyde. It is probable that the present Cymric element of North-western France, though generally traced to a supposed Welsh immigration, is largely of direct Gaulish descent. Many of the Latin and Germanic races have a strong infusion of Celtic blood. The relationship between the two branches of the Celtic race seems never to have been intimate, and is not very clearly determined. The two groups of languages are distinct, having some common roots, with but little else in common. The languages of each group are, however, possessed of strong family likeness to the others of their own group.

The ancient Celtic religion was a rude polytheism, the mythology and doctrines of which are now for the most part unknown. The priestly caste of Druids were lawgivers, poets, and prophets as well. Human sacrifices were common. The common people were grossly superstitious and ignorant. Weakened by the workings of their rude social system of clans and septs, oppressed by the exactions of their priesthood, and harassed by the constant inroads of Rome and the Germanic tribes, the Celts, after the dawn of history, are almost constantly seen to be the losing race. But they yielded nothing except to force, and among all the races none were ever more distinguished for valor. Among their other characteristics may be mentioned profound religious feeling and acute sensibilities.

The Celtic literature is of very ancient origin, all the old Celts having a literary class called "bards," sometimes of noble and sometimes of sacerdotal rank. The ancient Irish wrote in a rude alphabet called the Ogham. The people of Gaul have left comparatively few inscriptions, and these are often much Latinized. Some have apparently Gaelic roots, but Cymric roots appear in the names of places. The chief existing Celtic literature consists of the hymns, martyrologies, annals, and laws of Ireland (see GAELIC LANGUAGE and IRELAND); the Welsh poems and laws, and many historical and theological works, mostly of a somewhat later date than the Irish; with the Mabinogion, a collection of tales. There are also a few extant Cornish religious dramas. The Manx literature is not extensive, and is quite recent. The number of people speaking the Irish, Manx, and Gaelic languages is rapidly diminishing, while the number of persons of Celtic blood seems to be increasing. The English language is fast displacing the others in Ireland, Scotland, and the Isle of Man. In Wales, however, the use of the Cymric language is probably much more extensive now than for many centuries past. Intense national feeling and systematic, persistent, and widely sustained effort have caused the old language to maintain its ground. (See ZEUSS, "Grammatica Celtica," revised by Ebel; M. A. PICTET, "De l'affinité des langues celtiques avec le Sanscrit" (1837), and his "Les origines indo-européens" (1859 *seq.*).)

Cem'bra Pine, called also **Swiss Stone Pine,** the *Pinus Cembra*, a noble and stately forest tree of Asia and Europe, cultivated to some extent in parks and arboretums in the U. S. It is prized for its seeds, which, though hard to extract from the cone, are very agreeable, and are used for dessert, and with those of *Pinus Pinea* (the stone pine of Southern Europe and Barbary) are sold under the name of pine-nuts. The Cembra pine yields also a thin fragrant turpentine, called Riga balsam, Carpathian balsam, or balsam of Lebanon. It is caught in bottles as it flows from the wounded twigs, and is used in medicine.

Cem′ents [from the Lat. *cæmentum*, literally, a "cutting" or "chip;" a name applied both to building-stone and to the fragments of marble used in making mortar], a term applied to fluid, semi-fluid, or plastic substances which are capable of uniting solid bodies together when interposed between the surfaces, and afterwards solidifying. There are many kinds of cements, either animal, vegetable, or mineral substances, used separately or in combination with each other.

Glue is an animal cement in common use. It is a hard, brittle, brownish gelatine, obtained by boiling to a soft jelly the skins, hoofs, etc. of animals. When heated gently with water it becomes viscid, and is employed for uniting solid bodies, mostly wood. In drying it becomes very tough and hard, but is easily softened again by water. Marine glue is formed by dissolving 1 pound of india-rubber in 5 gallons of coal-naphtha, and adding to this solution an equal weight of shellac. The mixture is then placed over a gentle fire, and thoroughly incorporated by stirring. This glue is insoluble in water, and is very tenacious and adhesive. A cement for iron pipe, etc. is made as follows: mix together in a mortar 2 ounces of muriate of ammonia in powder, 1 ounce of flowers of sulphur, and 16 ounces of cast-iron filings, and keep the mixture dry for use. When the cement is to be used, take 1 part of this mixture, 20 parts of clear iron borings or filings, pound them together in a mortar, mix them with water to a proper consistency, and apply the compound between the joints. A good cement for resisting moisture is made by mixing 8 parts of melted glue, of the consistency used by joiners, with 4 parts of linseed oil, boiled into varnish with litharge. This cement hardens in forty-five to fifty hours, and renders the joints of wooden cisterns and casks air and water tight. A good cement for coating the outside of buildings consists of linseed oil, rendered dry by boiling with litharge, and mixed with porcelain clay or well-dried pipeclay in fine powder, to give the consistency of stiff mortar. Oil of turpentine added in small quantity to thin the cement aids its cohesion to stone, brick, or wood. A cement designed to improve the composition of artificial stone, stucco, etc. is made by dissolving 1 pound of gum shellac in 3 to 4 ounces of concentrated alkali in aqueous solution. This mixture is then diluted with water, and used for mixing up the materials—hydraulic cement, lime, and sand—of which the artificial stone or stucco is made. The water required to mix one cubic foot of the materials should contain 1 to 2 ounces of gum shellac. Shellac dissolved in a concentrated solution of borax gives a good cement for uniting broken stone. Singer's cement for joints between brass and glass is made by melting together 5 pounds of rosin, 1 pound of beeswax, 1 pound of red ochre, and 2 table-spoonfuls of gypsum. Ure recommends for cementing voltaic plates into wooden troughs, and for similar uses, a cement made of 6 pounds of rosin, 1 pound of red ochre, half a pound of gypsum, and a quarter of a pound of linseed oil; the ochre and gypsum to be calcined beforehand, and added to the other ingredients while in fusion. French plumbers employ for the joints of glazed pottery pipes, used for distributing water, a cold cement made of quicklime, cheese, milk, and the white of eggs, or a hot cement made by melting rosin, beeswax, and lime together. There are a great variety of cements composed of vegetable, mineral, and animal substances mixed, which it is not deemed necessary to mention.

There is a class of cements of which plaster of Paris or gypsum is the basis, the hardening of which is due to the union of the plaster with water, and not to the formation of silicates, as in the hydraulic cements hereinafter described. Plaster of Paris, however, never attains sufficient hardness and tenacity to be used with water alone. It may be advantageously combined with alum. Keene's cement is made by mixing powdered gypsum with an aqueous solution of alum, then heating the mixture until the water of combination is driven off. It is then finely ground in a suitable mill, and slaked with a solution of 1 part of alum to 12 or 13 parts of water, by weight. Martin's cement differs from Keene's in adding to the original mixture a portion of carbonate of soda or of potassa. It is burnt with a higher degree of heat. In Parian cement borax is used instead of the carbonate of soda or of potassa.

Cement—Common Lime, Hydraulic Lime, and Hydraulic Cement.—Considered as materials for use in the builder's art, the products derived from the calcination of pure and impure limestones are classified into common or fat lime, hydraulic lime, and hydraulic cement. Common lime is sometimes called air lime, because a paste or mortar made from it requires exposure to the air to enable it to "set" or harden. The hydraulic limes and cements are also called water limes and water cements, from their property of hardening under water.

Common Lime.—The limestones which furnish the common lime of commerce are seldom if ever pure, but usually contain, besides the carbonate of lime, from 3 per cent. to 10 per cent. of impurities, such as silica, alumina, magnesia, oxide of iron, oxide of manganese, and traces of the alkalies. Lime, common lime, quicklime, or caustic lime (synonymous terms) is a protoxide of calcium, and is produced when marble or any other variety of pure or nearly pure carbonate of lime is calcined with a heat of sufficient intensity and duration to expel the carbonic acid. It has a specific gravity of 2.3, is amorphous, highly caustic, has a great avidity for water, and when brought into contact with it will rapidly absorb nearly a quarter of its weight of that substance, accompanied and followed by a great elevation of temperature, the evolution of hot and slightly caustic vapor, the bursting of the lime into pieces, and finally its reduction to a powder, of which the volume is from two and a half to three and a half times that of the original lime. In this condition the lime is said to be slaked, and is ready for use in making mortar. The purer the limestone the larger is its *growth* or increase of volume in slaking. The paste of common lime is unctuous and impalpable to the sight and touch; hence these limes are sometimes called *fat* or *rich* limes, as distinguished from others known as *poor* or *meagre* limes. These latter usually contain more or less silica in the form of sand, and a greater proportion of other impurities than the fat limes, and in slaking exhibit a more moderate elevation of temperature, evolve less hot vapor, are seldom reduced to an impalpable, homogeneous powder, yield thin paste, and are characterized by less *growth* of volume. They are less valuable for mortar than the fat limes, but have an extensive application as a fertilizer. When used for building purposes they should, if practicable, be reduced to powder by grinding, in order to remove all danger of subsequent slaking.

Water dissolves, according to Sir H. Davy, about $\frac{1}{400}$ of its weight of lime, or, according to Thomson, $\frac{1}{758}$, while Dalton states it to be, at 60° F., $\frac{1}{778}$, and at 212°, $\frac{1}{1270}$. The solutions commonly called lime-water are valuable reagents and antacids. Lime being more soluble in cold than in hot water, its solution becomes turbid when boiled. A similar result is produced by breathing into a solution through a tube, owing to the carbonate of lime formed by respiration; which, however, is dissolved by an excess of carbonic acid gas. A paste of the slaked lime is therefore a mixture of the hydrate of lime and lime-water.

Lime may be distinguished by its dilute solution giving a white precipitate of oxalate of lime when a solution of oxalic acid is added to it, which is not redissolved by an excess of oxalic acid, and by not yielding a precipitate with sulphuric acid and sulphate of soda.

The purest minerals of the calcareous class are the rhombohedral prisms of calcareous spar, the transparent double refracting Iceland spar, and white or statuary marble. They are entirely dissolved in dilute hydrochloric acid, with a brisk effervescence, due to the escape of carbonic acid, and contain, according to an analysis of a specimen of white marble by Gen. Treussart, about 33 per cent. of carbonic acid, 64 per cent. of lime, and 3 per cent. of water.

Common lime, when mixed into a paste with water, or when slaked with sufficient water to produce a paste, may be kept for an indefinite time in that condition without deterioration, if protected from contact with the air so that it will not dry up. It is customary to keep the lime-paste in casks, or in wide, shallow boxes in which it was slaked, or heaped up on the ground, covered over with the sand to be subsequently incorporated with it in making mortar. It is convenient, for some purposes, to keep the slaked lime on hand in a state of powder, which may be done in casks under cover, or in bulk, in a room set apart for that purpose. Most common limes contain impurities which prevent a thorough, uniform, and prompt slaking of the entire mass, and hence the necessity of slaking some days before the lime is to be used, to avoid all danger to the masonry by subsequent enlargement of volume and change of condition.

A paste or mortar of common lime will not harden under water, or in continuously damp places excluded from contact with the air. It will slowly harden in the air, from the surface towards the interior, by desiccation and the gradual absorption of carbonic acid gas, by which a subcarbonate with an excess of hydrated base is formed, or $CaO.CO_2 + CaO.HO$.

The pastes of fat lime shrink, in hardening, to such a degree that they cannot be employed as mortar without a large dose of sand, and are unsuitable for masonry constructions under water, or in soils that are constantly wet. In other situations they have a very extensive application, possessing, as they do, a great advantage in economy over the hydraulic limes and cements, on account of the large augmentation of their volume in slaking, their extensive distribution over the surface of the globe, and the simplicity attending their manufacture. For masonry constructions of importance, and particularly upon our public works, a mortar or a concrete containing common lime only as the cementing medium is seldom used at the present day. Hydraulic lime or hydraulic cement is usually added, to a greater or less extent, in order to hasten the induration and secure greater ultimate strength and hardness.

The Hydraulic Property.—A lime is said to possess *hydraulic* properties when, after being calcined, reduced to powder, and made into a paste with water, it will harden or set under water, or in damp places excluded from contact with the atmospheric air. If the calcined stone can be slaked to powder in the presence of water, it is customary to call it *hydraulic lime.* The *cements* possess the hydraulic property to a greater degree than the hydraulic limes, and are reduced to powder by grinding. In both initial and ultimate strength and hardness, the hydraulic mixtures are greatly superior to those of common lime, even when the latter are employed under the most advantageous circumstances, but their maximum strength is not reached under a period of several years. The best cements, when mixed to a paste without sand, attain during the first month, or month and a half, fully one-half their greatest ultimate strength and hardness. After the first two years, the increase in strength and hardness proceeds very slowly, and at the end of three years the monthly increment requires the use of delicate instruments for its measurement. This principle, of slow and gradually diminishing induration, is characteristic of all hydraulic mortars, whether derived from the cements or the hydraulic limes, either natural or artificial. The most *active* hydraulic limes or cements, or those which set the most quickly, are not necessarily those which attain the greatest ultimate strength and hardness. The latter are characterized as possessing the greatest hydraulic *energy.*

The *argillaceous hydraulic limes* of commerce are generally derived from limestones containing from 10 to 20 per cent. of clay, homogeneously mixed with carbonate of lime as the principal ingredient. Traces of the alkalies, and a small percentage of the oxides of iron and carbonate of magnesia, are also present in most cases. The clay ingredient usually contains from $1\frac{1}{2}$ to 2 of silica to 1 of alumina. During the burning, which is conducted at a heat just sufficient to expel the carbonic acid, all the silica and alumina is neutralized by entering into combination with a portion of the lime, forming both the silicate of lime and the aluminate of lime, leaving in the burnt product an excess of quick or caustic lime, which induces slaking, and becomes hydrate of lime when brought into contact with water. As this lime is burnt at a low heat, the double silicate of lime and alumina, which is formed only at a high heat, is not produced. The silicate of lime is first formed, and the alumina, reacting upon the quicklime as an acid, produces aluminate of lime. When slaked by sprinkling, the quicklime alone is hydrated.

Argillaceous hydraulic lime is therefore composed of—

$$\text{Anhydrcus silicate of lime......}SiO_3.3CaO\text{, or }\left\{\begin{array}{l}\text{Silica.... 23}\\ \text{Lime..... 43}\end{array}\right.$$

$$\text{Anhydrous aluminate of lime..}Al_2O_3.3CaO\text{, or }\left\{\begin{array}{l}\text{Alumina 17}\\ \text{Lime..... 28}\end{array}\right.$$

$$\text{And hydrate of lime................}CaO.HO\text{, or }\left\{\begin{array}{l}\text{Lime..... 34}\\ \text{Water... 11}\end{array}\right.$$

When argillaceous hydraulic lime is mixed into a paste with water or made into mortar, the anhydrous silicate and aluminate of lime form hydro-silicates and hydro-aluminates of lime by combining with six equivalents of water, and subsequently undergo a species of crystallization, technically called *setting.* This setting will ensue under water, and constitutes the hydraulic property.

If, in the general case, more than 20 per cent. of clay be present in a homogeneous limestone, a larger proportion of the lime will combine with silica or alumina during the burning, leaving insufficient quicklime present to induce slaking; and such stone may be expected to furnish a hydraulic cement. Some heterogeneous limestones, however, containing as high as 30 to 35 per cent. of clay, will slake more or less thoroughly after burning, for the reason that the ingredients are not in sufficiently close contact to combine in the kiln in the formation of the hydraulic elements. In such cases the burnt product contains an excess of lime, of silica, and of alumina, and, after slaking as much as possible, there still remains a lumpy residue.

Limes containing 10 per cent. of clay are *moderately hydraulic.* If made into a paste and immersed in water in small cakes, they will harden so as to resist crushing between the thumb and finger in from twelve to fifteen days. The *eminently hydraulic limes,* derived from homogeneous stones containing from 18 to 20 per cent. of clay, will harden under water in from twelve to twenty hours. If the stone contains more clay than this, and still yields hydraulic lime by slaking, the excess of clay does not combine with lime, and therefore confers no additional hydraulic energy. On the contrary, it impairs the strength and value of the lime for building purposes.

In consequence of their peculiar properties, the hydraulic limes cannot be kept on hand in a state of paste, like common lime. They are preserved in casks or sacks in the condition of powder, and in using them for mortar or concrete, especially those that are eminently hydraulic, it is not well to mix more than one day's supply in advance. The lime and the sand may be mixed together dry, and kept on hand a long time in that condition if protected from the weather, but the water should not be added until a few hours before the material is to be used, whether for mortar or concrete.

The method usually pursued in manufacturing hydraulic limes is as follows: The stone, after being quarried and broken up into pieces not exceeding generally twelve or fifteen pounds in weight, is burnt in any suitable kiln at a heat just sufficient to expel the carbonic acid, and then, after being drawn from the kiln and while still warm, is sprinkled with from 15 to 20 per cent. of its own weight of water. The slaking soon begins, and the stone falls to pieces, some of it in fine powder, and the rest in unslaked lumps of various sizes. The mass is then thrown together in large heaps, where it remains undisturbed for six or eight days, in order that the slaking may be completed by the steam evolved. It is then screened through fine wire-cloth to get rid of the unslaked lumps, packed in sacks or barrels, and sent to market.

With some varieties of argillaceous limestones, the lumpy, unslaked residue, which does not pass through the screen, is natural hydraulic cement, in which case it is reduced to powder by grinding, and is either incorporated with the lime in order to improve its quality, or is marketed separately as hydraulic cement. The lumpy portion either contains too much clay, or has been burnt at too high or too low a heat, to be susceptible of thorough slaking by exposure to the air or sprinkling with water; and its quantity will be great in proportion to the amount of clay in the stone, or the extent to which the heat in burning has been improperly regulated. In some localities the residue is thrown away as dangerous or worthless, while in others it is customary to grind it up separately and mix it with the powder obtained by slaking.

When the burning has taken place at a heat suitable for common lime, the residue owes its origin to the presence of too much clay, and may be, for all useful purposes, inert, or it may be a light, quick-setting cement like the Roman. If the former, it should be rejected; if the latter, its incorporation with the lime-powder will augment its hydraulic activity and energy. When the residue is due to insufficient burning, it may cause damage by subsequent slaking in the masonry, and should be rejected. When the burning has been conducted at a high heat, the residue may be slow-setting Portland cement, or it may be clinker, partially or wholly vitrified, and inert. For these reasons the utilization of the unslaked lumps, arising, from whatever cause, in manufacturing hydraulic limes, requires watchful care, in order that the introduction of ingredients that are either worthless or dangerous may be avoided.

It is not known that any deposits of argillaceous limestones capable of furnishing good hydraulic lime exist in the U. S. It is manufactured in several localities in France, notably at Seilley, about 70 miles from Paris. The Seilley lime has recently been brought to the U. S. in small quantities for use in making artificial stone. When fresh it weighs about fifty pounds to the struck U. S. bushel, loosely measured. If made into a stiff paste, it will set in the air in ten or twelve hours, and will resist crushing between the thumb and finger in from twenty to twenty-four hours. It is not active enough for laying masonry under water, but will harden under water after the initial set has taken place in the open air.

The *silicious hydraulic limes* are generally derived from silicious limestones containing from 12 to 18 per cent. of silica, less than 90 per cent. of carbonate of lime, with a small proportion of alumina and oxide of iron. The process followed in their manufacture is similar, in all essential respects, to that described for producing argillaceous hydraulic lime. They owe their hydraulic property, when mixed to a paste with water, to the crystallizing energy of the anhydrous silicate of lime, formed during the calcination: $SiO_3.3CaO = \left\{\begin{array}{l}\text{Silica, 23.}\\ \text{Lime, 43.}\end{array}\right.$ The best type of silicious hydraulic lime is derived from the quarries at Teil on the river Rhone, department of Ardèche, France. It is known as hydraulic lime of Teil. The raw stone contains from 11 to 15 per cent. of silica, from 1 to 2 per cent. of alumina, from 80 to 84 per cent. of carbonate of lime, and a trace of oxide of iron. When newly made this lime weighs about fifty-six pounds to the struck U. S. bushel, loosely measured, but if exposed to the air it absorbs moisture so that its weight is considerably augmented. In initial hydraulic energy, the Teil lime does not materially differ from the lime of Seilley, but in ultimate strength and hardness it is believed to be superior to it. Analyses of the Teil hydraulic lime after burning, by Professor Rivot, gave the following composition:

Lime	78.29		73.60	
Silica	18.20	21.70	17.20	20.50
Alumina	1.80		1.70	
Quartz sand	1.70		1.60	
Oxide of iron	traces		traces.	
Water and carbonic acid	——		5.00	
	99.60		99.10	

The elements of hydraulic energy in this lime may be stated to be 60 per cent. of the whole immediately after calcination, as indicated below, neglecting a small quantity of alumina and oxide of iron:

$$\begin{array}{lll} \text{Silicate of lime... } 66 \left\{ \begin{array}{l} \text{Silica............ } 23 \\ \text{Combined lime. } 43 \end{array} \right\} & SiO_3.3CaO. \\ \text{Free lime .... } \underline{34} \qquad\qquad\qquad\qquad\qquad \underline{34} & CaO. \\ \qquad\qquad\qquad 100 \qquad\qquad\qquad\qquad\quad 100 & \end{array}$$

Artificial hydraulic lime can be manufactured by mixing together, in suitable proportions, thoroughly slaked common lime and unburnt clay, tempering the mixture with water, and then burning it in the form of bricks or rounded balls in an ordinary lime-kiln. The burnt material can be slaked in the ordinary way. For the common lime, powdered limestone, preferably chalk, may be substituted. It is better, however, when it becomes necessary to resort to artificial mixtures to produce the hydraulic ingredient of mortar, to make hydraulic cement at once, on account of its superior hydraulic energy.

Heavy, Slow-setting, Argillaceous Cement (*Portland Cement*).—When a homogeneous, argillaceous limestone contains so large a proportion of clay, usually exceeding 20 per cent., that it will not slake after calcination, it may be expected to furnish some grade of hydraulic cement. The stone from which the celebrated Portland cement is derived contains from 20 to 22 per cent. of clay and 78 to 80 per cent. of carbonate of lime. The clay itself is composed of 1½ to 2 parts of silica to 1 of alumina. When calcined at a high, long-continued heat, all or nearly all the silica and alumina of the clay combines with a portion of the lime, producing both silicate of lime, represented by the formula $SiO_3.3CaO \left\{ \begin{array}{l} \text{Silica, } 23, \\ \text{Lime, } 43, \end{array} \right.$ and double silicate of lime and alumina, as expressed by the formula

$$SiO_3(Al_2O_3 + CaO)_3 \left\{ \begin{array}{ll} \text{Silica,} & 15, \\ \text{Alumina,} & 51, \\ \text{Lime,} & 28. \end{array} \right.$$

The burnt product does not contain any uncombined, and therefore inert, silica and alumina to adulterate the cement and impair its hydraulic properties; while the quantity of uncombined lime is not sufficient to cause the mass to slake to powder in the presence of water. After calcination the cement is therefore reduced to powder by grinding between ordinary mill-stones.

Good Portland cement, when made into paste and formed into small cakes, will set under water in from two to four hours, so as to resist crushing between the thumb and finger. When stone suitable for Portland cement is calcined at a low heat, barely sufficient to expel the carbonic acid, the silicate of lime (as above) and the aluminate of lime ($Al_2O_3.3CaO$) are formed, and a light, quick-setting cement is usually the result, greatly inferior to Portland cement in weight as well as in ultimate strength and hardness.

The superior quality of Portland cement appears to depend in a great measure upon the presence of the double silicate of lime and alumina, which is formed only at a high heat. The weight of Portland cement, as well as its hydraulic energy and its ultimate strength and hardness, is increased by augmenting the intensity and duration of the heat employed in burning, within the limit of vitrification. The initial hydraulic activity, however, is diminished by high burning, so that the best Portland cements are slowest in setting. A cement weighing 100 pounds to the struck U. S. bushel may be burnt to weigh 125 pounds to the bushel, and its strength will be nearly doubled thereby.

It is not known that any deposit of argillaceous limestone suitable for making the best quality of Portland cement exists in the U. S., and there is only one such in Europe now worked. It is found at Seilley, in France, intermixed with the layers from which the argillaceous hydraulic lime is derived. Near Boulogne-sur-Mer, in France, there is a deposit of calcareous clay, from which very excellent Portland cement is manufactured. In its manufacture the wet process, described below, is followed.

Artificial Portland Cement.—Fully nineteen-twentieths of all the Portland cement used at the present day is artificial. It is made by thoroughly mixing together, in suitable proportions, clay and finely pulverized carbonate of lime (either chalk, marl, or compact limestone), burning the mixture in kilns at a high heat, and then grinding the burnt product to fine powder between ordinary mill-stones. There are two methods of manufacture, both well adapted to the character of the materials employed, and known respectively as the "wet process" and as the "dry process."

Portland Cement by the Wet Process.—The works in the vicinity of London, England, employ the wet process. The carbonate of lime is furnished by both the white and gray chalks of the neighborhood. The clay procured from the shores of the Medway and Thames, and from the adjoining marshes and inlets, contains about 2 parts of silica to 1 of all the other ingredients, comprising alumina, oxide of iron, soda, carbonate of lime, etc.

First. The clay and chalk are mixed together with a large quantity of water, in a circular wash-mill or basin, provided with heavy harrows attached to the horizontal arms of a revolving vertical shaft. By this means the chalk is thoroughly pulverized and incorporated with the clay in a semi-fluid state. The proportions are about 1 of clay to 3 of chalk, by weight. *Second.* When a thorough mixture of the ingredients is thus effected, the liquid mass, resembling whitewash in appearance, is conducted into large reservoirs called *backs*, where it is left to settle. When the heavier material, or raw cement, has settled to the bottom, and the surplus water has become clear on top, the latter is drained off. By subsequent evaporation the drying process is continued, until the raw cement has attained the requisite stiffness. During the time the mixture remains in the backs samples of it are taken from time to time and made into cement by burning in sample kilns, in order to test the accuracy of the proportions. If any error in this respect is discovered, it is corrected by conveying from the wash-mills additional material containing an excess of either clay or chalk, as the case may require. Sometimes the needed correction is secured by mixing together the contents of two or more backs. *Third.* When, by evaporation, the raw cement mixture has attained the consistency of butter, or rather of stiff clay, it is taken out of the backs by shovelfuls, and in that form and condition is removed to rooms artificially heated, or spread out around the tops of the kilns, and further dried. *Fourth.* After being dried, although it is not necessary to expel all the moisture, the cement is burnt in suitable kilns with nearly a white heat, just below the point of incipient vitrification. The kilns may be intermittent or perpetual, the latter being most economical in current expenses, though somewhat more costly in original outlay for construction. When properly burnt, the pieces of cement, called *clinker*, are of a greenish-brown color, contorted and much shrunken from the effect of the heat. *Fifth.* The cement clinker is then finely ground between ordinary mill-stones, packed in barrels, each containing 400 pounds net, and sent to market.

Portland Cement by the Dry Process.—By the dry process any of the compact limestones, as well as the chalks and marls, may be used in making Portland cement. *First.* The raw materials—the carbonate of lime and the clay—are kiln-dried at 212° F., in order to expel the moisture and prevent caking in the kiln, and otherwise facilitate grinding and sifting. *Second.* After drying, the clay and the carbonate of lime are mixed together in suitable proportions, and reduced to a fine powder. In most localities the proportion will vary from 20 to 23 per cent. of clay and 80 to 77 per cent. of the carbonate. One kind of machine will not suffice for grinding the raw material economically. In Germany, whence most of the artificial Portland cement made by the dry process is derived, three machines are used—viz. (1) A stone-breaking machine of the kind usually employed in breaking stone for roadways or for concrete. Through this the dried and mixed materials are passed, issuing therefrom in pieces varying from the size of a pea to that of a hen's egg. (2) A further reduction is effected by a vertical mill or edge-runner. (3) The material is then finely ground between horizontal millstones. *Third.* The powdered material is then tempered to a rather stiff paste in a brick-making machine, and made into bricks of a suitable size for burning. During this mixing the material is kept warm by coils of steam-pipe or otherwise, and the water used for tempering is rendered strongly alkaline by adding 3 to 6 per cent. of calcined soda, and an equal amount of newly burnt slaked lime. *Fourth.* The bricks are dried by artificial means, and are then burnt at a high heat and ground to a fine powder, as in the wet process. The same number of mills is necessary for grinding the cement as for pulverizing the raw materials. The clinker is first put through a stone-breaking machine, then into a vertical mill or edge-runner, and lastly is ground to an impalpable powder in a horizontal mill. The dry process is followed in manufacturing Portland cement in Germany.

Tests for Portland Cement.—Portland cement should be ground so fine that at least 90 per cent. of it will pass a No. 30 wire sieve of 36 wires to the lineal inch, both ways, and should weigh not less than 106 pounds to the struck bushel, loosely measured. When made into a stiff paste without sand, it should sustain without rupture a tensile strain of 400 pounds on a sectional area 1½ inches square, or 2¼ square inches (equal to 178 pounds to the sectional square inch), seven days after being moulded, the sample having been in water six of these days. The composition of 1000 parts of the natural Boulogne Portland cement, after burning, is as follows:

Lime	651
Magnesia	6
Silica	204
Alumina, and small quantity of oxide of iron	139
Sulphate of lime	a trace
	1000

When burnt at the high heat essential in manufacturing Portland cement, the double silicate of lime and alumina is first formed by 139 of alumina combining with 40 of silica, and this compound, with 75 of lime, thus producing 254 of the double silicate of lime and alumina. The balance of the silica (164 parts) then takes up 304 of lime, producing 468 of silicate of lime, leaving 272 of uncombined lime.

The composition of Boulogne Portland cement, just after calcination, with reference to its hydraulic properties, is therefore as follows:

254 parts of double silicate of lime and alumina, $SiO_3(Al_2O_3 + CaO)_3$,
468 parts silicate of lime, $SiO_3.3CaO$,
272 parts free hydrate of lime, $CaO.HO$,
A fraction of compounds of magnesia.

The artificial Portland cement of London contains—

Lime	681
Silica	206
Alumina	104
Oxide of iron	9
	1000

The elements are combined as follows:

238 parts double silicate of lime and alumina,
506 " silicate of lime,
295 " free hydrate of lime and oxide of iron.
1039

Light, Quick-setting, Argillaceous Cements.—When an argillaceous limestone, containing more than 23 per cent. of clay homogeneously mixed through the mass, is burnt with the great intensity and duration of heat necessary to produce Portland cement, it generally fuses into a species of slag or glass, in consequence of the large amount of silica present, and becomes nearly destitute of hydraulic energy. But if the calcination be kept below the point of vitrification, it may be expected to yield a quick-setting hydraulic cement, weighing about seventy pounds to the struck bushel, loosely measured. In the burning, a portion, and in some cases all, of the lime enters into combination with a portion of the silica and alumina of the clay, producing silicate and aluminate of lime, leaving generally an excess of uncombined clay, but more especially of silica, which, being inert, adulterates the cement, injuring its hydraulic energy, and consequently impairing its strength. Cements of this class, if mixed into a paste and immersed in water, will set so as to lose their plastic condition in ten or fifteen minutes, but are far inferor in ultimate strength and hardness to Portland cement of average quality. Some of these contain as high as 10 or 15 per cent. of the oxides of iron, the proportion of clay in such cases being generally below 23 per cent.

The cement of Vassy, Grenoble, Camp Rond, and Corbigny, in France, and the English and French Roman cements made from nodules of septaria, belong to this class. No deposits of this type of argillaceous limestones have been discovered in the U. S.

This grade of cement may also be produced artificially, by burning at a low heat a mixture of lime and clay, and was manufactured largely in England and France by this method, before the superior and peculiar qualities of the Portland cement were discovered.

Argillo-Magnesian Cements.—All the natural hydraulic cements of the U. S. are made from argillo-magnesian limestones—that is, limestones of which the principal ingredients are carbonate of lime, carbonate of magnesia ($MgO.CO_2$), and clay. The Rosendale cements, from the valley of Rondout Creek, in Ulster co., N. Y., and those found at Shepherdstown, Va., Cumberland, Md., Louisville, Ky., and at different points on the line of the Erie Canal, and at Sandusky, O., Utica, Ill., and other localities in the West, belong to this class. The process followed in their manufacture is essentially the same for all. The stone is quarried, and then broken up into pieces of irregular size, seldom exceeding twelve or fifteen pounds in weight, and burnt in an ordinary kiln (either intermittent or perpetual), with either wood or coal as fuel. Where coal is used the perpetual method of burning is usually followed, the kiln being filled, in starting, with alternate layers of coal and stone, and then fired with wood at the bottom. As the burning proceeds, the charge settles down, the burnt stone is drawn at the bottom of the kiln, and alternate layers of coal and stone added at the top. The burnt cement is then crushed up into small fragments by suitable machinery, ground between ordinary mill-stones, packed in barrels of 300 pounds each, and sent to market.

In burning the argillo-magnesian cement both the lime and the magnesia combine with the silica and alumina of the clay. The result is the formation of the silicate and aluminate of lime and magnesia—compounds which become hydrates when water is added, and are capable of undergoing the species of crystallization or hardening under water called *setting.* The argillo-magnesian cements cannot be burnt with that intensity and duration of heat necessary in making Portland cement without fusing into slag, destitute of hydraulic energy. Those manufactured in the U. S. are all quick-setting, and their weight does not ordinarily exceed seventy pounds to the struck bushel, loosely measured. The Rosendale cement is regarded as the most valuable of them all, but even this will never attain, under the most favorable circumstances, more than one-third the ultimate strength and hardness of the best Portland cement.

Test for Rosendale Cement.—This cement should be ground so that 90 per cent. of it can pass a No. 30 wire sieve of thirty-six wires to the lineal inch, should weigh not less than sixty-eight pounds to the struck bushel, loosely measured, and when made into a stiff paste, without sand, should sustain, without rupture, a tensile strain of 135 pounds on a sectional area of 1½ inches square, or 2¼ square inches (equal to 60 pounds to the sectional square inch), when seven days old, the sample having been six days in water.

The elements of hydraulic energy in limes and cements are composed as follows, the proportions being given by weight:

Silicate of lime, $SiO_3.3CaO$	Silica	23
	Lime	43
Aluminate of lime, $Al_2O_3.3CaO$	Alumina	17
	Lime	28
Silicate of alumina, $2SiO_3.Al_2O_3$	Silica	30
	Alumina	17
Double silicate of lime and alumina, $SiO_3.(Al_2O_3+CaO)_3$	Silica	15
	Alumina	51
	Lime	28
Silicate of magnesia, $SiO_3.3MgO$	Silica	23
	Magnesia	30

Magnesian Cement.—Pure carbonate of magnesia, called magnesite, when burnt at a heat of moderate intensity, about cherry-red, ground to a fine powder, and made into a paste with water, possesses considerable hydraulic energy. This calcined magnesite has been patented under the name of Union cement. Its characteristic property, however, upon which it depends for its peculiar value, is not developed when mixed with water alone, for in that case the induration or setting is due to the crystallization of the hydrated magnesia or oxide of magnesium. But if the burnt and pulverized magnesite, or Union cement, be mixed up with the chloride of magnesium—for which the bittern water of seaside salt-works has been found to be a cheap and suitable substitute—a chemical combination takes place between the oxide and the chloride of magnesium, and oxychloride of magnesium is formed. This is a very remarkable hydraulic cement, being greatly superior to any other known cement in strength and hardness, not excepting even Portland cement.

Dolomite, or the double carbonate of lime and magnesia, when burnt at a low heat, reduced to powder, and made into mortar, also exhibits hydraulic properties. But if the heat be carried sufficiently high—say about 400° C.—to reduce the carbonate of lime also, thus forming caustic or quicklime, the addition of water causes slaking, and the hydraulic energy is destroyed or impaired by the presence of the hydrate of lime.

Any magnesian limestone containing as high as 60 per cent. of carbonate of magnesia may be presumed to be capable of yielding hydraulic cement of greater or less value, if properly underburnt, no matter whether clay be present or not. If clay exists as one of the principal ingredients, there are formed in the kiln silicate and aluminate of magnesia, as well as silicate and aluminate of lime. All of these compounds become hydrated when brought in contact with water, and are then in condition to undergo that species of crystallization called setting.

Mortar.—Mortar is a mixture of the paste of lime or cement with sand. The paste may be made before adding the sand, or the materials may be incorporated dry, and afterwards tempered to a plastic condition with water. In common mortar the cementing substance is common lime. Hydraulic mortar may be made by mixing a paste of hydraulic lime or cement with sand, or by adding hydraulic materials to common mortar.

Common Mortar.—As a paste of common lime hardens or *sets* very slowly, even in the open air, unless it be subdivided into small particles or thin films, it is important that the volume of lime-paste in common mortar should be but slightly in excess of what is sufficient to coat all the grains of sand and fill the voids between them. If this limit be exceeded the strength of the mortar will be impaired. With most sands the proper proportion will be from $2\frac{5}{10}$ to 3 volumes of sand to 1 volume of lime-paste. Generally, if either less or more sand than is herein indicated be used, the mortar will be injured; in the former case from excess of lime-paste, and in the latter from porosity.

Hydraulic-Lime Mortar.—With mortars of hydraulic lime the volume of sand should not be less that $1\frac{8}{10}$ times that of the lime-paste, in order to secure the best results regardless of cost. The usual proportions are, however, for ordinary work, the same as in common mortars, care being taken to incorporate sufficient paste to coat all the grains of sand and to fill up the voids between them.

Hydraulic-Cement Mortar.—A paste of good hydraulic cement hardens simultaneously and uniformly throughout the mass, and its strength is impaired by any addition of sand. For ordinary use, however, it is customary to add as much sand as possible without making the mortar porous: 1 barrel of cement, as packed for market, to 3 barrels of sand, is the proportion usually followed. The usual practice is to mix the cement and sand together dry, and afterwards temper to a plastic condition with water.

Tensile or Cohesive Strength of Mortar per square inch, in pounds.

Composition of the Mortar.	One Month Old.	Two Years Old.
Portland cement mixed to a paste without sand..............	300 to 400	500 to 600
Good Portland cement. 1 vol.. Sand.......................... 3 "	50 to 80	200 to 230
Rosendale cement mixed to a paste without sand..............	80 to 100	180 to 220
Rosendale cement........ 1 vol. Sand.......................... 3 "	15 to 20	75 to 85
Portland cement paste.. ½ vol. Fat lime paste............ ½ " Sand.......................... 3 "	....	95 to 110
Rosendale cement paste. ½ vol. Fat lime paste............ ¼ " Sand.......................... 3 "	....	45 to 60
Tiel hydraulic lime dry 3 vol. Sand.......................... 5 "	25 to 35	120 to 160
Good common mortar............ Common lime-paste....... 1 vol. Sand.......................... 3 "	....	40 to 60

Crushing Strength of Mortars and Concretes, from Trials upon Cubes and Parallelopipedons of various sizes, in pounds per square inch of top surface.

Composition of the Mortar.	Six Months Old.	Two Years Old.
Portland cement without sand..	4500 to 5300	5000 to 6000
Dry Portland cement... 1 vol. Sand.......................... 3 " Mixed to a stiff mortar.........	1500 to 2200	2000 to 2600
Dry Portland cement... 1 vol. Sand.......................... 5 " Mixed as above.....................	1200 to 1600	1600 to 2000
Rosendale cement without sand	1500 to 1800	1800 to 2000
Dry Rosendale cement, 1 vol. Sand.......................... 3 " Mixed to a stiff mortar.........	450 to 600	550 to 700
Good hydraulic lime, like Tiel.................. 3 vol. Sand.......................... 5 "	450 to 590	550 to 600
Common lime-paste...... 1 vol. Sand.......................... 3 "	....	400 to 500
Poor common lime-mortar........	....	200 to 250
Composition of Concrete.		
Mortar {1 Portland cement..... 3 Sand.........} 1 vol. Broken stone.............. 3 "	....	2000 to 2500
Mortar {1 Rosendale cement..... 3 Sand.........} 1 vol. Broken stone.............. 3 "	....	700 to 800

Cement and Lime Mortar.—When it is desirable, from any cause, to lessen the cost of cement mortar, the best way is to add a portion of common lime to the cement, rather than to increase the quantity of sand, as this last method produces a porous mortar. The volume of the cementing paste, whether of pure cement or a mixture of cement and lime, should be slightly in excess of what is theoretically necessary to coat all the grains of sand and completely fill the voids. A mortar of cement and sand loses about four-tenths of its strength if one-half of the cement paste is replaced by an equal volume of common lime-paste, but is then quite suitable for ordinary work.

Concrete or *Béton.*—These terms in modern practice are synonymous, and apply to any mixture of mortar (generally hydraulic) with coarse materials, such as fragments of brick or stone, gravel, pebbles, or shells. The volume of mortar should be slightly in excess of the volume of voids in the coarse materials. Among American engineers it is customary, in making concrete by hand, to (1) mix the cement and sand, or cement, lime, and sand, together, dry; (2) then add water, and mix to a stiff mortar; and (3) then spread the mortar evenly over the platform; (4) the coarse fragments are then spread out upon the mortar, and the whole mixed together thoroughly with shovels. The coarse materials should be kept damp, or sprinkled with water before they are incorporated with the cement and sand. After mixing, the concrete is conveyed away in wheelbarrows, and compacted in position by ramming in layers six inches to eight inches thick. Concrete should not be mixed with too much water, but when ready for use should be quite coherent, and capable of standing at a steep slope without the water running from it; otherwise it will be impossible to compact it by ramming. It should not be plastic and jelly-like under the rammer.

In carrying on large operations it is advantageous, on many accounts, to make the concrete in a mill, of which there are several kinds. Any box or cylinder to receive the ingredients, revolving slowly about either a diagonal or concentric axis, will answer the purpose. A cubical box, measuring four feet in length on each edge, was used by the writer upon the fortifications on Staten Island with entire success. The box was rigidly mounted upon an iron axle passing through opposite diagonal corners, and was provided with a trap-door, about two feet square, close to one of the angles farthest from the axis, through which the materials were introduced. Eight revolutions of the box, made in less than one minute, were found to be quite sufficient to secure a thorough incorporation of the mortar with the coarse material (broken stone and pebbles). In using a mill of this description, it is not necessary that the mortar should be first prepared by a distinct and separate process, but all the ingredients of the concrete—the cement, lime (if lime be used), sand, water, and coarse materials—may be introduced promiscuously into the box. The mill may be charged by wheelbarrows from a platform arranged at the proper height, or preferably by a large tub manœuvred by a derrick. The proper charge for the box, in order to ensure thorough mixing, should not exceed one-half to five-eighths of its total capacity. One tubful (thirty-six to forty cubic feet) should charge the box.

The standard formula for making Rosendale cement concrete upon government works is:

Concrete No. 1.

1 barrel of cement } = 3.27 barrels of concrete mortar;
3 " " sand }
5 " " broken stone, or brick, gravel, oyster-shells, or a mixture of two or more of them.

This batch will make 21.75 cubic feet of concrete rammed in place. The mortar of this concrete, tested by itself, possesses a crushing strength of 130 pounds per square inch when two months old, the test being applied to 5-inch or 6-inch cubes. For unimportant works, six to six and a half barrels of broken stone, instead of five, may be incorporated, and the concrete may be cheapened still further by replacing a portion of the cement by common lime, as in No. 2.

Concrete No. 2.—In foundations above water the concrete mortar may be composed as follows:

1 barrel of Rosendale cement = 3.70 cubic feet of paste,
⅓ " " common lime = 2.50 " "
3½ to 4 " sand, loosely measured.

The concrete should contain 1 volume of this mortar to about 2½ volumes of ballast.

Concrete No. 3.—Portland cement concrete possessing a little more strength than the No. 1 above may be made as follows:

1 barrel of Portland cement }
1 " " slaked lime-powder } = 10.37 barrels of concrete mortar;
10 " " sand }
16 " " broken stone or other good ballast.

This batch will produce 69½ cubic feet of concrete rammed in position. The mortar of this concrete will sustain a crushing weight of 154 pounds to the square inch when two months old.

Omitting the common lime, the following formula will give a good concrete:

Concrete No. 4.

1 barrel of	Portland cement	= 5.4 barrels of concrete mortar.
5½ " "	sand	
6 " "	gravel and pebbles	= 12½ barrels mixed and shaken down, containing 26½ per cent. of voids.
9 " "	broken stone	

This batch of concrete produces 50 cubic feet rammed in position, and is suitable for the best quality of concrete work.

It is desirable, in all cases, that the mortar for concrete should be hydraulic, in order to secure simultaneous induration throughout the entire mass after it has been compacted in position. Having established the quality of the mortar, whether of cement and sand, or cement, lime, and sand, the proportion of mortar to the coarse materials should be adjusted, so that the volume of the former should be somewhat in excess of the volume of voids in the latter.

The *natural pozzuolanas* comprise pozzuolanas proper, tras or terras, the arènes, some of the ochreous earths, and the sands of certain graywackes, granites, basalts, etc. Their principal ingredients are silica and alumina, the former largely preponderating, and most of them contain small quantities of soda and potash, and the oxides of iron and manganese. They possess the peculiar property that when finely pulverized, even without previous roasting, and combined with a paste of common lime, a hydraulic mixture is produced which will compare favorably with the mortars of hydraulic lime and sand. Pozzuolana itself was first discovered near the village of Pozzuola, near the base of Mount Vesuvius, and its properties were known to both Vitruvius and Pliny. It was extensively used by the Romans before their day. Vitruvius gives a formula for its use in monolithic or *pisé* masonry, which, with slight variations, has been followed in Italy ever since. It is as follows:

12 parts of pozzuolana, well pulverized,
6 " " quartzose sand, well washed,
9 " " rich lime, recently slaked.

This constitutes the mortar. To this is added 6 parts of broken stone, porous and angular, when it is intended for a pisé or filling in.

Tras closely resembles pozzuolana, and is employed substantially in the same way. It is found on the Rhine between Mayence and Cologne, and in various localities in Holland. The arènes are a species of ochreous sand, containing so large a proportion of clay that they can be mixed into a paste with water without the addition of lime, and used in that state for pisé work, as well as for common mortar. Mixed with rich lime, they yield hydraulic mortars of considerable energy. Many of the natural pozzuolanas are improved by a slight roasting, and an artificial pozzuolana may be produced by subjecting clay to a slight calcination. Brick-dust mixed with common lime gives a feebly hydraulic mortar. Forge scales from the smith's anvil, the slags from iron-foundries, and the ashes from lime-kilns, containing cinders, coal, and lime, are artificial pozzuolanas. (For bituminous cements, mastics, etc., see BITUMEN.) Q. A. GILLMORE.

Cementa'tion of Steel is the process followed in the production of blistered steel or steel of cementation. The term cementation is also applied to other cases of incorporation together of two solids, under the influence of high heat without fusion. (See STEEL, by A. L. HOLLEY, C. E.)

Cem'etery [Lat. *cœmeterium;* Gr. κοιμητήριον, from κοιμάομαι, to "sleep," to "repose;" Fr. *cimetière*]. In all ages the disposition of the human body after death has engaged the thoughts of mankind.

The earliest records of our race indicate an interest in the interment of the deceased. "Bury me not, I pray thee," said the patriarch Jacob—"bury me not in Egypt, but I will lie with my fathers. And thou shalt carry me out of Egypt, and bury me in their burying-place. . . . There they buried Abraham, and Sarah his wife; there they buried Isaac, and Rebekah his wife, and there I buried Leah." Such are the natural expressions of human feeling; it is a matter of instinct, a spiritual impulse, which supersedes belief and disdains question. Even the American Indians have been known to burden themselves with the bones of their ancestors when removing to new reservations. These feelings are common to all ages—to the barbarian and the civilized, to the bond and free, to the heathen, to the Christian. They are manifested by the barrows, cairns, and mounds of olden times; and everywhere spots seem to have been so selected that the magnificence of nature might administer comfort to human sorrow and incite to human sympathy.

The aboriginal Germans interred their dead in groves consecrated by their priests. The Egyptians soothed their grief by embalming the dead and interring them in vast catacombs or enclosing them in stupendous pyramids. The Hebrews watched with religious care over their places of burial. They usually selected for this purpose ornamental gardens, deep forests, fertile valleys, or rocky mountains; and they still designate them, with a sad emphasis, as the "house of the living." The ancient Asiatics lined the approaches to their cities with sculptured sarcophagi and mausoleums embosomed in shrubbery. The Greeks exhausted the resources of their exquisite art in adorning the habitations of the dead. They discouraged interments within the limits of their cities, and consigned their relics to shaded groves in the neighborhood of streams and fountains, and called them "places of repose" (κοιμητήρια). The Romans erected the monuments of the dead in the suburbs of the city, on the sides of their spacious roads, in the midst of trees and ornamental walks. The Appian Way was crowded with columns and obelisks in memory of their heroes, and at every turn the short and touching inscription met the eye—*Siste, viator* ("Pause, traveller"), inviting at once to sympathy and thoughtfulness. These suggestions must have given formerly, as they may do still, to the language of the senseless stone a voice enforced by the benignity of that nature with which it is in unison. The Moslems placed their burial-grounds in rural retreats and embellished them as a religious duty.

The Greek term *cemetery*, signifying a place of rest or repose, was applied to the usual places of interment of the early Christians, who followed the customs of the Romans; but the desire to lie under the religious sanction of the Church afterwards transferred their burial-places to the vicinity of religious buildings or within towns; and still in some countries the Church derives revenue from interments. The practice is now happily changed, and few comparatively attach importance to the protection which churches were supposed to afford; indeed, the protection has proved fallacious, religious sects having almost ceased to provide for the dead. When their ground becomes valuable or the site of the church is to be changed, disinterment too often takes place, without a symptom of the tenderness with which the remains were deposited. The extension of cities has been too often attended by the painful spectacle of burial-grounds torn up and the occupants removed. In the rural cemetery this cannot occur, for each lot-holder possesses a deed in fee for burial purposes, and he is as positively the owner of his lot as he is of his dwelling-house, and he cannot by law be dispossessed. The desire so long cherished to be interred under the shadow of the church has nearly passed away, and there can be no doubt as to the advantages of the new rural mode. The refining influences of a well-kept cemetery are too obvious to need to be dwelt upon.

Chadwick, in 1843, had demonstrated the unhealthfulness of church and city interments, and the world woke up to the necessity of a change. America led the way. Boston instituted Mount Auburn, on which occasion Judge Story delivered a beautiful and appropriate dedicatory address; Laurel Hill, Philadelphia, immediately followed; Greenwood, New York, came next, and others succeeded, till now nearly every city (as well as many villages) has its rural burial-place. It was a fortunate thing that the first examples were governed by cultivated men; they inaugurated a taste for fine planting that culminated in a general demand for ornamental grounds. Boston, Philadelphia, and New York were fortunate, also, in the location of their cemeteries, having chosen grounds capable of high embellishment, and now these cities are establishing still more desirable places of sepulture in Forest Hills, West Laurel Hill, and Woodlawn, where the improvements suggested by experience are introduced, such as receiving-tombs carefully constructed, and the selection of trees and shrubs adapted for permanence, or such as when fully grown will not interfere with the monuments. Much depends on the first planting of a cemetery.

The great body of English poetry is more rich on the subject of sepulture than the poetry of any other nation, and abounds with references to the practice of ornamenting graves with flowers, shrubs, and trees. A rich vegetation exercises a powerful influence in preventing the escape of deleterious miasmata, though this is not to be feared where graves are single and of a depth of seven or eight feet, as they always should be. Trees should be chiefly of fastigiate growth, which neither cover a large space with their branches nor give so much shade as to prevent the growth of grasses. Of these, are all the arborvitæ family, the junipers, the yews, hollies, and a few species of oaks, magnolias, and in general the trees of middle size suitable to each particular climate. The attempt made at Laurel Hill to introduce as many varieties as possible has been attended with partial success; its specimens of the cedar of Lebanon and other historical and rare trees are justly admired.

How to lay out a cemetery is an important topic. It should conform to the character of the ground and be made as cheerful as possible. The so-called landscape plan, lately introduced at Cincinnati, has no enclosures, the lots only marked by a sunken post at each corner, with but one monument in the centre, and the interments surrounding this on all sides; the advantages claimed are a park-like appearance and more open space, with more facility for neat keeping, etc. To this it is replied that where there is no impediment the footprints of visitors and habitués will soon create paths in various directions; short cuts will inevitably follow, and paths be made over the graves. The correct way will be found to devote a portion of each cemetery to the new plan, and let individual wishes be consulted; this has been done at Woodlawn and West Laurel Hill with advantage.

The rules to be observed in cemeteries in common use in America indicate a general desire to promote good order, and are in the main judicious. Bricked vaults under ground of greater or less size are not uncommon, and a more general desire for those above the surface is observable. These latter should never be allowed unless provision is made to effectually seal the crypts in which bodies are deposited; otherwise the vicinity is liable to be infected with unhealthy odors which the wonderful purifying power of sufficient earth entirely prevents. Iron railings, which prevailed in the early period of our rural burying, are happily disappearing, and should no longer be permitted, as indeed all perishable materials should be discarded. A hedge, however, is allowable, provided it be of an enduring kind, such as the slow-growing holly. Permanency should be aimed at, and this cannot be commanded by even iron, which perishes by rust, and all unions of iron and stone become disfigured. Granite is much used as a curbing; this suffices for the enclosure, and marks the possession of each family, and is the most enduring; the best burnt bricks for underground structures are also lasting; marble or other veneering must soon give out by the introduction of water in the interstices, which in freezing it opens with great force.

The best material for monuments is granite, either the expensive Aberdeen or the American. Italian marbles are not adapted to a cold climate; they inevitably split and crumble, while the American will do the same if not laid in the position of its natural bed.

John Jay Smith, *Pres. Laurel Hill Cemetery.*

Cen'ci (Beatrice), a beautiful Roman lady whose father was very depraved and treated his children with great cruelty. The accounts of the father's conduct with the daughter are not to be repeated, and the father having been found dead under suspicious circumstances, Beatrice, her brother, and her step-mother were accused of his murder, and for that crime were executed at Rome Sept. 11, 1599. The event contains many elements of the most intense psychological interest. More especially, the character of Beatrice, "the fair parricide," presents a number of traits almost unique. Her story is the subject of one of Shelley's tragedies and of a novel by Guerrazzi.

Cenis, Mont. See Mont Cenis.

Cen'ser [Fr. *encensoir,* from the Lat. *incendo, incensum,* "to burn;" Lat. *acerra*], a vase or other vessel used for burning perfumes and incense in temples and churches. Censers were used by the ancient Hebrews and Greeks, and are now employed in the Roman Catholic Church at mass, vespers, and other services. The censer is suspended by chains which are held in the hand, and is tossed or swung in the air. It is frequently called the Thurible (which see).

Cen'sor [Fr. *censeur;* from Lat. *censeo,* to "judge or estimate"], the title of two magistrates of high rank in ancient Rome, who were appointed to take the census—*i. e.* to make an enumeration of the citizens and a valuation of their property—also to inspect and regulate their manners and moral conduct. In the early ages of the republic these duties were performed by the consuls, and no special magistrates were elected for the purpose until 443 B. C. The censors were originally chosen for a term of five years (which was soon reduced to eighteen months), and only patricians were eligible to the office. About 340 B. C. a law was enacted that one of the censors must be a plebeian. The censorship (in Lat. *censura*) was regarded as the highest dignity in the republic except the office of dictator. The power of the censors was in a great measure undefined and irresponsible, especially in the regulation of morals (*regimen morum*). They had power to expel a senator from the senate for a misdemeanor, and to punish with marks of ignominy those whose conduct did not accord with their own ideas of rectitude. They could degrade persons from a higher to a lower rank, and fill vacancies in the senate. Among their duties was the administration of the finances of the state and the erection of new public buildings. As a general rule, the only persons eligible to the office were those who had previously been consuls. No person could be elected censor for a second term.

Cen'sorship of Books, the term applied to interference by a government with the freedom of the press, exercised formerly over books alone, but since the rise of journalism extended to periodicals also. The censorship of books did not come into operation until the invention of printing (except that heretical books were prohibited by the Church). It soon became common to all European countries, Great Britain included. The censorship of books was established by act of Parliament in 1662, and renewed from time to time: but its renewal was refused in 1693. In 1766 it was abolished in Sweden; in 1770, in Denmark; in 1791 in France, where it was restored in 1805, again abolished in 1814, and after having again been in turn restored and abolished, was finally suppressed in 1827, but has since been from time to time, to some extent, revived. In Germany and Austria freedom of the press was promised in article 18 of the Federal act (1815), but not established until 1848. In 1872, Russia was the only country of Europe in which it formally existed, but in several others the police authorities have a supervision of books and periodicals. In the republics of North and South America a censorship of books has never been known.

The Church of Rome has long claimed the right of censorship over books. Some of the early provincial councils prohibited the reading of suspicious or heretical works, but the first catalogue of the kind now known was issued in 494 A. D., in the time of Pope Gelasius.

The Index Librorum Prohibitorum, a list of fully prohibited books, was first authoritatively issued by Pope Pius IV. (1557–59), though previously lists more or less complete were published in various parts of Europe. The work was vigorously pushed on by the Council of Trent, and has been kept up by the subsequent popes. The best-known edition of the Index is that of 1819, published at Rome. Frequent additions to the Index are made by decree.

The Index Expurgatorius is a list published, like the above catalogue, by the "Congregation of the Index" at Rome, and contains the names of books which cannot be read until certain specified passages are expunged. Bishops have power to give the learned the privilege of reading prohibited books. The ecclesiastical censorship of books does not command much respect, even in countries bound by concordat to accept and enforce it. The Russian Greek Church has also a catalogue of prohibited books, and the influence of the system is greater and worse in the Eastern than in the Roman Catholic Church.

Census [a Latin word from *censere,* to "weigh," "estimate," "assess;" Fr. *recensement;* the obsolete English word *cess* has the same origin], an official account of population or wealth. (For a discussion of the origin and progress of statistical inquiry in general, see Statistics.)

I. The Census of Antiquity has but little bearing upon the modern census. There are allusions in historical records, of greater or less validity, to censuses taken in early ages in China and Japan. The book of Exodus (xiii. 11–13; xxii. 29; xxx. 12–16) contains ordinances prescribing donations for religious purposes, which, based, as they were, upon the numbers of men and of beasts among the Hebrew tribes, required for their due observance an occasional enumeration. In Ex. xxxviii. 26; Num. i. 2, 3; xxvi. 63–65; 2 Sam. xxiv. 1–9; 1 Chron. xxi. 1–7, 14; xxvii. 23, 24 are found accounts of several of these enumerations, the most notable being that of King David, which is stated to have been followed by a pestilence that destroyed 70,000 men. Whether this infliction was in punishment of the pride and presumption which led the king to order this census, or of the failure to collect the full amount of the redemption-money due the sacerdotal treasury, does not clearly appear; nor is it safe to conjecture whether this succession of the plague to the census became the cause of the widespread aversion to enumeration of inhabitants found in later ages alike among Christian and Mohammedan nations, or whether that superstition pre-existing in the minds of the Hebrew people caused the pestilence, when it occurred, to be considered the direct and proper result of the enumeration which had immediately preceded it. The censuses which are referred to in the New Testament did not originate with the people of Judæa, but were initiated and conducted under Roman authority. By the Solonian laws an official determination of the individual wealth of all citizens, and their classification according to four grades in this respect, was made a part of the constitution of Athens. This classification, based upon wealth, had both a fiscal and a political purpose, the higher classes not only paying taxes at a greater rate upon their property, but possessing larger political privileges.

In Rome, whence we derive the word, the census was at once a political, a military, and a fiscal agency. Its institution is attributed to Servius Tullius (555 B. C.). The first object sought was the classification of citizens according to the quantity of land owned by each. There were five classes of freeholders upon this basis, the non-freeholders (*proletarii*) paying no taxes, having no vote, and being excluded from military service. The enumeration and consequent registration were accompanied by religious ceremonial and sacrifices for the purifying of the people (*lustration*). As the census was taken quinquennially the word *lustrum* came to signify a term of five years. The census was conducted first by the kings, afterward by the consuls, until, in 443 B. C., two officers, whose powers were of the highest in the state, were chosen from the patricians, to be called censors, by whom this duty was to be discharged. The extension of the powers of the censors to the supervision and correction of morals and social relations, and even to the purging of the senate of unworthy members, carried the Roman censorship far outside the limits assigned to the census of any modern nation. In addition to this periodical enumeration, births, deaths, divorces, and possibly, also, marriages, were required to be registered at Rome upon their occurrence. Notwithstanding the successive enlargements of the citizenship geographically, the census of citizens continued to be taken in Rome only, and by the censors alone; consequently, the roll of citizens became more and more inadequate to the facts. As the republican spirit declined the census became irregular in occurrence. When Octavius, in his sixth consulship, numbered the Roman people, there had been no census for forty-two years. The next two censuses took place at intervals respectively of twenty and twenty-one years. While thus the Roman census proper lost accuracy and validity with the lapse of time, owing largely, it is probable, to the exemption of citizens from the land-tax, with a view to which, in great measure, it had been originally instituted, a species of official enumeration sprang up with reference to the provincials wherever the land-tax was extended, which more nearly approached than the census had ever done to the modern forms of statistical inquiry. The accounts relating to the provincials were not dignified by the name of *census*, but bore that of *professio;* they were not taken in Rome, but in the region to which they related; they were not conducted by the censor, but by the proconsul; they were sanctified by no religious ceremonies or sacrifices; they were not even coincident, of necessity, with the census of citizens. They contained, however, a greatly superior amount of information, extending not only to the number of freemen and slaves, of women and children, of cattle of every description, of houses and holdings, but to the acreage of every farm, to the amount under tillage, in pasture, or in wood, and even to the number of vines and of olive and other fruit trees. "It was," says Mr. Merivale, "from the precise information contained in these official registers that Augustus, toward the close of his reign, drew up the complete survey of the Roman empire, which he placed in the hands of the vestal virgins, to be delivered to the senate and his successor after his death. To this table of statistics he gave the name of *Breviarium* or *Rationarium*. It was the ledger of his household; but his household comprehended half the human race."

II. The Modern Census.—With the dissolution of the Roman empire the census as a statistical agency disappears from history. During the Middle Ages the word was at times used, but in application almost exclusively to the record of landed property or the assessment of taxes. Charlemagne in 780 A. D. undertook an economic survey of his vast dominions, appointing commissioners whose duty it was to report upon the condition of the people, the soil, and the products of the several provinces. The "Domesday Book" of England, compiled by command of William the Conqueror in 1081, contains the quantity of land within each county of the kingdom, the name of each Norman or Saxon proprietor of land, and the number of slaves and of cattle belonging to each. Several other statistical works, of an uncertain value, appeared in the long interval between the last Roman census and the seventeenth century of the Christian era.

To Sweden is attributed the honor of first establishing a systematic plan for recording important facts concerning population. By an ecclesiastical law of 1686, still in force, the clergy were required to keep a register of births, marriages, and deaths, with many accompanying particulars; a record of all removals out of or into each parish; a list of inhabitants by homes and by families; and an account of all extraordinary accidents occurring during the year. In 1746, in consequence of a memorial presented to the diet by the Academy of Sciences of Stockholm, schedules of questions concerning the movement and the condition of population were distributed among the parishes, with instructions that returns should be made embracing the previous twenty-five years, which was done in 1749. These returns were, however, at first deemed confidential, and the disclosure of the number of inhabitants was forbidden under heavy penalties. It was not until 1762 that permission was given to publish extracts from the official returns. Out of the facts thus obtained Dr. Richard Price constructed those life-tables which formed the basis of his great work on reversionary payments, and of which he wrote: "I cannot hesitate to pronounce that they exceed in correctness everything of this kind which has been hitherto offered to the public, and that nothing is wanting to make our knowledge in this instance complete but similar observations in other kingdoms." From 1749 to 1751 the Swedish reports of population were made annually; from 1754 to 1772, triennially; from 1775 to the present time, the census has been taken in that country once in five years. In towns the schedules are filled up by the heads of families and collected by the police; in the rural districts the census is still taken by the pastors as a part of their regular duties.

In the British Isles vital statistics had their origin in the record of deaths made while the plague was raging in London, in 1592. The practice fell into disuse, but in 1603 a weekly account was ordered to be kept of all burials and christenings in the city, which was regularly done thereafter. The writings of Sir William Petty, between 1661 and 1686, first attract attention to these records as a mine of valuable information. This eminent writer on political arithmetic made use of the bills of mortality in London and Dublin to compute the population of those cities at various dates, the rate of the multiplication of mankind, and also as the subject of certain "natural and political observations," with reference to government, religion, trade, growth, air, disease, etc. Sir William Petty had sought to reach the facts of the living population by computation based on the bills of mortality. In 1743, no progress whatever having been made in Great Britain toward the development of statistical science, Dr. Webster undertook, and in 1755 completed, through his own labors, an approximate account of the population of Scotland. Inspired, doubtless, by this example, Sir John Sinclair began in 1791 the herculean task of obtaining returns relating to population, agriculture, trade, and industry from all the clergymen of the Established Church of the kingdom; his schedule of interrogatories comprised one hundred and sixty items. Persevering against untold discouragement, this remarkable man succeeded so far as to secure nine hundred voluntary contributions to his census, and in 1798 published his results in a work of twenty-one volumes, which remains a monument of industry, zeal, and assiduity.* Both his example and his direct appeals aided in securing the attention of Parliament to the need of a systematic periodic collection of statistics, and on Dec. 21, 1800, was passed the act providing for a general official enumeration of the population of England, Wales, and Scotland in the following spring, and every tenth year thereafter. As the British census, rather than the census of any continental country, has been that toward which the attention of statisticians in this country has been directed as a standard, a somewhat extended analysis of its method may be useful.

The first census was taken through the overseers of the poor Mar. 10, 1801, in both England and Wales, a later date being adopted in Scotland owing to the inclemency of the weather. The single census schedule required the following information: the number of houses, inhabited and uninhabited; the number of families; the number of inmates, distinguished as male or female; occupations according to three divisions—viz. agriculture, trade, manufactures or handicraft; all other avocations; the number of baptisms and burials each tenth year 1700 to 1800, and the number of marriages from 1754 to 1801. In the census of 1811 the same schedule was used, except that only the occupation of the head of the family was entered. In 1821 a most important addition was made—viz. the classification of ages. In 1836 a change was made in the laws of the kingdom which, though not effected in the interests of the census, has yet caused a marked improvement in every enumeration since that date. This was the establishment of a system of registration uniform throughout England and Wales, which were for this purpose divided into districts and sub-districts, with permanent, paid officials, all under the control of the registrar-general. Through this agency marriages, births, and deaths are recorded at the time of occurrence, with severe penalties, promptly enforced, in case of omission. To this staff of trained officials, having a permanent tenure, was committed the work of taking the decennial census, the overseers of the poor being thereafter relieved of that charge. In Scotland, however, the parish schoolmasters still continued to be employed on this duty. The British census of 1851, like the American census of the previous year (to be hereafter spoken of), marked a great advance in statistical science.

The growing interest throughout Europe in sanitary and sociological inquiry had increased the demand for positive information regarding the numbers and condition of population, and the magnificent work of M. Quetelet, the Belgian statistician, had given intelligent direction to that demand. Accordingly, great efforts were put forth to render the sixth census of England, Wales, and Scotland, in 1851, superior in results to preceding enumerations. The special law enacted for the purpose provided that the census should be taken on one and the same day—31st of March—in the three countries; 30,610 enumerators were appointed, with the authority of the registrar-general, by the 2190 district registrars of England and Wales. Only as much territory was assigned to each enumerator as could be canvassed by one person. There being no uniform system of registration in Scotland, the thirty-two sheriffs of that kingdom were authorized to appoint 1010 temporary registrars—generally parochial schoolmasters—and 8130 enumerators; the government appointed 257 enumerators for the smaller islands. Some days before the census-day the enumerators delivered to every occupier of a house or tenement a "householder's schedule," containing inquiries as to the name, the head of family, condition, sex, age, occupation, and birthplace of every person in Great Britain, and also as to the number of blind, deaf, and dumb. For the use of the lower classes of Wales schedules were printed in Welsh. The schedule was to be filled up with reference to the night of Mar. 30–31. No one present on that night was to be omitted except workingmen and others performing night-labor away from their habitations. Travellers were enumerated at the hotels and houses at which they arrived on the following morning. Simultaneously with the household schedules the enumerators distributed in the proper quarters forms for collecting information respecting places of worship, scholastic establishments, and miscellaneous institutions. The schedules were taken up by the enumerators on the 31st of March. The collectors filled up those parts which persons had neglected or were unable to fill. They were also required to note all the unoccupied houses and buildings in course of construction. The floating population—that is, such persons as spent the night named in barges or boats on canals or small streams, in barns, sheds, tents, and the like—the enumerators were required to estimate according to the best information they could obtain. Special notice was to be taken of all extraordinary assemblages of people anywhere at the time of the census. The enumerators were allowed one week for the transcription of their schedules and the completion of summaries and estimates called for. The revision of the returns by the district registrars had to be completed in a fortnight. The returns were subjected to another revision by the superintendent-registrars before they were transmitted to the census office. The custom-house officers took the census of sea-going vessels in port. Persons belonging to the navy and commercial marine were also separately enumerated by the proper authorities. The government furnished the statistics of the army, half-pay officers, and pensioners, the civil service, the civilians and Europeans in the East India Company's service, and British subjects living in foreign parts, as far as they could be ascertained through consular and diplomatic organs.

The British census of 1851 was the most successful statistical operation, as regards both quickness and accuracy of execution, performed up to that time in any country. The census of England and Wales was taken in 1861, in 1871, and in 1881 as of date April 3. In the last year named, 34,711 persons were employed in distributing, collecting, and copying the householders' schedules. To these must be added 2175 registrars and 630 superintendent-registrars, making altogether 37,516 directly engaged in the local collection of the required particulars.

The establishment of a permanent system of registration in Scotland in 1855 has given to the subsequent censuses taken in that country (1861, 1871, 1881) similar advantages to those derived by the English census from the Registration Act of 1836. The history of the census in Ireland begins in 1811, coincidently with the second British census. The attempt resulted in a decided failure. The census of 1821 was of doubtful accuracy; the census of 1831 had subsequently to be corrected according to new data. The censuses of 1841 and of 1851, taken by the members of the constabulary force, attained great perfection, the reports of the latter year, in seven immense volumes, constituting a monument in the history of public statistics. The famine of 1846–47 gave to the results of this census a peculiar and painful interest. All parts of the United Kingdom are now enumerated in the most thorough manner.

In France the census did not find a place in the government until after the Revolution. Vauban, indeed, the great engineer of Louis XIV., in his project for equalizing taxation, addressed to the king in 1707, strongly urged the necessity of an enumeration of the population, wealth, and industry of France. "There is," he said, "no battalion in the kingdom, however insignificant it may be, that is not subject to at least a dozen reviews and inspections during the year. Of how much greater importance is it to enumerate and review the condition of the great body of the nation from which the king draws all his glory and his riches!" Whether from repugnance at the idea of a census, or from the offence given by a project of just and equal taxation in the days of the old régime, the work of Vauban was by royal decree ordered to be seized and publicly burned—an indignity followed close by the death of the illustrious author. During the reign of Louis XV. some useful statistics were collected by the minister of commerce. In 1784 the gifted Neckar, a minister of Louis XVI., published his treatise on the finances of the kingdom, the views and proposals of which were based on the fullest and most authentic information regarding the state of the several parts of the kingdom which could be obtained without special agencies of enumeration. Before the close of that century a law was passed requiring prefects of departments to prepare from the civil registers exact annual abstracts of births, marriages, and deaths; this law, with some modifications, is still in force. A general census was taken in 1801, and again in 1806. The next succeeding enumeration was in 1821, since which time the census has been regularly taken once in five years, the last time in 1881.

Belgium, the country to which the science of statistics owes so much, has carried to a high point the art of enumeration. Immediately upon the achievement of Belgian independence a special statistical service was created—viz. in 1831. In 1841 a central commission was established, with which M. Quetelet was from the first connected. In 1843 provincial statistical commissions were instituted throughout the kingdom. In 1856 a law was enacted newly regulating the mode of taking the census and keeping the civil register. It provided that a general census should be taken every ten years throughout the kingdom, and that the population-returns should form the basis of representation. The census was to be taken in such a manner as to give the actual as well as the legal population. The prescribed inquiries included name, sex, age by year and month, birthplace, civil status, occupation or condition, habitual domicile, and town and country population. Both the distribution and the collection of schedules were to be made in one day. Temporary census bureaus were established, one for each province, which were to receive the returns of the agents after they had been revised by the communal juries—bodies appointed for each community, and consisting of officials and private citizens. The statistics of schools and public institutions were taken by means of special schedules. The military authorities were charged with the army census. The refusal to give information was punishable by fine and imprisonment. The central statistical commission receives the results of the successive censuses, yearly abstracts from the civil registers, and the results of special occasional inquiry, and prepares the same for publication.

Prussia obtains population-reports through a central bureau established in 1805. The labors of the bureau are directed to—1, general statistics; 2, births, marriages, and deaths; 3, schools and churches; 4, medical statistics; 5, statistics of mechanical trades and manufactures. From 1805 to 1820 these inquiries were made annually, but since the latter date information relative to the first, third, and fourth subjects has been collected but once in three years. When the customs union of 1834 was established, triennial censuses of population were authorized, and have been taken regularly since. At first the inquiries related to the *numbers* of the actual population, according to the sex, age, birthplace, religion, immigration, and emigration. In 1840 the enumeration was required to be made *by name,* which resulted immediately in a large increase in the population-returns. In 1846 the number of families was determined, and in 1849 the distribution of the population by habitations. In 1858 the persons of the two sexes between seventeen and forty-five years of age were returned in five classes. In 1861 the unmarried and widowed were specially classified. With the census of the same year an inquiry was added in reference to the language spoken and the social condition and occupations of the population.

The Prussian census is taken by civil officers, in the month of December, on one day, by means of printed schedules. In addition to the statistics of population, many statistics are obtained showing the nature, extent, and distribution of real property, wages and salaries, insurance, aid and co-operative societies, and the numerical strength of the Catholic and Protestant churches.

Austria.—During the last half of the eighteenth and the first half of the nineteenth century no censuses were taken in Austria except those connected with military conscription. Separate systems of enumeration prevailed in the different provinces, and the materials for a general knowledge of the whole population of the empire were very meagre. In 1828 a central bureau of statistics was created. A uniform enumeration was made throughout the empire for the first time in 1851, but its results were so imperfect that in 1855 a commission of high administrative officers was appointed for the preparation of a new census law, which received the imperial sanction in 1857. The military needs of the state were no longer the main motive for a census, but statistics of population, wealth, and industry were to be obtained as a basis for the safe conduct of public affairs. A census based on the actual population was to be taken once in six years, exclusively by the civil authorities. Printed schedules were to be filled up by the heads of families, owners of tenement-houses, and those in charge of convents, schools, and public institutions. Those that intentionally failed to furnish the desired information were to be punished by fine and imprisonment. The schedules called for information under the following heads: Composition of families, including servants; age; sex; names and titles; civil status; social condition; religion; occupation; marriages, births, and deaths; the number of cities, towns, hamlets, villages, dwellings, and renters. The number of Austrian subjects living in foreign parts was to be obtained through the imperial legations. The census of the naval and military population was to be separately taken by the proper authorities.

Russia.—Partial censuses were taken by the Russian government in 1700. 1704, 1705, and 1710. In 1718, Peter the Great required all landed proprietors to make a declaration of the number of serfs belonging to each. The same year he organized a special commission to visit the separate provinces of his empire for the purpose of making a general census. No enumeration of females was made in these early censuses, which were taken solely for the purposes of revenue and military conscription. A decree of 1722 directed that a census should be taken once in twenty years, but this interval of time was not regularly observed. In 1802 a central bureau of statistics was organized, reorganized in 1852 under the name of the statistical commission. The commission has taken censuses in 1812, 1815, 1834, 1850, 1860, 1870, and 1880. The census is taken by means of printed schedules distributed by the local authorities. The work of consolidating and publishing devolves upon the statistical commission.

Norway.—A decennial census was instituted here in 1815, and has continued up to the present time, comprising inquiries as to age, sex, civil status, number of families and habitations, useful domestic animals, and the territorial area of each district. A bureau of statistics superintends all forms of public statistics except those pertaining to the administration of justice, public education, and financial administration. Inquiries are made once in five years in regard to the condition of industry. Annual exhibits are made of births, marriages, and deaths, of commerce and navigation, of the administration of justice, and of the population suffering from physical and mental disabilities.

Spain paid but little attention to public statistics after her census of 1798 until 1856, when a central statistical commission was organized, under whose supervision a general census was taken in 1857, and since then once in three years. The census is taken in one night by government officials charged with the collection, verification, and consolidation of the returns. A final revision is made by the statistical commission.

Switzerland.—The original constitution of the Swiss federation required a census once in twenty years. Most of the inquiries were conducted by the several cantonal governments. The returns were not uniform, and were generally inaccurate. In 1860 a law of the Federal assembly prescribed a decennial census for the whole federation, and instituted a federal bureau of statistics under the direction of the interior department. The first census under the new law was in 1860. The inquiries included sex, age, civil condition, origin, birthplace, domicil, religion, language, physical disabilities, immigration, the distribution of real property, the number of families, and the number of habitations and other buildings. The cantonal statistics collected by the local governments are consolidated and published by the central bureau. Until a few years ago, the different cantons followed different methods in the collection of vital and mortuary statistics, but at the instance of the bureau they have now adopted a uniform plan. In 1866 the central bureau initiated the census of live-stock, and later collected very full statistics of railways, savings banks, and fire-insurance companies.

Italy.—Soon after the founding of the modern kingdom of Italy, in 1859 and 1860, a bureau of statistics was created with ample powers. The first general census, which was to afford the basis of representation in the national parliament, was taken Dec. 31, 1861, under a law prescribing general enumerations once in ten years. The census is taken in one day by means of previously distributed schedules. Since 1861 the central bureau has been charged with additional inquiries relative to mutual-aid societies, savings banks, public charities, industrial corporations, libraries, and institutions of education.

The census in modern *Greece* dates from her last struggle for independence. The first general enumeration of the people was made in 1836. From that date censuses were taken annually until 1845; since when they have been taken at irregular intervals—viz. 1848, 1853, 1856, 1861.

III. The Census of the United States is, in its latest development, unique, differing widely from the European type, the reason for which will hereafter appear.

During the colonial period the British board of trade attempted several partial enumerations for administrative uses; but the results were often flagrantly inaccurate, especially in the Southern colonies. In the census of New York, attempted by Gov. Hunter in 1712, the superstition already alluded to[*] entered seriously to affect the completeness of the returns. This feeling was so strong as to deter the governor of New Jersey, a few years later, from attempting the census of that colony. So defective were the colonial censuses in general that Mr. Bancroft, for the purposes of his "History," constructed in preference a table of population projected backward to 1750 from the first United States census—that, namely, taken in 1790. Several efforts were made during the Revolutionary war and during the continuance of the government of the Confederation, but without success, to secure an enumeration of the population of the several States, with a view to apportioning requisitions for men and supplies. In the failure of these schemes, various estimates and computations were made use of, all subsequently ascertained to have been in a considerable degree erroneous.

By the Constitution of 1787 a decennial census was made a constituent part of the political system of the United States. M. Moreau de Jonnès has attributed great credit to the United States on this account, declaring that they present a phenomenon unprecedented in history—"that of a people who instituted the statistics of their country on the very day when they founded their government, and who regulated, by the same instrument, the census of inhabitants, their political rights, and the destinies of the nation." The fact is, however, that this provision of the Constitution was not in the least degree of a philosophical origin. It was a necessity of the federal representative character of the government then established, in which both representation and direct taxation were required to be apportioned according to population. The first census law was passed March 1, 1790, and the first census was taken under it as of date August 1 of that year. Nine months was the period allowed for the completion of the enumeration. The work was to be conducted by the marshals of the several judicial districts, who were authorized to appoint as many assistants as should be required, each of whom should have an assigned district, to be personally enumerated by him. Lists of inhabitants were to be set up at two places of resort within each district for public inspection. All persons sixteen years of age and upward were required, under penalties, to give all needed information to the census-takers. The inquiries were six in number for each family: (1) name of the head of the family; (2) number of free white males sixteen years and upward; (3) number of free white males under sixteen years; (4) number of free white females; (5) number of all other free persons; (6) number of slaves.

The results of the first enumeration caused much disappointment owing to overstrained expectations based on the extravagant estimates that had prevailed, as is usual in the absence of authentic information; and Mr. Jefferson, then secretary of state, in sending copies of the census report to the ministers of the United States in foreign lands, carefully explained that the enumeration was largely defective. The results of subsequent censuses, however, established the substantial accuracy of the count made in 1790.

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[*] When a proposition to institute a census was before the British Parliament in 1753, the member for Newcastle-upon-Tyne stated that "the people looked upon the proposal as ominous, and feared lest some public misfortune or an epidemical distemper should follow the numbering."

In 1800 two learned societies memorialized Congress on the subject. The American Philosophical Society, Thomas Jefferson president, represented that the decennial census offered an occasion of great value for ascertaining sundry facts highly important to society, and not otherwise to be obtained. It therefore prayed that the next census might be so taken as to present a more detailed view of the inhabitants of the United States under several different aspects, such as the effect of soil and climate on human life; the increase of population by birth and immigration; and the conditions and vocations of the people. To gain the first of these ends, the society suggested that the population should be much more minutely analyzed with respect to age. To gain the second, it was proposed that a table should be used presenting in separate columns the respective numbers of native citizens, citizens of foreign birth, and aliens. To reach the third end, it was proposed that the number of free male inhabitants of all ages engaged in different professions and pursuits should be ascertained, such as merchants, agriculturists, handicraftsmen, mariners, etc. The other memorial, to a similar effect, came from the Connecticut Academy of Arts and Sciences, Timothy Dwight president. Both memorials were presented to the Senate Jan. 10, 1800, and were referred to the committee already charged with drafting a census bill. By the law of 1800 the schedule was somewhat extended. It registered the name of the head of each family; the number of free white males under ten years of age; of free white males of ten and under sixteen; of free white males of sixteen and under twenty-six; of free white males of twenty-six and under forty-five; of free white males of forty-five and upward. The last five inquiries were duplicated in reference to females. All other persons, except Indians not taxed and slaves, were also enumerated, but without distinction of age. The general direction of the census was placed in the department of state, where it remained until 1850.

In 1810 the population-schedule of 1800 was retained without modification, but by a supplementary act (May 1) the scope of the enumeration was extended to embrace an account of all the manufacturing establishments. The construction of the schedule was left to the secretary of the treasury. The results of this new statistical effort proved to be of little value.

The census of 1820 presented no new features of marked importance. The population schedule discriminated between foreigners naturalized and not naturalized, while slaves and free colored persons were classified with respect to age. A new manufacturers' schedule was introduced, which was an improvement upon that of 1810. It comprehended fewer details, but was more discriminating in inquiries and more scientific in arrangement. This part of the work, however, was so imperfectly done by the census-takers, that the results obtained possessed little value.

In the census of 1830 no attempt was made to obtain industrial statistics of any sort. The schedule made a more minute classification of population. The number of the deaf and dumb and blind in the three classes of white, free colored, and slave population was ascertained as far as practicable in conducting a new experiment.

In 1840 still other statistics of population were collected—the number of insane and idiotic people, the number of persons engaged in the great industries, such as agriculture, manufactures, and commerce, likewise the number of Revolutionary pensioners. Several columns were added to the schedule for educational statistics—the number of scholars in schools, together with the number of white persons over twenty years of age who could not read and write. The attempt to obtain statistics of industry was renewed, and an extended though badly-arranged list of questions was incorporated. As there was no penalty for refusing to answer these questions, in some localities the people refused to answer them, on the ground that they were illegal and inquisitorial. The industrial statistics obtained, however, were the most valuable yet procured.

As the time for taking the seventh census drew near, the subject began to attract an unusual degree of attention. A census board, consisting of the secretary of state, the attorney-general, and the postmaster-general, was created by an act approved March 3, 1849. This board was charged with the duty of preparing forms, schedules, etc. for taking the next census, but was instructed not to incorporate into the schedules more than one hundred questions of all kinds. At the next session of Congress the Senate raised a special committee on the census, and imposed upon it a similar task. The law, as passed, greatly extended the sphere of the census. The act, approved May 23, 1850, is entitled "A general act providing for the census of 1850, and for every subsequent census." It created a census office in the newly-created department of the interior. The six schedules incorporated in the law bore the following names by number: 1, "Free inhabitants;" 2, Slave inhabitants;" 3, "Persons who died during the year ending June 1;" 4, "Productions of agriculture;" 5, "Products of industry;" 6, "Social statistics." Several important new features were incorporated in the first schedule; viz. the name, age, sex, and color of each person, together with the place of birth.

The third or mortality schedule contained a class of inquiries wholly new in the American census. The fourth, fifth, and sixth schedules related to subjects that had received some attention in previous censuses, but without adequate provision for the collection of the statistics required. The census of 1850 was a great improvement on all its predecessors. The addition of general statistics of manufactures and of agriculture was a gain of the highest importance. Others of the new features of the act of 1850 never became practically valuable.

The census of 1860 was taken on the same plan as that of 1850, with but few modifications.

Before the census of 1870 was taken, an attempt was made to procure a new law which should provide new machinery and remodel the old schedules. An elaborate bill, drawn largely by the late President Garfield, passed the House of Representatives, but failed to receive the sanction of the Senate. The census of 1870 was taken under the law of 1850. Some important additions to the inquiries were made by authority of the secretary of the interior. In consequence of the abolition of slavery, the old schedule relating to statistics of slaves was dropped. To meet the requirements of the fourteenth amendment to the Constitution, two columns were added to the population schedule—the first to obtain the number of male citizens of the United States in each State of twenty-one years and upward; the second to obtain the number of such citizens whose right to vote is denied or abridged on other grounds than rebellion or crime. The results of this special inquiry were of little value. Many changes were made by the census office in the forms of the inquiries, by which they were rendered more definite and more easily understood. Besides the inquiries concerning "place of birth," two columns were added requiring a statement of the parentage of each person. This has enabled us to know the number of our people born of foreign parents. An inquiry was also added concerning the public debt of towns, cities, counties, and States. A striking feature was added in the publication of results by the construction of engraved maps, illustrating the various classes of statistics.

In preparation for the tenth census (1880), Congress passed an act (March 3, 1879), supplemented by the act of April 20, 1880, under which that census was taken, and under which, unless new legislation shall be had, "a census will hereafter be taken every ten years."

By the act of 1879 the census system of the United States was greatly changed, both as to the agencies of enumeration and as to the subjects of inquiry. The most important of these will be now indicated.

1. *Agencies of Enumeration.*—(*a*) By the act of 1879 the superintendent of census becomes an officer appointed by the President and confirmed by the Senate, instead of merely a "superintending clerk," appointed by the secretary of the interior. (*b*) No other important change is necessarily wrought by the new law in the organization of the census bureau as an office for revising, digesting, compiling, and publishing the results of the enumeration. (*c*) Instead of the marshals of the several judicial districts (sixty-four in 1870), officers specially appointed for the purpose, termed "supervisors of census," are entrusted with the charge of the enumeration. The appointment of such officers, not to exceed 150 in all nor fewer than one for any State or Territory, is authorized. The full number authorized were appointed in 1880, the numbers in the several States varying from one to eleven (New York). The creation of a special body of officers for the purpose, presumably appointed with reference to their qualifications for the work, and directly responsible to the department charged with the general direction of the census, in the place of entrusting this duty, as under the act of 1850, to officers previously appointed for altogether different duties, responsible to a department which has nothing to do with the census and already fully burdened with regular official duties, in connection with the United States courts—duties which are not of a nature to be avoided or postponed—constitutes a great advance toward a proper enumeration. (*d*) Instead of the appointment by marshals of assistant marshals to perform the actual work of enumeration, without any control thereof by the central office, as under the act of 1850, the appointment of the actual canvassers—called by the new law "enumerators"—is by the act of 1879 made subject to the veto of the census office. (*e*) The population of districts

to be assigned to any enumerator is reduced from an estimated maximum of 20,000, as by the law of 1850, to a maximum of 4000, according to the results of the next preceding enumeration. The subdivision of supervisors' districts and the arrangement of enumerators' districts are also made liable to the veto of the census office. The result of these provisions in 1880 was to increase the actual number of enumerators from about 6400 in 1870 to 31,265. By this means not only is the earlier completion of the work made practicable, but a higher degree of local knowledge and personal acquaintance is secured—elements of the highest importance, as affording security against defective and erroneous returns of population. (*f*) While the enumeration continues to be taken as of the same date (June 1) as by the act of 1850, the time allowed for the completion of the work is reduced from five months to one month, while in cities of over 10,000 inhabitants (according to the next preceding census), the enumeration is required to be completed within two weeks. (*g*) The rules regulating the compensation of enumerators are greatly changed in the direction of allowing a closer correspondence of pay to work than was possible under the inflexible rule laid down in the act of 1850. (*h*) Instead of committing to each enumerator the collection of the manufacturing and social statistics of his own district, the superintendent of census may in his discretion "withdraw the schedules for manufacturing and social statistics from the enumerators of the several subdivisions, and may charge the collection of these statistics upon experts and special agents, to be employed without respect to locality." Under this provision special agents were appointed at the census of 1880 to collect the manufacturing statistics of 279 cities and large towns. Special agents were also appointed to collect the statistics of certain industries for the United States at large, such as iron and steel, woollen, silk, and cotton goods, glass, coke, interchangeable machinery, etc., and of all the mining industries. Special agents were also appointed to collect the statistics of the deaf and dumb, blind, insane and idiotic, of criminals, and of paupers, never before properly enumerated, although embraced in the act of 1850; also to collect the statistics of the factory system, the social statistics of cities, the statistics of schools, colleges, museums, and churches, of public indebtedness, of valuation and taxation of property, etc. (*i*) The superintendent of census is authorized in his discretion to employ "prior schedules," so called—that is, schedules to be left with heads of families in advance of the enumeration, and to be taken up on or after the legal date of the census. No use was made of this provision, however, at the tenth census.

2. Regarding the points of inquiry by the act of 1879 in comparison with the act of 1850, it may be said that several entirely new subjects of enumeration were introduced by the later law, such as railroads, telegraphs, fire, life, and marine insurance, etc.; while the amount of detail required respecting the traditional subjects of enumeration is vastly increased in the agricultural schedule.

It was said that the census of the United States, in its present state of development, is unique, differing widely from the European type; the justification of this statement has been given above. The European census is a mere count of inhabitants, individually and by families, with certain personal particulars as to age, sex, color, conjugal condition, occupation, place of birth, etc. Whatever statistical information beyond this government requires is obtained either by registration, by boards or commissioners, or by other agencies wholly independent of the census proper. The United States census since 1850 has been, in the phrase of the act of 1879, "a census of population, wealth, and industry." The amount of statistical detail collected in our decennial enumeration is many fold that obtained in any other country through the same agency, and is vastly greater than the sum of the statistical details collected in any other country through all agencies combined. The reason for thus imposing upon the census inquiries which in European countries are made, if made at all, through other agencies, has been found mainly in the indisposition of Congress to raise the question whether, under the Constitution, the United States government can institute and conduct purely statistical investigations affecting private persons, and enforced by penalties in the event of refusal to give information, except in connection with the decennial enumeration expressly authorized and required by the Constitution. Were this consideration set aside, there can be little question that the statistical work of the country could be better done by agencies very differently organized.

The publications of the successive censuses of the United States have been as follows:

1790.—"Return of the Whole Number of Persons within the Several Districts of the United States, etc." (8vo, 52 pp., 1792).

1800.—"Return of the Whole Number of Persons, etc." (folio, 78 pp., 1801).

1810.—(1) "Aggregate Amount of each Description of Persons, etc." (oblong folio, without date); (2) "A Series of Tables showing the Several Branches of American Manufactures, etc." (4to, 170 pp.).

1820.—(1) "Census for 1820, etc." (folio, 164 pp., 1821); (2) "Digest of Accounts of Manufacturing Establishments, etc." (folio, 100 pp., 1823).

1830.—"Fifth Census of Enumeration of the Inhabitants of the U. S." (folio, 163 pp., 1832). This work was so badly compiled and printed that Congress directed a republication. Even the latter is honeycombed with errors.

1840.—(1) "Compendium of the Enumeration, etc." (folio, 378 pp., 1841); (2) "Sixth Census or Enumeration of the Inhabitants of the U. S." (folio, 470 pp., 1841); (3) "Statistics of the United States, etc." (folio, 410 pp., 1841); (4) "Census of Pensioners of Revolutionary and Military Service, with Names, Ages, and Places of Residence, etc." (4to, 196 pp.).

1850.—(1) "The Seventh Census of the United States" (4to, 1022 pp., 1853); (2) "Statistical View of the U. S." (8vo, 400 pp., 1854); (3) "Mortality Statistics, etc." (8vo, 304 pp., 1855); (4) "Digest of the Statistics of Manufactures" (8vo, 143 pp., 1859).

1860.—(1) "Preliminary Report of the Eighth Census" (8vo, 294 pp., 1862); (2) "Population" (4to, 811 pp., 1864); (3) "Agriculture" (4to, 464 pp., 1864); (4) "Manufactures" (4to, 963 pp., 1865); (5) "Mortality and Miscellaneous Statistics" (4to, 650 pp., 1866).

1870.—(1) "Population and Social Statistics" (4to, 854 pp., 1872); (2) "Vital Statistics" (4to, 700 pp., 1872); (3) "Industry and Wealth" (4to, 843 pp., 1872); (4) "Compendium" (8vo, 949 pp., 1872).

1880.—Several hundred "Census Bulletins" were published in 1880 and 1881, giving the principal results of the tenth census as rapidly as they were ascertained. Some of these were of a single page; more of two, three, or four pages; others, of greater size. In 1882 several reports of special agents were published in quarto; *e. g.* "Manufactures of Iron and Steel," by James M. Swank (154 pp.); "Silk Manufactures," by W. C. Wyckoff (29 pp.); "Firearms and Ammunition," by C. H. Fitch (32 pp.); "Social Statistics of New Orleans," by G. E. Waring, Jr., and George W. Cable (99 pp.); "Water-Power of the South Atlantic Water-Shed," by G. T. Swain (164 pp.). There were also published, in 1882, "Statistics of Public Indebtedness," by Robert P. Porter (4to, 667 pp.), and "Statistics of the Population of the United States" (4to, 463 pp.). Congress, however, by act of Aug. 7, 1882, provided for the publication of this census after a more uniform manner, and the final publication began in 1883 with the "Compendium" (2 vols., making in all 1771 pp., 8vo), followed by vol. i., "Population" (4to, 1050 pp.); vol. ii., "Statistics of Manufactures, with Special Reports on Iron and Steel, Glass, Textile Manufactures, Chemical Products, Factory System, etc." (4to, 1255 pp.); vol. iii., "Statistics of Agriculture, with Special Reports on the Cereals, Flour-Milling, Tobacco and Meat Production" (4to, 1182 pp.); vol. iv., "The Agencies of Transportation, Railroads, Steam Navigation, Canals, Telegraphs, and Telephones" (4to, 869 pp.). No other volumes of these reports have been issued up to this date (Jan. 1, 1884), but many additional volumes are stated to be awaiting publication.

The cost of the successive censuses is officially given as follows: first, $44,377.18; second, $66,609.04; third, $178,444.67; fourth, $208,525.99; fifth, $378,543.13; sixth, $833,370.95; seventh, $1,329,027.53; eighth, $1,922,272.42; ninth, $3,336,511.41. The cost of the tenth census has not been finally ascertained, but, excluding printing and engraving (as in the statement of the censuses of 1860 and 1870), it is not expected to exceed four and three-quarter millions.

IV. State Censuses.—In many of the States of the Union a census is required at some time within the interval between each two national censuses. These provisions are very various, but there is even greater range in the manner in which the provisions are executed. Many of the States whose constitutions expressly require a census once in five or ten years take no action whatever in respect thereto of a sufficiently overt character to become the subject of observation. A few States not only go through the form of compliance with such provisions, but do good, effective work. Foremost among these are Massachusetts, Rhode Island, and New York. The decennial enumerations of these States (1855, 1865, 1875, etc.) are very valuable contributions to statistics. The Michigan State census of 1874 is a valuable document.

By the twenty-second section of the act of Mar. 3, 1879, it was provided that if any State or Territory, through its duly appointed officers or agents, shall, during the two months beginning on the first Monday of June in the year (1885, 1895, etc.) which is the mean between two decennial censuses of the U. S., under said act, "table and complete a census in all respects according to the schedules and forms of enumeration in the census of the U. S., and shall deposit with the secretary of the interior, on or before the first of September following, a full and authentic copy of all schedules returned and reports made by the officers and agents charged with such enumeration, then the secretary of the treasury shall, upon receiving a certificate from the secretary of the interior that such schedules and reports have been duly deposited, pay, on the requisition of the governor of such State or Territory, out of any funds in the treasury not otherwise appropriated, a sum equal to fifty percentum of the amount which was paid to all supervisors and actual enumerators within such State or Territory at the U. S. census next preceding, increased by one-half the percentage of gain in population in such State or Territory between the two censuses next preceding: *Provided*, that the blank schedules used for the purposes of the enumeration herein provided for shall be similar, in all respects of form and size of heading and ruling, to those used in the census of the United State." Whether this effort to promote State censuses intermediate between the national censuses will have any more effect than the provisions for State censuses now found in the constitution or on the statute-books of many States remains to be seen. (See map of CENTRE OF POPULATION, in article UNITED STATES.) FRANCIS A. WALKER.

NOTE.—In the preparation of this article use has been freely made of the article, under the same title, contained in the first edition of this work.

Cent [Lat. *centum*, a "hundred"], a coin of the U. S. worth the one-hundredth part of a dollar, or nearly one halfpenny sterling. It is now coined of an alloy of copper, tin, and zinc, and is legal tender for the payment of sums not exceeding twenty-five cents. The Dutch cent is the one-hundredth of a guilder, and its value is about one-third of that of the American cent. The French cent (*centime*) is one-hundredth of a franc.

Cen'taurs [Gr. Κένταυροι; Lat. *Centauri*], fabulous animals which the ancient Greek poets imagined to be half men and half horses, the head and anterior part being human. They were supposed to be the offspring of Ixion and a cloud, and to have lived in Thessaly. The battle of the Centaurs with the Lapithæ was celebrated in Greek mythology, and was a favorite subject of ancient art.

Centau'rus (the "Centaur"), a constellation of the southern hemisphere, contains two stars of the first magnitude, designated respectively as α Centauri and β Centauri.

Centennial Exhibition, or **Exposition.** See INTERNATIONAL EXHIBITION and PHILADELPHIA.

Center. See CENTRE.

Cen'tering, the framework upon which an arch or vault of stone, brick, or iron is supported during its construction. The simplest form of centering is that used by masons and bricklayers for the arches of common windows and doors. This is merely a board of the required shape, upon the curved edge of which the bricks or stones of the arch are supported until they are keyed in. In building bridges or other structures where arches of great span are to be constructed, the centering is usually made of framed timbers or timbers and iron combined.

Centerville. See CENTREVILLE.

Cen'tigrade [from the Lat. *centum*, a "hundred," and *gradus*, a "step," "degree"] **Thermometer,** the name of a thermometer having its scale between the freezing and the boiling-point of water divided into one hundred equal parts, or degrees, the freezing-point being taken as zero, and the boiling-point as 100°. This scale was invented about the year 1741 by Prof. Anders Celsius of Upsala in Sweden, and hence it is often called Celsius's thermometer. Its use was for many years mostly limited to Sweden and Russia, but it is now the scale generally used in France; and its excellencies so commend it that it will probably come into almost universal use. In Germany it is rapidly superseding the scale of Réaumur, while in England, Holland, and the U. S., where Fahrenheit's scale is more generally known, the centigrade is used in chemical and other scientific operations, and thermometers are often marked with both scales, one on each side of the mercurial column. The advantages of the centigrade scale are that its zero and its hundredth degree are natural, and not arbitrary, and, above all, that its divisions are in harmony with the decimal system of measurement. The objection to the centigrade, that its degree is too large, is obviated by dividing the degree into decimals, which are marked on the scale, thus greatly increasing its precision. One degree centigrade is equal to 1.8 Fahrenheit, or, conversely, one degree Fahrenheit nearly equals .55 of a degree centigrade; but there are some practical difficulties in reducing temperatures from one to the other, which will be noticed under the article THERMOMETER (which see).

Cen'tipede [Lat. *centum*, a "hundred," and *pedes*, "feet"], a popular name for various insects of the order Myriapoda, but properly given to those of the sub-order Chilopoda, and especially to the family Scolopendridæ. They have long slender bodies, and twenty-one to twenty-three pairs of feet. Some tropical species are nearly a foot long. The bite of many species is poisonous, and even dangerous. *Scolopendra heros* is the largest U. S. species, and is found in the South.

Central America. See AMERICA.

Cen'tral City, on R. R., capital of Gilpin co., Col. (see map of Colorado, ref. 2–D, for location of county), is situated among the Rocky Mountains, 40 miles W. by N. from Denver. It derives its prosperity from its gold-mines, and has several quartz-mills and a fine school building. Pop. in 1870, 2360; in 1880, 2626; in 1885, 2472.

Central City, Dak. See APPENDIX.

Central City, R. R. junction, on Platte River, capital of Merrick co., Neb. (see map of Nebraska. ref. 7–J, for location of county). Pop. in 1880, 648; in 1885, 1232.

Central Falls, Providence co., R. I. (see map of Rhode Island, ref. 4–G, for location of county), on Blackstone River, about 6 m. N. of Providence, has extensive manufactures. Pop. not in census of 1880 or 1885.

Central Forces, in mechanics, are those which radiate from a point or centre. A body impelled by a constantly acting force towards a fixed centre will move up to that point with a constantly increasing velocity; but if it have an initial motion in a direction towards some point other than the centre, the constantly acting central force will deflect it from its original path, but will not draw it to the centre of force. The resultant path will be a curve. The straight line from the moving body to its centre of force is called a "radius vector," and it is found, mathematically, that radii vectores of a body moving in a curve under the influence of a central force will pass over equal areas in equal times, whatever the rate of motion. We further find that the velocity of such a body is at all times inversely proportional to the perpendicular from the fixed point on the tangent to the curve at the point considered. Therefore, if the motion be uniform, the path of motion is a circle. If the path be an ellipse, and the centre of force be the centre of the curve, the central force is directly proportional to the distance; but if the centre of force be at a focus of the ellipse (or of a hyperbolic or parabolic path), the force acts with an energy inversely proportional to the square of the distance.

Centra'lia, a city and R. R. junction, of Marion co., Ill. (see map of Illinois, ref. 9–E, for location of county), 253 miles S. of Chicago. It has machine-shops of the Illinois Central R. R. Company, a coal-mine, an iron-foundry, and various other manufactories. There are in Centralia several parks, a public library, a high school, and graded schools. The Southern Illinois fair-grounds are situated in the city. Pop. in 1870, 3190; in 1880, 3621.

Centralia, on R. R., Nemaha, Kan. (see map of Kansas, ref. 4–I, for location of county), is 62 miles W. of Atchison. Pop. in 1880, 289; in 1885, 540.

Central Park. The Central Park, the most important public work undertaken by New York City, next to the Croton Aqueduct, was the first place deliberately provided for the inhabitants of any city or town in the U. S. for exclusive use as a pleasure-ground, for rest and exercise in the open air. The well-known Boston Common, it is true, dates back to 1634, and by a clause in the city charter it is made public property for ever, and cannot be sold or exchanged. Its original purpose, however, was not as a place for exercise and recreation, but for a "common," such as the earlier settlers had known in the villages of the mother-country, and such as still exist there—places on which the owners of cattle, horses, sheep, and geese pasture them in common; and it is only since Boston and other New England towns, such as Salem and Lynn, have increased so greatly in size, that these tracts—all comparatively small; the Common in Boston is only 48 acres—have been appropriated to their present use.

New York, we believe, never had a common, but the city remained for so many years confined to the lower part of the long and narrow island on which it is built that there was no need felt for any ground being set apart, either for the pasturing of cattle or for the recreation of the inhabitants. The Battery supplied, for many years, a most charming promenade, many of the streets long retained a semi-rural or village character, and the immediate suburbs of the city, which, within the easy memory of men now living, began as low down as Canal street, were as pleasant places for strolling, on foot or in the homely vehicles of the time, as could be desired. The very name of the Bowery tells us what was the look of the old country-road with its overarching trees; it is not long since an old pear tree stood to mark where once the old Stuyvesant farm sunned its broad acres, that now show ranks of houses where once waved ranks of corn; and not a few of the hugest of New York fortunes are the result of the rise in the value of land once cultivated as market-gardens by the fathers of its present aristocratic owners.

It was not till more than two hundred years had elapsed since the founding of the city that the inhabitants of New York began to feel the need of some place specially devoted to open-air enjoyment. The late A. J. Downing was the first to propose the establishment of a great public park, and the articles he wrote in 1850 on the subject in the "Horticulturist," a journal devoted to rural affairs he was at that time editing, gave eloquent expression to the public feeling, and soon bore practical fruit. In 1851, Mr. A. C. Kingsland, then mayor of New York, in a message to the common council, strongly recommended the establishment of a public park within the limits of the city, and it was at once referred to the committee on land and places. This committee reported in favor of adopting the mayor's recommendation, but the report gave rise to an unfortunate controversy that postponed for two years the undertaking of the so-much needed improvement. When it was first determined in the popular mind that New York must have a public park, two rival schemes presented themselves for consideration. One of these was the Jones's Wood scheme, the other the Central Park scheme, and the advocates of each measure mustered such good argument and such powerful influence that the legislature itself was puzzled for a time, and after having on the 21st of July, 1853, passed an act authorizing the city to take possession of the land now known as the Central Park, it actually on the same day passed another act authorizing the city to take possession of Jones's Wood! But the opinion of the public was too plainly in favor of the central site, and the next year (April 11, 1854) the act relative to Jones's Wood was repealed, and no further attempt was made to revive it. The site known as Jones's Wood had very little to recommend it, and it had two serious defects—its insufficient size and its position at one side of the city. Its recommendations were, the undulating character of its surface, the fact that it was already covered with a good growth of forest trees, and, above all, that it lay along the East River, always an animated scene with its steamboats, shipping, the islands, and the neighboring shore. Unfortunately, one of these islands, Blackwell's, extended along the whole water-front of the proposed park, which was bounded on the N. and S. by Seventy-fifth and Sixty-sixth streets, and on the W. by the Third avenue; and an island inhabited by convicts would not have been an edifying prospect. There is little to be gained by thinking of what might have been, but the Jones's Wood scheme might have had a better chance if, instead of limiting itself to the narrow area of 150 acres included between the above-named streets and the East River, it had boldly proposed to take possession of Blackwell's Island, and even to pass over to the shore of Long Island itself by means of (eventually) several bridges. Engineering difficulties we do not pretend to have thought about may have stood in the way of such a project; but, apart from any such lions in the way, the plan itself had many obvious advantages. It would have given us much more variety than we have at present, together with a water-view, always a delightful addition to a public pleasure-ground, and as much land, with as irregular an outline, as was needed. For in truth it would appear that the only recommendations the Central Park site had to offer were just its more central position and its greater size. And it is not to be denied that these were very considerable advantages, and that, on the whole, no better solution of the problem than this offered could have been found within the limits of the island. If the project for a park had been mooted either earlier or later, we might have avoided what we think will generally be admitted a serious drawback to the beauty of the park—the presence of the two huge reservoirs, which no ingenuity could make agree with any design in landscape gardening. Earlier, we might have secured our park below the small reservoir at Fortieth street; later, we might have had it upon the Harlem River. In either case it would not have been necessary to lose 150 acres out of a little more than 800, as we do in the Central Park to-day.

As we have said, the popular preference for the larger and more generally accessible site was plainly expressed, and great gratification was manifested when the legislature had settled the matter in such a way that a beginning might reasonably be looked forward to in carrying out the long-wished-for scheme. On the 17th of Nov., 1853, five commissioners were appointed by the supreme court, through Judge William Mitchell, to take the land for the Central Park. These commissioners were William Kent, Michael Ulshoeffer, Luther Bradish, Warren Brady, and Jeremiah Towle. All these gentlemen were well known in the community, and a general confidence was felt that their difficult task would be performed with fairness and judgment. Nor did this confidence prove to be ill-grounded. The commissioners employed nearly three years in the work of estimating and assessing, sending in their report on the 4th of Oct., 1856, and, as Judge Harris remarked in confirming their report, it is an evidence of the success with which they accomplished their intricate task that but about one in forty of the owners of the lots taken for the park appeared before him to object to the award of the commissioners. The supreme court confirmed the report of the commissioners, and in Feb., 1856, the common council passed an ordinance for the payment of $5,160,369.90, of which $1,657,590 were to be paid by the owners of lands adjacent to the park, in view of the benefit they would receive from their neighborhood to it.

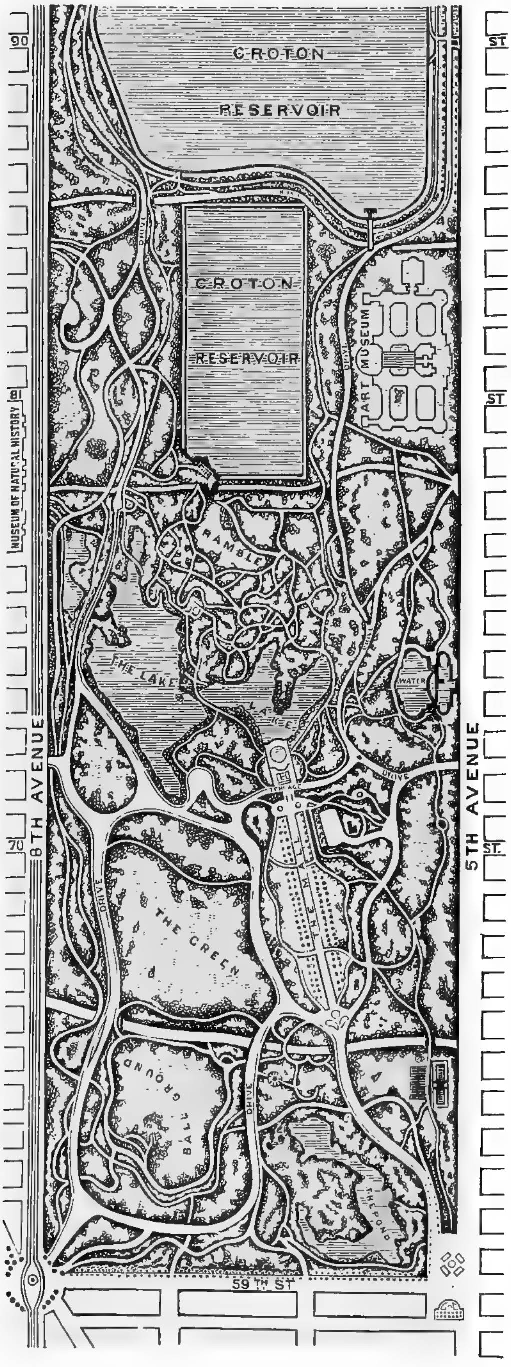
As the legislature had done nothing during its winter session towards arranging a government for the park, the city authorities took the matter into their own hands, and on the 19th of May, 1856, the board of aldermen adopted an ordinance appointing the mayor and the street commissioner commissioners with full authority to govern the park, to determine upon a plan for its improvement, and to appoint such persons as they might see fit to carry out their intentions. At that time Mr. Fernando Wood was mayor and Mr. Joseph S. Taylor street commissioner, and they sought the best advice they could obtain from gentlemen who held public and social positions—such as, taken with their reputation for taste and judgment, necessarily gave their opinions weight. These gentlemen, Washington Irving, George Bancroft, James E. Cooley, Charles F. Briggs, James Phalon, Charles A. Dana, and Stewart Brown, were invited to attend the meetings of the commissioners, and to form a board of consultation for the purpose of discussing what course had best be pursued in order to secure a suitable design for laying out the park. The first of these meetings was held on the 29th of May, 1856. Mr. Irving was made president of the board, and the preliminaries were settled for carrying out the objects of the commission. Many plans were presented for the improvement of the park, but nothing suitable, and matters dragged until a plan was presented by General Egbert L. Viele, an American engineer, a graduate of West Point, who had served in the Mexican war and in several Indian campaigns as an officer of the regular army. Gen. Viele's plan was founded on a topographical map constructed by himself, the result of surveys of the ground made under his immediate direction. This plan was approved by the commission, and was formally adopted by them, and Gen. Viele was charged with the execution of the work as engineer-in-chief. But no money was appropriated for the use of the commission, and it was soon found that unless either the legislature or the city authorities took more active measures for securing a plan, the enterprise must fall through. Accordingly, on the 17th of April, 1857, the legislature appointed a new commission, consisting of eleven members, who were to hold office for five years, and who were empowered to spend a sum of money the interest on which was not to exceed $30,000. To raise this money the common council of the city issued stock having thirty years to run.

The new commission went vigorously to work, and, disregarding what had been done by its predecessor, advertised for new plans to be sent in in competition. On the 1st of April, 1858, thirty-three plans had been received. These were placed upon public exhibition, and up to the 21st of April the board held frequent meetings in the room in which the plans were hung, in order to make easier a careful examination and full discussion of the merits of the designs. On the 21st of April the plan No. 33, bearing the motto "Greensward," was declared on the first ballot, by the votes of seven out of the eleven members, to be entitled to the first prize of $2000.

The authors of "Greensward," the successful plan, proved to be Mr. Frederick Law Olmsted and Mr. Calvert Vaux; both well known and highly esteemed by a large and cultivated circle in this community. Mr. Olmsted, young as he was, had already a national reputation. He had long been a successful practical farmer, and while still engaged in that pursuit had published a remarkable little book, the record of a vacation ramble, called "Walks and Talks of an American Farmer in England." He became more widely known by a series of letters written from the Southern States to the New York "Times" newspaper, under the signature of "Yeoman," and afterwards republished in book-form with the title "The Seaboard Slave

States." This book contained the first trustworthy account of the condition of society in the South, especially in the regions remote from the great cities, that had, up to that time, been published at the North. To write such a book as this last required energy and courage in no small measure: to these qualities were added a love of natural scenery and the power to trace the secret of the combinations to which a landscape owes its charms, a singular faculty for observation, and, as was afterwards shown in the management of the Central Park, an ability altogether exceptional for administration.

Mr. Calvert Vaux is an Englishman by birth and training, who came to this country and adopted it for his permanent home in 1852. He was the partner in business of the late A. J. Downing, and after Mr. Downing's death in 1853 he succeeded to his large and profitable clientage. At the time of the acceptance of his and Mr. Olmsted's design for the park he was successfully established as an architect, and had published a valuable and popular book on domestic architecture.



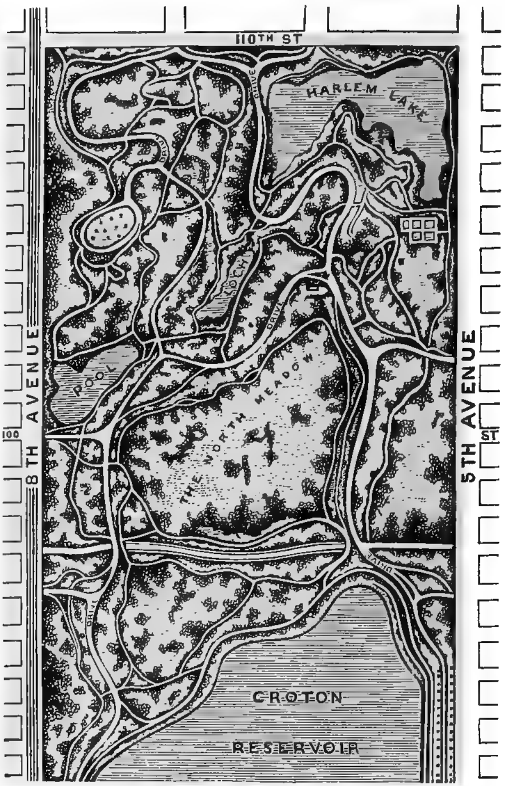


FIG. 1. Map of Central Park.

Here, then, were two men thoroughly fitted for the work that was put into their hands, and that work one the importance of which can hardly be estimated, not merely to the city which owns it, but to the whole country. It was our first great public park; it has already proved the parent of others, two of them, at least, of far greater importance than their original, and in the end no doubt every city on the continent of any considerable size will have a public park. What a piece of good fortune, then, that the Central Park, from which they all date, should have been, from the first, the fruit of a pure and manly taste, of sound sense, and of practical knowledge! It has been a first-rate example, according to its opportunities, and no matter how much it may be improved upon by other communities with ampler space and a more varied and picturesque conformation of ground to begin upon than fell to us, the Central Park will always be looked upon with a sort of affectionate pride, as having been the first to point out the way and to show us the possibility of walking in it.

The Central Park is two and a half miles long and half a mile wide. It extends from Fifty-ninth street on the S. to One-hundred-and-tenth street on the N., and is bounded on the E. and W. by the Fifth and Eighth avenues. It is thus a perfect parallelogram, but it is virtually divided into two unequal parts, between which are the two great reservoirs of Croton water—one a quadrangular basin of masonry, the other much larger, with an irregular outline, and confined in an embankment of earth lined with stone. The two basins cover in all nearly 150 acres. The smaller of the two is nearly a third of the short diameter of the park in width, while the larger nearly touches the eastern and western boundaries of the park, and extends N. and S. from Eighty-fifth street nearly to Ninety-eighth street. The original park enclosure contains 776 acres, to which have been added 68 acres at one time, and, more recently, Manhattan Square, so that it now contains 862 acres. It follows that nearly one-sixth of the ground covered by the Central Park is occupied by these unsightly embankments, which obstruct the view and offer nothing in return, since the water they contain cannot be seen except by mounting to a level with their summits. If the park were large enough, there could be no objection to such a division as we now have into Upper and Lower Parks, particularly if it were made by a sheet of water or by any picturesque feature—a ravine, for instance. But, as it is, there is no compensation for the loss of the ground, and moreover the communication between the two divisions is narrowed, especially by the larger reservoir, to such a point that all dignity is quite lost.

The two divisions of the park which we have called "the Upper" and "the Lower" are not only separated artificially from one another by the two reservoirs; they are really quite diverse in character. The Upper Park is distinguished by the freer sweep and greater variety of its horizon lines, by the fine views that it commands of the surrounding country, and by the greater play of the surface, making it easy for the landscape-gardener to produce his legitimate effects with grass and trees, rocks and water, and not obliging him to make up for want of interest in the natural features of the place by a resort to architecture. Up to the present time the Upper Park must have called for a much smaller expenditure of time and money than has been found necessary in the lower portion, since that is almost entirely artificial. The park lies along the eastern slope of a long ridge of rock which crops out of the ground somewhere about Thirtieth street, and extends thence to Manhattanville. This ledge is not continuous, but is broken by several transverse ridges with answering depressions, which indicate, we suppose, the points where the ends of the inclined strata would be found as they lie overlapping one another. There are four of these *irregular* ridges, the chief of them crossing the park diagonally, and the greatest elevation will be found in the central, westerly, and north-westerly portions. In the Lower Park were two swampy valleys lying between three of these ridges, and into these has been collected all the surface-drainage, with the happy result of producing two sheets of water—one, the smaller, a picturesque pond with steep rocky banks intermingled with patches of grass and shrubbery; the other a sheet of water nearly twenty acres in extent, the view across which from the most favorable point is of considerable breadth, and entirely unbroken for at least a quarter of a mile. The ridge that divides these two valleys has been treated with great skill. One large boggy tract has been filled in to an average depth of two feet, all the rocks that stuck out of the ground have been removed by blasting, and some large adjoining ledges reduced in the same way, and the depressions filled up; so that there have been secured thirty acres of level, or but slightly undulating, ground. East of this fine green extends another level space eighty rods in length and twelve in width, separated from the first by a carriage-drive. This tract is occupied by a broad walk, with two rows of American elms on each side, called "The Mall," which leads directly to the Terrace, the chief attraction to most persons in this portion of the park, and which we shall presently describe.

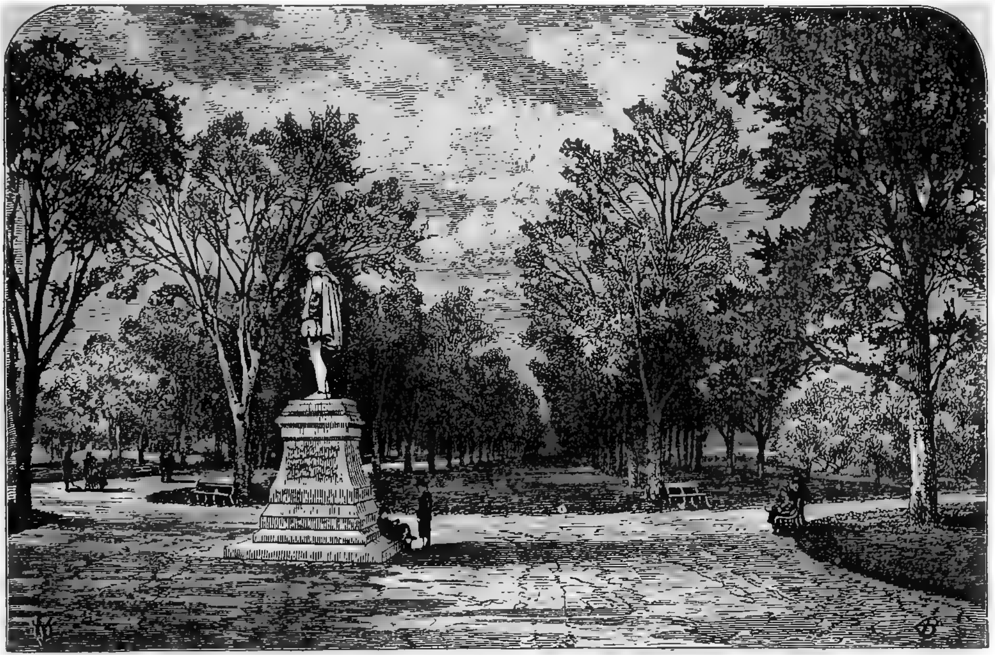


FIG. 2. Mall and Ward's Shakspeare.

These are the main features of the landscape of the southern part of the Central Park—the "Lower Park," as it is conveniently called—but the designers have known how to introduce great variety in the treatment, and they have been so successful that this portion of the grounds must long be the favorite with the general public over the less finished and more natural upper half.

To the Lower Park there are nine entrances. Four of these are on the southern side, answering to the four avenues that touch the park there—viz. the Fifth, the Sixth, the Seventh, and the Eighth. Of these the Sixth and Seventh stop at the park, while the Fifth and Eighth continue along its eastern and western sides respectively. Of the five other entrances, three are on the Fifth avenue at Sixty-fourth, Seventy-second, and Seventy-ninth streets—although that at Sixty-fourth street is rather an entrance to the Museum than to the park proper—and two are on the Eighth avenue, at Seventy-second and Seventy-ninth streets, opposite, as will be noticed, two of the gates on the Fifth avenue. These entrances are at present merely openings in the boundary-wall, and as the erection of formal gateways is a very unimportant feature, so far as the decoration of the park is concerned, and practically is a matter of very little importance, it is to be hoped that it may be put off for some considerable time longer, until the growth of public culture shall make good taste in the design more certain than probably could be hoped for now. Whoever is in the habit of using the park, not merely as a place of recreation, but as an episode in his daily walk to his place of business, or as an introduction to the long ride thither in the cars or omnibus, or whoever, having no such intimate acquaintance with it, has examined a plan of it, must have remarked with how much skill the walks are arranged to unite the different entrances and to lead to places of interest. There is no twisting and winding of the paths and drives merely for the sake of irregularity. Every path and drive has a well-defined purpose: it unites two points or leads to some thing it is supposed will interest the visitor. In general, it may be stated that, as far as possible, the walks and drives *lead in*, for it is plainly to be desired that the attention of those who come to the park should not be drawn to the boundaries any more than can be avoided. The park is so narrow in proportion to its length that no skill will avail to hide the defect altogether; for though the planting-out of the walls is merely a question of time, the houses could never be planted-out. People who build on the Fifth and Eighth avenues are determined that their houses shall command the park from their windows, and, lest the trees should shut out their view, they build their houses so high as to make that danger impossible, and with a superfluous caution set turrets on their roofs. It is a misfortune, but it is now too late to avoid it, that in time the park will be shut in by a nearly solid wall of city houses. This was easy to foresee, and it was so manifest an objection to the site that it ought to have been taken into serious consideration. However, the men who designed the park were of a practical turn, and crying after spilt milk was not in their books; they made the best they could of what they had. They drew the walks and drives as much as possible towards the long axis of the park, and kept the striking points of interest mainly on the same line. Yet they so contrived it that there should be also a circuit-drive for the pleasure of those who should come to the park rather for exercise than for sight-seeing, and who would naturally prefer as long a stretch as possible.

Along this central line of the Lower Park, then, are found the Children's Shelter, an immense tent of rustic woodwork, handsome, solid, well-contrived, with abundance of seats and benches and capacious fixed tables for the accommodation of children and their nurses; the Swings, and, near both these, the Dairy, where a good plain lunch may always be had, with excellent milk; then, passing under the Marble Archway, we reach the Mall with the statues of Shakspeare and "The Indian Hunter" by Ward—statues of which any park in the world might be justly proud; a statue of "Beethoven" was unveiled in this park July 22, 1884, and one of "The Pilgrim" June 6, 1885. Farther on from the Mall is the Casino, a restaurant close by the Carriage-concourse, where horses and carriages wait while their owners walk about, or take refreshments as they listen to the music in the pretty Pavilion sitting under the Vinetrellis, which is rather affectedly called in a late report "the Pergola"—an Italian name for the thing. We should like to get rid of such names as Casino, Carrousel, Pergola, Concourse, Esplanade, Plaza, Belvedere, and to have in their places plain English titles. Perhaps "Casino" and "Esplanade" are naturalized, or at least well enough understood to be allowed, but for the rest we are sure it would be better to take more homely names. Finally, we have, near the centre of the park, the Terrace, thus far, the only instance in our country of that treatment of a bluff or of a hillside sloping to a level ground which is so common in Europe, and which, as an opportunity, has been made so much of by foreign landscape-gardeners. When well treated it is very effective and very popular. Everybody likes "a view" (and many a mistake in house-building and in house-buying has been made under the impression that if a thing is desirable now and then, it is desirable always); and one that is obtained, not by climbing, but by walking to the edge of a terrace or out upon a balcony, owes some of the pleasure that it gives to its unexpectedness. The Terrace at the park is small and insignificant, of course, compared with those at St. Germain, at Meudon, or at Perugia; but few modern public parks have so fine a

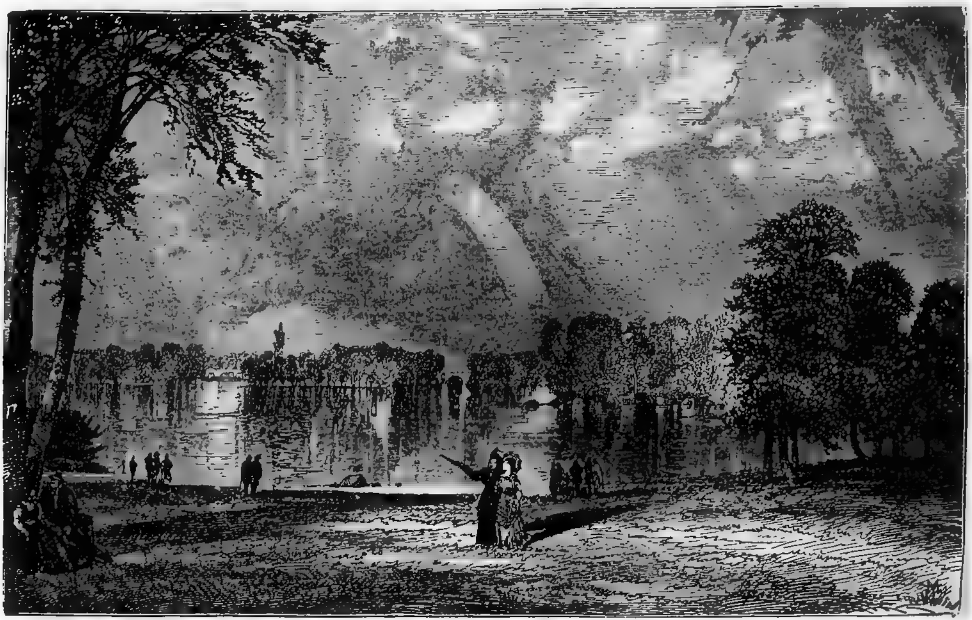


FIG. 3. Lake from Circle.

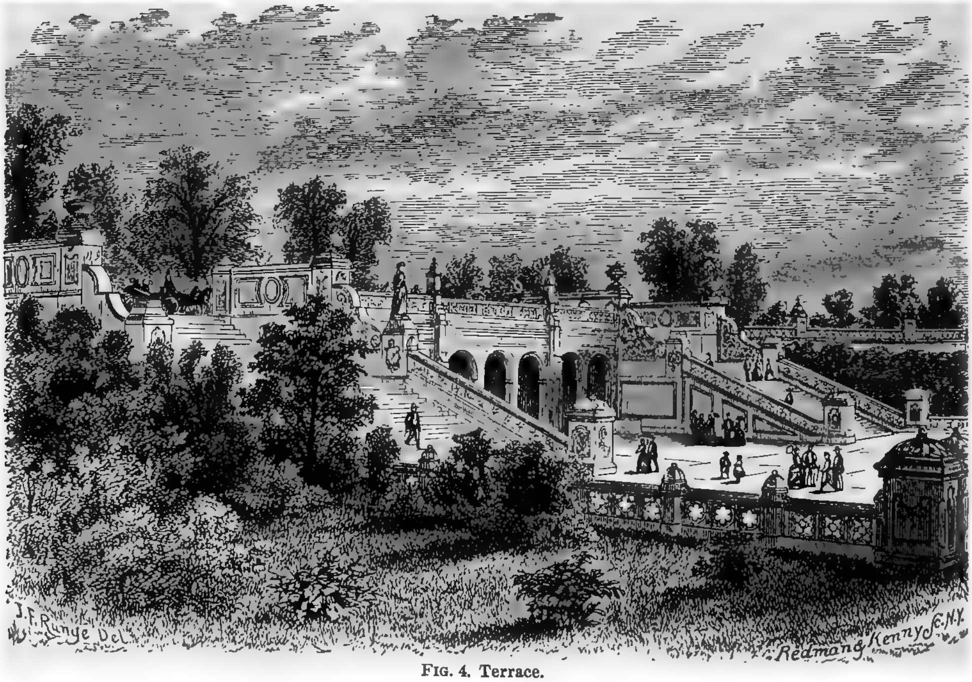
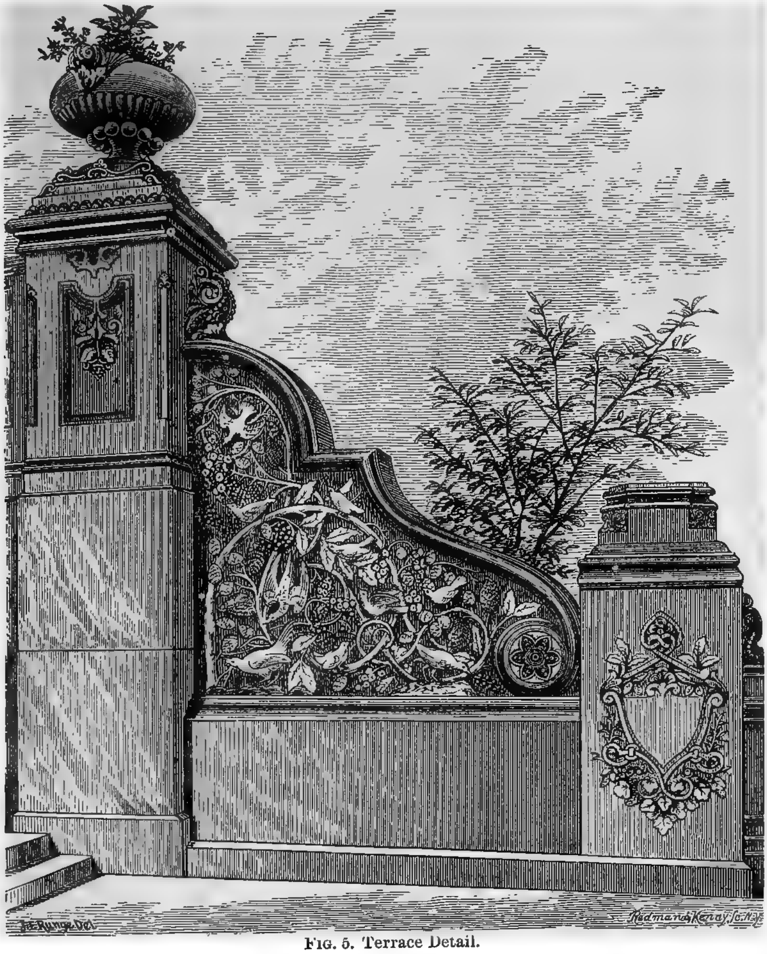

J. F. Runge Del.
Redman & Kenny Sc. N.Y.

FIG. 4. Terrace.

one. It looks out upon the Lake, a handsome irregular piece of water always alive with boats, and across it to the Ramble. It consists of two flights of ample steps of light-colored freestone, with noble ramps, elaborately sculptured with arabesques of birds and flowers, and with rails equally handsome terminating in stone pedestal-posts, which will at some distant day be the support of statues. All the railings that enclose the Terrace are similar in design to the stair-rails, though the carving in no two of the panels is alike; and wherever the design calls for them the pedestal-posts are repeated, so that, if ever they are all crowned with statues, the effect ought to be singularly imposing. The only obstacle to one's complete enjoyment of the Terrace *as* a terrace is the fact that it is crossed by a carriage-drive; but it is only on very crowded days that this can make it dangerous or troublesome to pass directly from the Mall to the platform that overlooks the Lake. The lower level is reached either by passing *underneath* the carriage-drive through a well-lighted and prettily decorated hall, or by crossing the drive and descending the steps above alluded to. People take one or the other as convenience or inclination prompts, but here, as everywhere in the park, it has been made impossible for accidents to occur to pedestrians unless by their own fault. The carriage-drives, horseback-drives, and walks are kept distinct throughout, and at convenient points, wherever it has been found necessary, the walks are carried over or under the drive. There is no part of the park where a child or an old person or an invalid cannot move about in safety by simply keeping to the walks; and there are several points in the park where areas of considerable extent have been arranged with a particular view to the complete security of all persons, whether young or old, who come to amuse themselves with playing or strolling about, unconfined by formal pathways. Such are "the Ball-ground," "the Green," "the Children's Quarter" near the "Dairy," and the "Ramble." The "Mall," too, and the "Esplanade" are capital places for children and nurses; they may spend the whole day here without interruption, and refreshments may be had close at hand in the Casino.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Redman & Kenny, Sc. N.Y.

Fig. 5. Terrace Detail.

These are the principal points to be noted in the Lower Park, with the exception of the Ramble, which, to many people, is, and must always be, one of the pleasantest features of the place. It is a rocky hill that rises from the northern side of the Lake, and which the art of the landscape-gardener has transformed from barrenness into rural beauty. Pretty walks run in every direction, with good seats conveniently placed; and what with abundant shrubbery, charmingly varied in character, and allowed to grow as freely as it will, a plenty of the commonest wild flowers, and a running stream where ducks of the finer breeds and a crane or two to pique curiosity have their quarters, there are not many places near the city where so much of the charm of wildness may be enjoyed as in these few acres. Our wild birds of this region build and breed freely here, and before "the Ring" entered on their brief but disastrous rule quail were abundant. But these men, who were as ignorant in all practical matters connected with the proper management of the park grounds as they were in matters of taste, cut away a great deal of the underbrush, much of which had been carefully planted, and all of it encouraged to grow. Many of the trees, too, that feathered naturally to the ground, and whose growth no one, with any knowledge of what constitutes beauty in a tree, would think for a moment of interfering with, have been deprived of their lower branches. Trees such as the ash, the elm, the lime, and the beech, with almost all the Coniferæ—firs, pines, spruces, and hemlocks—have this beautiful habit of feathering to the ground; and perhaps there is no surer test of the mere cit than the liking he has for trimming up the lower limbs, thus depriving the tree not only of a chief beauty, but of a feature essential to its well-being, for, as is often seen, a tree, especially if it be an evergreen called upon to support a weight of snow or to resist a strong wind, will succumb if by the cutting away of its broad base all the weight has been thrown to the top. And these limbs, once removed, are never supplied again, so that the loss is irremediable. The pranks of "the Ring" in the park were wild and various, but in nothing did they offend so seriously as in this matter. One of the immediate results has been that the quail and many other birds, who depend upon the shelter afforded by the lower branches of these trees and by the underbrush, have either died or left for other places where "Rings" are unknown, or too well known to be allowed to meddle with public interests.

The Ramble is laid out, as we have said, upon a hillside, and this hill has been tunnelled to admit the passage of one of those traffic-roads that make so important a feature in the design of the park. The park, lying as it will in the midst of a thickly populated region, ought not, it is evident, to lay itself open to the charge of being an obstruction to the daily business of the neighboring region; and this was plainly seen by the designers, who also saw, however, that it was of equal importance that the traffic of the neighborhood ought not to be allowed to obtrude itself upon the park. The ingenuity which has met both difficulties and both wants, as they have been met by the traffic-road, is its own best commendation. Four of these roads cross the park, uniting, E. and W., Sixty-fifth, Seventy-ninth, Eighty-fifth, and Ninety-seventh streets, respectively. They are only so much curved as has been found necessary to accommodate them to the surfaces of the park, nor are they sunk any farther than is made necessary by the same conditions. Indeed, it is not correct to say that they are ever *sunk* at all, the road-bed being always on a level with the avenues that bound the park;

they only appear in certain cases to be sunk because they cut through rising ground. They are paved, lighted, and provided with sidewalks like ordinary streets, and they are in common use as traffic-roads, though not of course to the extent that they will be when the region about the Central Park becomes more densely populated. The object of the designers has been to make them completely independent of the park as a pleasure-ground, and they are so; indeed, in only a few cases can they be entered at all from the park, except where their terminations are coincident with the park gateways, and in no case can they be so entered by carriages. The gates that here and there communicate with them are to facilitate the removal of rubbish or the bringing in of materials. These communications are, however, not for the use of the public, and visitors to the park are not supposed to be aware of their existence. In no instance do these roads ever cross the surface of the park on a level with the walks and drives, but always under them or over them—generally by the former mode—and they are well planted-out by shrubbery where, without it, they would obtrude themselves upon the view.

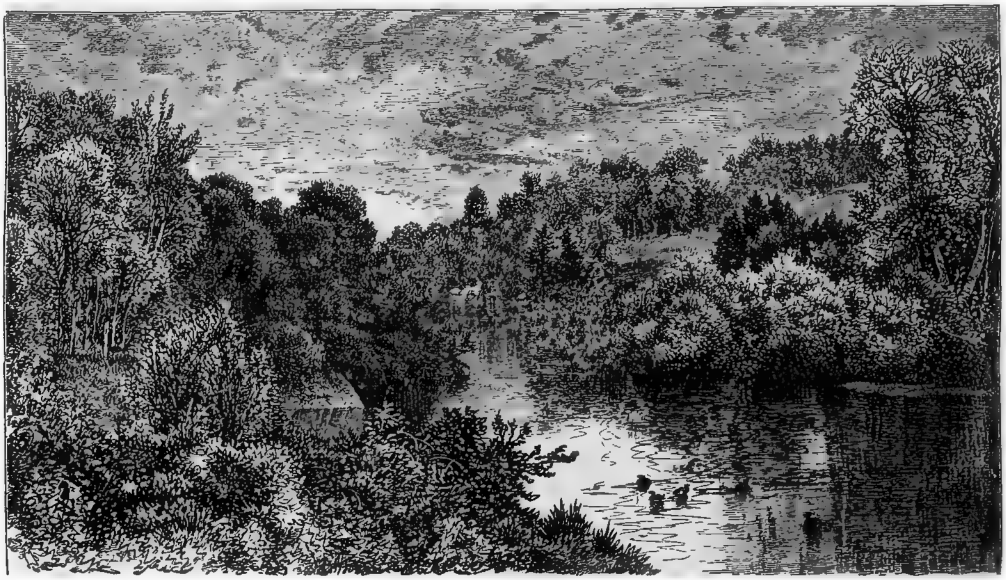


Fig. 6. "Glen."

The Ramble has a central point of interest to those who do not care for the solitude and quiet that make it attractive to so many, in the Belvedere, a picturesque edifice composed of a balustraded platform, with a tower from which a view of no mean extent can be had by those who like a moderate climb. The platform itself commands a pretty view, into which the rectangular tank of the smaller reservoir, on the edge of which it is built, enters as the most important feature.

It will thus be seen that almost all the special attractions of the Lower Park—we mean those apart from what may properly be called the landscape—are brought near the long axis running N. and S. This arrangement draws the main body of the visitors away from the boundaries, and thus prevents them from being forced upon our observation. Yet this result is brought about quite naturally and without effort; no one perhaps would perceive it if his attention were not called to it. There are, however, other points of interest in this Lower Park, and no doubt every year will see the attractions more and more distributed, until the present centralization will be overcome and forgotten. There are the cages near the old Arsenal building, some exposed, and some under shelter—containing the animals which have from time to time been presented or loaned to the city. The collections of the Natural History Society were exhibited in the old Arsenal until the completion of a wing to the Museum of Natural History in Manhattan Square. This building was formally opened Dec. 22, 1877. (See American Museum of Natural History, in Appendix.) The intention is to establish a post-graduate university of natural science with as full collections of specimens as can be found anywhere. One story of the completed wing is reserved for students. By the joint action of the park department and the trustees of the Museum two days in each week, Monday and Tuesday, are reserved for special students and for teachers and pupils of public schools; by this means opportunities are given for lecturing to classes with abundant illustration, and the Museum becomes an important part of the educational system of the city. The collections are constantly increasing in value, partly by purchase and partly by presents from those who are interested in the success of the institution. Manhattan Square, a piece of ground lying between Eighth and Ninth avenues and between Seventy-seventh and Eighty-first streets, was some time ago added to the park, and it was decided to carry out a plan long contemplated for establishing a Zoological Garden and a Museum of Natural History upon this site. We suspect, however, that it will be found necessary to establish the Zoological Garden in some other place. Either institution would need all the room that the square affords.

The present collection of living animals belonging to the park, with those loaned to the trustees by private owners or by proprietors of travelling-shows, though comparatively small, is of great interest and gives an immense deal of pleasure. The animals are well housed and cared for under the direction of an intelligent keeper, whose special report makes one of the most valuable features of the annual report of the trustees. "The department has already received specimens of many of the most valuable foreign tropical animals, and now desires additions to its collections of our native species. Of the various American deer, only two, the common Virginia deer (*Cervus Virginianus*) and the American elk (*Cervus Canadensis*), are found in the park. Specimens of the black-tailed deer, the mule-deer, the reindeer, the Mexican deer, the moose, the caribou, and the prong-horned antelope would be much valued. Specimens of almost any of the smaller animals of the Far West, the squirrels, gophers, rabbits, and hares, would be desirable acquisitions. Thirteen species of foxes are enumerated as peculiar to this continent, of which but two, the common gray and red fox of the East, have as yet reached the park. The department usually pays the transportation-expenses of animals given to it, and it is found that when sent by express, with proper directions as to the supply of air, water, and food, they come by rail and boat from the more distant parts of the country with safety."

The sheets of water which in summer add so much to the landscape effect of the park are thronged in winter by skaters, for whose comfort and safety every provision is made by the park authorities. The ice is flooded, scraped, and swept with great skill and promptness, information as to the state of the ice is conveyed by signal to all parts of the city, temporary structures of wood, sufficiently warmed, are provided for putting on skates and for refreshment, and the means of cheap and healthful exercise are supplied to thousands of people, men and women, boys and girls. A visitor who watches these crowds of skaters from the banks or from the bridge that commands so wide a view of the lake, will surely be struck with the good behavior of the crowd; he will see no rudeness, no coarse manners, but a general good-nature and civility; and though the excellent park-police are always on hand, they have hardly ever any occasion to make an arrest, or even to administer a rebuke.

The building for the Metropolitan Museum of the Fine Arts has been erected in the park on the ground between the smaller reservoir and the Fifth avenue—a location greatly to be regretted, we think, both on account of the effect the building has of still further closing up the already scrimped communication on that side between the Upper and Lower Parks, and from the injury to the appearance of the building itself, placed alongside or under the shadow of these immense water-tanks. We have to regret that land outside the park could not have been obtained on the eastern side, answering to Manhattan Square on the W., and the new Museum have been built on that. Besides giving a better and freer site for the building, it would have given greater apparent breadth to the park itself at the point near the reservoirs, where it presents an unfortunately cramped aspect.

Long before the Central Park was finished—and in the main it may be said to be finished now—it was found too small for the immediate demand upon it, especially in the way of drives and horseback rides; and it was plain that ampler provision must be made for the needs of the future. What was felt to be wanted was not merely room for more extended drives and rides than are possible within its present limits, but a more continuous park accommodation for the region N. of One Hundred and Tenth street, which region is rapidly being built up and settled. It was felt very early that the park was too far away from the populous part of the city, too much time was consumed merely in getting to it, and the approaches to it were devoid of all interest and variety. It has long ceased to be possible to control the southern approaches to the park; the land is all taken up, and is too valuable, but the disposition of the upper part of the island is within our own control, and the problem, How to provide for the future in this direction, has been solved in a most satisfactory manner by Messrs. Vaux and Olmsted in the Park-way System. (See PARK-WAY.) This system, if it could have been taken in hand a little earlier, would have made the park begin, in fact, at Madison Square, by the simple plan of changing Fifth avenue or Broadway into a stately Mall, with a plantation of trees along the middle, a double carriage-track, a horseback-ride, and ample sidewalks; in short, a finer Champs Elysées. There might easily, at small expense, have been a Circus or Round at Thirty-fourth and Forty-second streets. The reach between Madison Square and the Central Park having been thus transformed from a dull walk between nearly unbroken lines of stone walls to an open promenade for exercise and enjoyment, the work now in hand of enlarging and planting the park-ways (called by the unmeaning name of "boulevards," in our New York love of French names), by which the western side of the upper part of the island is being saved from the monotony and meanness of the lower part, would have been only an extension of the plan, and would have made the Central Park merely a beautiful incident in the long line of drives, rides, and walks, with delightful accompaniments of grass and trees, stretching from Madison Square to the Westchester suburb, which was laid out under the control and management of the Park Commission. No city in the world would have had such ample accommodation for enjoyment and exercise—convenient, too, to the great majority of her inhabitants—as New York, if this plan, once easy of execution, could have been carried out. The portion of it that covers the land S. of the Central Park has long ceased to be possible, but the connections N. of the park, between it and the Westchester suburb, are now being created, and when finished will make an era in the material and social history of our island. The plan will be fully explained in the article on PARK-WAY; it has been thus cursorily alluded to here to show that a need widely felt and often expressed, of more park accommodation, has been attentively considered, and that there is every prospect of its being satisfactorily met, in the upper part of the island at least, by those who have the park in charge. (See CLEOPATRA'S NEEDLE.)

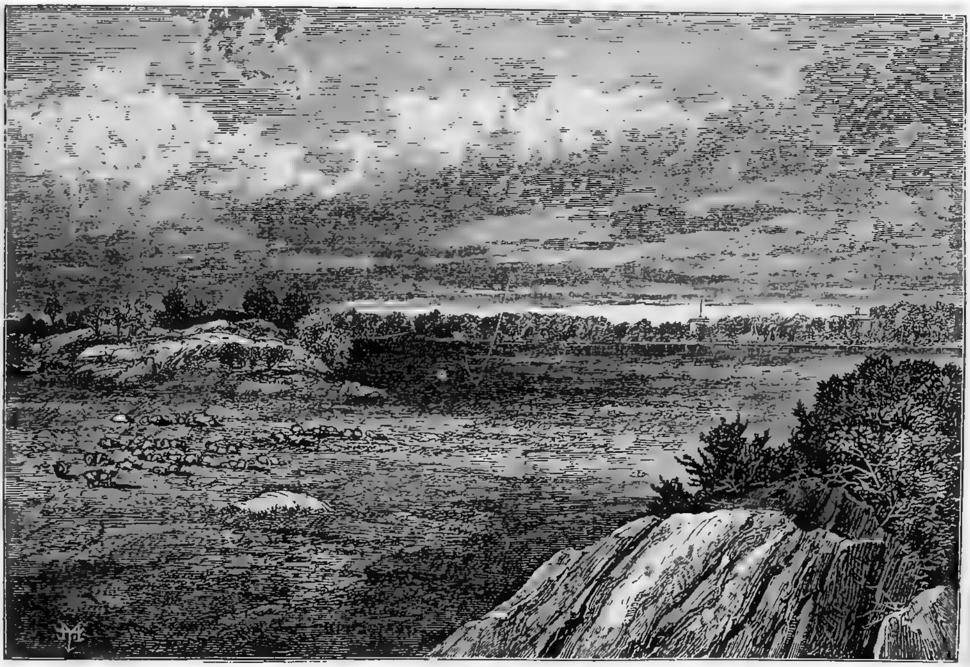


FIG. 7. Ball Ground.

The park has been a great civilizer, and its mission in this respect is only just begun. When it was first established it was the only park in the country; now there are a dozen, and there will be more and more. Without the Central Park we should not have had in this generation the Brooklyn Park, the Fairmount Park in Philadelphia—a noble undertaking—the Chicago Park; nor would those stupendous projects of the Yosemite Valley Park and the Park of the Great Cañon of the Yellowstone have been conceived and carried out. Indeed, they are Gargantua's play-grounds, and make Hyde Park and Versailles look pinched and mean. They have been laughed at as bits of brag, but, in truth, they are the merest good sense and wise provision, with no trace of exaggeration. Would that the founders of New York could have so looked ahead, even fifty years ago! We ourselves have fortunately looked ahead in season, and, forecasting the time when our city shall cover the lower half of Westchester county, we have lately located several large public parks on land formerly belonging to that territory.

We must not forget that if it was a great piece of good-fortune to get the Central Park at all—and who can doubt it?—it was an inestimable happiness that it was entrusted to the hands that have made it what we see it. New York can never honor the men enough who, with the exception of a brief time of nightmare, when "the Ring" tried to make it their stye, have cared for it with disinterested devotion from the beginning. They deserve our gratitude for this, that, in a dark time, when public honor, and even common honesty in public men, seemed thrown overboard, they helped us to support our self-respect, and to make a return to better things seem possible by keeping steadily in view the sight of at least one civic department administered with good sense, economy, and honesty, and with a single eye to the public good. CLARENCE COOK.

Cen'tral Prov'inces, The, one of the great administrative divisions of British India, are situated between lat. 18° and 24° N., and between lon. 77° and 83° E. Area, 84,208 square miles. They were formed into a chief commissionership in 1861, and they are divided into four commissionerships and nineteen districts. The line of railway connecting Bombay with Calcutta passes through these provinces, and has completely altered the condition of the country, which, up to the time when it was formed into a chief commissionership, was almost unknown. The traffic that passes through the capital, Jubbulpore, is larger than that of any other city in India, except Bombay. The revenue of the provinces in 1880 amounted to £1,299,130. Pop. in 1881, 8,173,824.

Centrarchidæ. See Appendix.

Cen'tre, or **Center** [Gr. *κέντρον*; Lat. *centrum*], originally a "point;" hence the point of a compass which remains fixed while the other is moved round to describe a circle. The centre of a circle is a point within it equally distant from every part of the circumference. The centre of a sphere is a point equally distant from every point of the surface. In war, the term *centre* is applied to the main body of an army located between the two wings. In French politics the *Centre* is used to designate a party of moderate royalists or conservatives who support a policy intermediate between that of the *Droit*, "right," and that of the *Gauche*, "left."

Cen'tre, capital of Cherokee co., Ala. (see map of Alabama, ref. 2–E, for location of county), is near the Coosa River, about 140 miles N. by E. from Montgomery, near a steamboat landing. It has an academy. Pop. in 1880, 144.

Centre, capital of Shelby co., Tex. (see map of Texas, ref. 3–K, for location of county). Pop. in 1880, 177.

Centre City, on R. R., capital of Chisago co., Minn. (see map of Minnesota, ref. 9–F, for location of county). Pop. in 1880, 33.

Cen'tre Col'lege, Danville, Ky., was chartered as a State institution in 1819. An amendment to the charter gave the control of the school to the Presbyterian synod of Kentucky upon condition of synod's paying $20,000 towards the endowment. The condition was fulfilled, and Centre College became a synodical school in 1831. The following list gives the names of its presidents and the dates of their election: Rev. Samuel Findlay (pro tem.), 1822; Rev. J. Chamberlain, D. D., 1822; Rev. D. C. Proctor, D. D. (pro tem.), 1826; Rev. Gideon Blackburn, D. D., 1827; Rev. J. C. Young, D. D., 1830; Rev. L. W. Green, D. D., 1857; Rev. W. L. Breckinridge, D. D., 1863; Ormond Beatty, LL.D., 1870. Under the long presidency of Dr. Young the college rose to great eminence among Western schools. It retained both its numbers and its reputation until the civil war, when the number of students was reduced from 200 to less than 50. The close of the war did not bring peace to the Church. The synod of Kentucky was rent asunder, the larger body joining the Southern Presbyterian Church—the smaller, and with it Centre College, adhering to the General Assembly. Litigation ensued, and all the courts, both State and Federal, decided that the Assembly had the rightful control. Amidst this litigation (now closed) the number of students steadily increased, the last annual catalogue giving a roll of 97, with a training-school of 85 pupils; total, 182. Centre College aims to give simply a liberal education. The college course embraces the usual curriculum, along with special advantages for acquiring the leading languages of modern Europe. Other features of interest are a four years' course of lectures on the history, structure, and literature of the English language, and a daily lecture by the professor of ethics on biblical themes or on subjects relating to the development of a true Christian manhood. Students find boarding in private families and in a college-home. The faculty consists of a president, vice-president, and seven other instructors. The libraries of the college contain about 8000 volumes. Facilities for instruction in the sciences are good and increasing. The alumni at the close of 1883 numbered 906. The college year begins the first Monday in September, and closes the third Thursday in June. The endowment yielding an income amounts to about $165,000; the buildings and grounds are estimated at $85,000 additional. Ormond Beatty.

Cen'tre of Grav'ity, the point in a body which is always in the line of the resultant of the weights of all the particles composing that body, no matter in what position the body be placed. Each particle of a body held above the surface of the earth is acted upon by gravitation, and we may look upon the gravitation of each particle as being one of a system of parallel forces, and the gravitation of the whole as a resultant of those forces. Whatever be the direction of these forces with respect to the mass, the resultant will always pass through a fixed point within the mass, which point is the centre of gravity for the body. Every mass which is supported above the earth must have its centre of gravity so placed that a line drawn from it perpendicularly downward will fall within the base; otherwise the body will fall. The centre of gravity of many bodies may be found by geometrical rules, but with the supposition that the bodies are of homogeneous or uniform specific gravity—a condition which is not often found exactly fulfilled in practice. F. A. P. Barnard.

Cen'tre of Mag'nitude, The, is a point so situated that all straight lines passing through it, and terminated by the circumference or superficies of the figure or surface, are bisected in it.

Centre Point, capital of Howard co., Ark. (see map of Arkansas, ref. 4–A, for location of county). Pop. in 1880, 316.

Cen'treville, capital of Bibb co., Ala. (see map of Alabama, ref. 4–C, for location of county), on the Cahawba River, at the Lower Falls, 38 miles S. E. of Tuscaloosa. Pop. in 1870, of Centreville beat, 1285; in 1880, 1644.

Centreville, on R. R., Wayne co., Ind. (see map of Indiana, ref. 6–G, for location of county), 5 miles W. of Richmond, has a female college. Pop. in 1870, 1077; in 1880, 875.

Centreville, city and R. R. junc., capital of Appanoose co., Ia. (see map of Iowa, ref. 7–H, for location of county), 125 miles W. S. W. of Muscatine, has a fine court-house and manufactures of various kinds, and is underlaid with an abundant supply of coal of very fine quality. Pop. in 1870, 1037; in 1880, 2475; in 1885, 3434.

Centreville, on R. R., capital of Queen Anne co., Md. (see map of Maryland, ref. 2–G, for location of county), 30 miles E. by N. from Annapolis, is situated in a large peach-growing region. Steamboats connect it with Baltimore. It has an academy, an agricultural implement factory, and a foundry. Pop. in 1870, 915; in 1880, 1196.

Centreville, capital of St. Joseph co., Mich. (see map of Michigan, ref. 8–H, for location of county), on R. R. and Prairie River, 132 miles E. of Chicago. It has a large knitting factory and good schools. Pop. in 1870, 749; in 1880, 705; in 1884, 822.

Centreville, capital of Reynolds co., Mo. (see map of Missouri, ref. 7–I, for location of county), on the West Fork of Black River, about 40 miles S. by W. of Potosi. Pop. not in census of 1880.

Centreville, capital of Hickman co., Tenn. (see map of Tennessee, ref. 6–E, for location of county), on Duck River, 50 miles S. W. of Nashville. P. in 1870, 175; in 1880, 287.

Centreville, capital of Leon co., Tex. (see map of Texas, ref. 4–I, for location of county), 130 miles N. E. of Austin City. Pop. in 1870, 221; in 1880, 223.

Centrip'etal and **Centrif'ugal,** terms used in botany, and applied to two modes of inflorescence. When the terminal flower-bud is the first to expand, the inflorescence is said to be centrifugal. When the expansion begins with the bud which is nearest the base of the floral axis (or nearest the circumference in a cyme or corymb), and proceeds towards the terminal or central bud, the inflorescence is centripetal.

Centripetal and **Centrifugal Forces.** If we suppose a body to move in a circle with a uniform velocity, it is shown by the laws of motion that it must be acted upon continually by a uniform force directed towards the centre; which force expends itself each instant in deflecting the moving body from the straight line in which it would normally move, this line being a tangent of the circle in which motion takes place. The force with which the body is impelled toward the centre is called *centripetal*: the equal and opposite force which tends to make it fly from the centre is the *centrifugal* force. Both together are the *central* forces. Each is equal to the weight of the body multiplied by the square of the velocity, and divided by the acceleration of gravity and the radius.

Centumalus is the name of a plebeian family of the *Gens Fulvia*.—One member, Maximus Centumalus, was legate to the dictator M. Valerius Corvus in the Etruscan war, 301 B. C., and consul in 298 with L. Cornelius Scipio, when he gained a brilliant victory over the Samnites near Bovianum.—Another, Cn. Fulvius Centumalus, was consul in 229, and triumphed in the following year, having dispersed the troops of the Illyrian queen, Teuta, and shut her up in the fortress of Rhizon. This was the first triumph over Illyrians occurring in the history of Rome.—His son, Cn. Fulvius Centumalus, was consul in 211 together with P. Sulpicius Galba. His command was prolonged beyond the term of his consulship, but in 210 he was defeated by

Hannibal near the town of Herdousa in Apulia. He himself and eleven tribunes perished in the battle.

Centumviri, among the Romans, were judges appointed, three out of each tribe, to decide common causes. The extent, however, of their power is uncertain.

Cen'turies of Mag'deburg, the first church history by the Protestants, the preparation of which occupied many eminent scholars for a long period. The plan of an extended work, which should reveal the deviations of the Roman Church from the practices of the early Christians, was first conceived by Matthew Flacius of Magdeburg in 1552. The labor begun by him was carried forward by Wigand, Matthew Judex, Basil Faber, Andreas Corvinus, and Thomas Holzhuter, and the means therefor were provided by the evangelical princes and great men. The work appeared at Bâle in 13 vols., each volume covering a century (1559–74), but the headquarters of the enterprise was Magdeburg, whence the name. The materials are arranged under fifteen different heads—doctrine, government, heresies, ceremonies, missions, councils, etc. The arrangement is mechanical, and the style (the book is written in Latin) is cumbersome and affected. But the amount of criticism brought to bear on the subject is considerable. The *centuriatores*, as the authors were called, never brought it down beyond the year 1300. In refutation of the "Centuries," Baronius wrote the "Annales Ecclesiastici."

Centu'rion [Lat. *centurio*, from *centuria*, a "hundred men"], an officer of the ancient Roman army who commanded one hundred men or a company called *centuria*.

Cen'tury [Lat. *centuria*, from *centum*, a "hundred"], a company of one hundred men in the Roman army; also a civil division of the Roman people formed for the purpose of voting. According to this division, which was founded on property, the people voted in the *comitia centuriata*. (See COMITIA.) Servius Tullius divided the citizens of Rome into 193 centuries. In modern times the term is mostly used to denote a period of 100 years.

Century Plant. See AGAVE.

Cephalas'pis [from the Gr. κεφαλή, "head," and ἀσπίς, a "shield"], a genus of fossil fishes armed with rhomboidal ganoid plates of enamelled bony structure. Several species are found in the upper Silurian and in the Devonian rocks. They had large heterocercal tails, and appear to have been rapidly moving, predaceous fishes. The name is derived from the large plate which covered the head, the sharp anterior edge of which may have served the fish as an offensive weapon.

Cephaliza'tion [from the Gr. κεφαλή, "head"]. As the head is the seat of power in an animal, the part that gives honor to the whole, it is natural that among species rank should be marked by means of variations in the structure of the head; and not only by variations in structure, but also in the extent to which the rest of the body directly contributes, by its members, to the uses or purposes of the head. *Cephalization* is, then, simply the degree of head domination in the structure, as implied in the derivation of the term. The following are some of the ways or methods in which it is manifested:

1. With *superior* cephalization—that is, as species rise in grade or rank—more and more of the anterior part of the body or of its members render service to the head; with *inferior*, less and less. In many cases, part of the organs that serve as feet in the lower tribes serve as jaws in the higher, or, in other words, are transferred from the locomotive to the cephalic series, and thus the structure indicates higher cephalization.

2. With *superior* cephalization the structure of the head or of the anterior portion of the body becomes more and more compacted, perfected, and condensed or abbreviated; with *inferior*, the same portion becomes more and more lax in its parts or loosely put together, and imperfect in the parts or members themselves, and at the same time the whole is more and more elongated and spaced out or enlarged.

3. With *superior* cephalization the posterior portion of the body becomes more and more compacted, or firmly put together and abbreviated; that is, as concentration goes on *anteriorly* there is abbreviation *posteriorly*. Even the tail shows grade; for great length or size or functional importance is actually a mark of inferior grade, other things being equal.

4. With *superior* cephalization there is an upward rise in the head-extremity of the nervous system; and this reaches its limit in man, in which it becomes *erect* and points heavenward. With *inferior*, there is the reverse condition, and the limit is seen in the *horizontal* fish.

5. With *inferior* cephalization there is not only a less and less concentrated or compacted and perfected state of the whole structure before and behind, but in its lower stages the degradation of the structure extends to an absence of essential parts, as teeth, members, senses; and often also to a gross enlargement of the body beyond the size which the system of life within can properly wield, and in this case the body is stupid and sluggish.

The laws of cephalization act conjointly with another principle in animal life—that of the *oppositeness subsisting between the cephalic or anterior and the posterior extremities of the animal structure*, which is a kind of antero-posterior or fore-and-aft polarity. This oppositeness or polarity is *up and down* in the plant, and *fore and aft* in the animal. The fore and aft becomes strictly up and down *in position* in man; and this by elevating heavenward the cephalic extremity, not by a change of the axis of symmetry to that of the plant.

The following are examples of cephalization, and of decephalization as the reverse steps are properly designated, in some of the classes of animals:

The subdivisions of the division of brute mammals (or quadrupeds) containing the larger species are four:

First, the Quadrumanes, or monkeys.

Second, the Carnivores, or flesh-eaters, including the lion, cat, dog, bear, and the like.

Third, the Herbivores, or plant-eaters, including the elephant, rhinoceros, horse, hog, ox, deer, etc.

Fourth, the Mutilates, including the whales, dolphins, etc., in which the limbs are degraded to the structure and uses of fins, and part are wanting, and therefore the species are in a sense, *mutilated*, whence the term *Mutilates*. Such forms are appropriately styled *degradational* forms, since they correspond to a degradation of the mammalian structure or type. These several subdivisions have their distinctions, and also their naturalness, strongly exhibited in characters based on this principle of cephalization. Illustrations of this fact may be drawn first from the fore limbs.

In the Quadrumanes or monkeys the fore limbs are so constructed and arranged that they serve (1) for carrying their young, (2) for supplying the mouth with food, (3) for taking their prey, and (4) for locomotion; in the Carnivores, they serve (1) for taking their prey, and (2) for locomotion; in the Herbivores, only for locomotion—for cattle use their fore legs for their simple legitimate object of walking, nothing higher, nothing lower; in the Mutilates, or whales (*degradational* species, as before styled), they are fit only for something lower, for they are merely fins, like those of fishes. It thus appears that in the passage from Carnivores to Herbivores the fore limbs lose all cephalic use, they not even serving in the latter to get or carry food to the mouth; and lower down, in the whales and related species, they are degraded into swimming organs.

Passing, now, from the highest of these four subdivisions—that of the monkeys—up to man, there is a sudden elevation of structure, corresponding well with the spiritual elevation. The fore limbs are taken out of the foot-series, and thus rescued from the inferior service of locomotion. As in some brutes, these members serve to carry the young and to collect food and convey it to the mouth. But along with such uses there are others more exalted, demanded by the spirit within. Moreover, far the larger part of the body is thus made to belong to the anterior portion, and this anterior portion is consequently much increased, while the posterior stands on its narrow base of two feet, and is reduced to a minimum.

Let us now look at the above four subdivisions of mammals with reference to other methods of cephalization, and see how they exhibit, in accordance with this principle, their differences of grade.

The Quadrumanes, or monkeys—the highest of the brute species—have the body most raised from the horizontal; the head in the typical species shortest and most compacted; and the superior species among them—the man-apes, as the gorilla and orang—have no tail, so that this kind of posterior abbreviation is at its extreme limit.

The Carnivores, as the cat, lion, etc., also have a short, well-compacted head, but one more projecting than that of the higher monkey; the hind feet, as well as fore feet, are provided with claws to aid in climbing; and the mouth is prostituted from the proper or normal use of the organ to that of carrying its young or its prey.

The Herbivores, as the ox, horse, tapir, etc., have the head very much elongated (a strong mark of decephalization), and in some appropriated to the inferior use of self-defence; part of the teeth usually wanting; and the feet fitted for locomotion, and not in any case for grasping. Moreover, in the ox, goat, deer, and allied species, and in the horse, the hind legs are very much the stronger, on which account from this group come the draft-animals used by man; and this characteristic indicates a backward transfer of force, which is a prominent mark of decephalization.

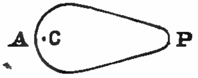
The Mutilates, or the whales, have a head sometimes many yards in length, made of bones imperfectly united; the teeth often entirely wanting, and sometimes excessively numerous—the latter a mark of feeble concentration in the life-system, in consequence of which the parts grow or multiply to excess (something as a tree grows in size, because given up to the uncontrolled power of growth); and not only the fore legs reduced to fins and feeble in locomotion, but the hind limbs wanting; the body behind enormously enlarged and prolonged; and the prolonged tail, thus made, serving as the main organ of locomotion—a low, fish-like condition of the structure, indicating in a striking manner its extreme decephalization. If the Carnivore is a *prosthenic* animal, or *strong before*, the whale, like a fish, is eminently *metasthenic*, or *strong behind*.

The four grand divisions of mammals are thus strikingly marked off by characters based on this principle of cephalization.

Turn now to man, at the head of the system of life. He is vastly above even the man-apes in the form of the head, as well as in its perfection of make, for the jaws project but slightly, when at all, beyond the forehead, and his back, in his natural position, only a little behind the posterior side of the brain. His nervous system stands vertical, with the brain at the summit; and in average specimens of the race the brain is nearly treble the size of the brain of a gorilla. His teeth are simply for cutting soft food and for chewing, not for tearing flesh or branches of trees, or for carrying his young. His fore limbs take no part in locomotion; they are transferred completely from the locomotive series to the cephalic. His feet may be thought to be inferior to a monkey's, since they cannot clasp a stick or branch, like a hand. But this latter quality makes a good climber, and serves well a being with the monkey's propensities and necessities, but is not befitting man's erect body and higher purposes, which are best served by feet that give a firm support.

The question as to the condition of the life-forces thus passes from the sphere of speculation to one of direct observation. A lion, for example, exhibits to the eye the high degree of cephalization of its structure by its strength anteriorly, or that of its head and fore limbs, and the correlate form and structure of these and other parts of the body; and a whale manifests its low degree by its degraded head and senses, its feeble limbs partly obsolete, and the immense size and strength of the tail; and this is so obvious that the muscular or motorial force of the two might be sufficiently well represented by the annexed figures; Fig. 1 corresponding to that of the lion, and 2 to that of the right whale, A being the anterior or cephalic extremity, and P the posterior or caudal extremity. The figures give a faint idea of what is meant by *cephalization* and *decephalization*. If the sensorial forces of the lion were taken into consideration, the contrast between the two would be still greater. C is the position of the prime systemic centre; its remoteness from the front margin in the right whale (Fig. 2) is one of the marks of the extreme decephalization of the structure. The arrangement of the muscular force in different Herbivores might be represented by figures intermediate between 1 and 2.

1.



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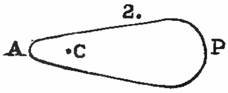


For further illustration, the Articulates may be referred to; that is, the sub-kingdom of animals, including insects, spiders, centipedes, crustaceans (crabs, lobsters, etc.), and worms, the body and members of which are jointed. The three classes are—1, Insecteans; 2, Crustaceans; 3, Worms. The transfer of members from the locomotive to the cephalic series, or the reverse—one of the most striking marks of cephalization in animals having limbs—is well shown in the two higher of these classes. The three orders or grand divisions of Insecteans are—1, Insects; 2, Spiders; 3, Myriapods or Centipedes.

Insects, the highest, have *three* pairs of feet and *three* pairs of mouth-organs. Spiders have *four* pairs of feet and *two* of mouth-organs. Here *one* pair out of the series of head-organs in insects is transferred in spiders to the locomotive series. Insects and spiders are hence very distinct types of structure; and the higher is based on superior cephalization; for in insects a larger part of the structure is embraced in the cephalic or anterior portion than in spiders.

Both insects and spiders are structures with fixed or closed limits, for the number of pairs of feet is limited, and the segments of which the body is made admit of no increase beyond the normal or regular number. But Myriapods are not limited in the number of segments of the body, or in that of the pairs of feet; on the contrary, they allow of any number of feet and of indefinite lengthening behind. The order is distinguished by the degradational character of indefinite posterior elongation, and as indefinite a number of legs—an evidence of low decephalization.

It appears, then, that in passing from Myriapods to typical spiders there is first posterior abbreviation—one mark of cephalization; and in addition the body of the spider is not worm-like in being made up of a large number of similar segments, but has an anterior part set off for the purposes of the head and locomotion (called the cephalothorax) distinct from the abdomen. Next, in passing from spiders to insects, one pair of locomotive organs, the anterior, becomes a pair of jaws—that is, it is given over to head-uses; and, moreover, the head becomes a separate segment from the thorax, which shows further concentration of the forces anteriorly, or a higher grade of cephalization.

The orders of Crustaceans are three: 1, Decapods, or the ten-footed; 2, Tetradecapods, or the fourteen-footed; 3, Entomostracans, or species with defective feet. In the highest, the Decapods, there are *five* pairs of feet and *six* pairs of mouth-organs; while in the next order, that of Tetradecapods, there are *seven* pairs of feet and *four* pairs of mouth-organs. In the latter, then, the feet have gained *two* pairs, the mouth has lost *two*; or, in other words, *two* pairs have passed from the cephalic to the locomotive series. Hence, the Decapods and Tetradecapods differ on the same principle as insects and spiders; that is, in the transfer of part of the mouth-organs of insects to the locomotive series. Like the latter, also, the feet are perfect and *fixed* or *limited* in number, the regular or normal number never being exceeded. They are, therefore, regular or normal types.

In descending to the third order, or the Entomostracan, from the Tetradecapods, the mouth loses other pairs of organs by this method of transfer—in some *one* pair, in others *two*, in others *three*, in others *four* (or all). The Entomostracans are defective in both their feet and segments, and are *degradational* forms; and hence these several grades of transfer have not separately the importance which belongs to them in the regular or normal types. In going up from Entomostracans to Tetradecapods, the system of structure becomes normal and the number of mouth-organs or jaws four pairs, the locomotive numbering seven pairs; and then in passing from Tetradecapods to Decapods, the two of the seven pairs of locomotive organs become jaws, or are turned over to the head.

Again, among Decapods, or ten-footed Crustaceans, the prime difference between the crab and the lobster or shrimp is, that in the former the head of the latter is shortened, and its parts abbreviated and more compacted together, and the abdomen or tail-portion reduced from great length and great strength (which makes an organ of locomotion) to a very short, narrow, and feeble organ packed away under the rest of the body. There is concentration and compacting of the whole structure—a shortening in before and behind—on an extraordinary scale, and thus the crab exhibits its higher grade of cephalization.

Again, an insect and a crab are both Articulates, and are built on a common fundamental type of structure. At the same time, the insect, though very much the smaller, is greatly higher in degree of cephalization. The head and thorax of the insect answer together to the *head alone* of the crab, its three pairs of jaws and three pairs of legs corresponding to simply the six pairs of jaws in the Decapod. Thus, abbreviation before and behind, and concentration of the system, are here carried to an extreme perhaps not exceeded in the whole animal kingdom. We appreciate this when we consider the minuteness of the brain—or, more properly, of the cephalic ganglion—of a bee or an ant, and the wonderful instinctive intelligence, and also mechanical power, which proceed from it.

The varieties of the human race afford other illustrations of the principle of cephalization. The lower races of men have projecting jaws, a retreating forehead, and generally a head elongated behind. With upward progress in cephalization, the jaws shorten in, and the head changes in proportions from elongation hindward to fulness in front, with increasing breadth and height and verticality of forehead. There is an increase of head-power accompanying this shortening before and behind, and the bringing of the mouth directly under the vertical forehead; and all is an effect of upward progress in cephalization. It has been stated by American dentists that it is not uncommon for the outer incisor to be crowded out, and the posterior molar to fail of development; and this, if true, may be a direct effect of the shortening of the jaws still going on. Whether so or not, it is certain that the jaws of man are made short through the rejection of twelve of the forty-four teeth that belong to the typical mammals, man having but thirty-two, so that the progress in cephalization of the mammalian type has apparently forced out three from either side of either jaw—viz. one incisor and two premolars. Another effect of cephalization, or concentration headward, in the highest type of mammals has been a shortening of the arms, the arms being extra long in the apes, man-apes included. Dr. B. A. Gould found in his measurements of soldiers (to which work he was called by the Christian Commission during the war) that the negroes had the arm on an average an inch longer than the whites. We may hence conclude that cephalization has presided over the greater part of the changes in form which man has undergone in passing from the savage to the civilized state.

It follows from the facts that have been presented, that if the animal races have made progress through the ages as a consequence of a struggle for life and natural selection, as claimed by Darwin, or if there has been any system of natural causes at the basis of evolution, the progress must have been subordinated to this law of cephalization. The brain is the part of an animal that, in one way or another, comes most into contact with the outer world; for all the senses react upon it, and hence all outside influences and the whole constitution of the being bear upon its condition. It would be likely, therefore, to undergo modifications for better or worse according as the conditions favor progress or the reverse. This may not unfrequently be the source of new varieties of animals—that is, the means by which an impress is made on the embryo and a new variety initiated.

The evidences of the connection of grade, and also of classification, with cephalization, might be traced through all the grand divisions of the animal kingdom. But to give full illustrations of the subject in the various departments of zoology would require a mention of details that would here be out of place. Sufficient has been brought forward to explain the principle, and give some idea of its importance. J. D. Dana.

Cephalo'nia [anc. *Cephallenia;* Gr. Κεφαλληνία], the largest of the Ionian Islands, and now constituting one of the nomarchies of the kingdom of Greece, is in the Mediterranean near the W. coast of Greece. It is about lat. 38° N. and lon. 20° 30′ E. The greatest length is 32 miles, and the area 302 square miles. The surface is mountainous, the climate is pleasant, and the soil is mostly thin. The highest summit rises about 5000 feet above the level of the sea. The chief articles of export are currants and olive oil. The principal towns are Argostoli and Lixuri. There are many ancient ruins upon the island. This island was called *Samos* by Homer. Pop. in 1879, 80,543.

Cephalop'oda, or **Ceph'alopods** [from the Gr. κεφαλή, "head," and πούς (gen. ποδός), the "foot," because the "arms" or "feet" surround the mouth], the highest class of the Mollusca, including the cuttle-fishes, nautili, argonauts, ammonites, etc., all marine and carnivorous, and all laterally symmetrical, having a shell usually straight, but sometimes coiled in a vertical plane. The nautili and argonauts alone have external shells, though many extinct species had them; but the other living species have generally an internal shell, of which "cuttle-fish bone" affords an example. The cephalopods have muscular arms or tentacles, used in prehension and locomotion; many have fins, and all have the power of locomotion by forcibly expelling water from the gill-chamber. They generally have two large eyes, ear cavities, each containing an otolite, two jaws, and a fleshy, spinous tongue. The nervous system is well developed. The brain is a peri-œsophageal ring. The gills are either two or four in number, placed in a chamber into which water is admitted by a slit, and from which it is expelled through a "siphon" or "funnel." The class is divided into two orders—Dibranchiata and Tetrabranchiata, 2-gilled and 4-gilled cephalopods.

The Dibranchiata are swimmers, having (except the argonauts) an internal shell, or rarely none at all; eight or ten arms, with suckers and sometimes sharp hooks upon them; and an ink-bag filled with a dark fluid for coloring the water, concealing the animal in times of danger. The Dibranchiata are divided into octopods, having eight arms only (argonauts and Octopodidæ), and decapods, having ten arms, two of which are longer and used as tentacles (squids, belemnites (fossil), cuttle-fishes, and spirulæ).

The Tetrabranchiata are mostly extinct. They have external chambered shells, are creepers instead of swimmers, have four gills instead of two, have very numerous arms, eyes on a stem instead of being sessile, and have one heart with a single chamber, while the Dibranchiates have also two gill-hearts. The Tetrabranchiata have no ink-bag. The *Nautilus* proper (not the argonaut or paper nautilus) is the only living genus. The fossil species are very numerous, and include Nautilidæ, Orthoceratidæ, and Ammonitidæ.

Cephalop'tera [from the Gr. κεφαλή, the "head," and πτερόν, a "fin" or "wing"], a genus of cartilaginous marine fishes belonging to the ray family, and including the *Cephaloptera vampirus,* called sea-devil or vampire, sometimes weighing several tons. It is much wider than it is long, measuring some seventeen feet by ten. Each side of the head has a pre-cephalic fin coiled upon itself in the shape of a horn. It is sometimes found on the southern coast of the U. S., and is said to have been known to seize the cables of small vessels and tow them for miles at a great speed.

Ce'pheus, a constellation of the northern hemisphere, comprises about thirty-five stars, the largest of which is Alderamin, a star of the third magnitude.

Cerac'chi (Giuseppe), a skilful Italian sculptor, born about 1760, came to Philadelphia in 1791, and executed fine busts of Washington, Alexander Hamilton, and others. Among his works is a statue of Bonaparte. As an accomplice of Arena in a conspiracy against the life of Bonaparte, he was executed in 1802.

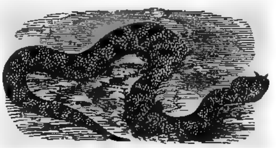
Ceram', or **Zeram',** an island of the Malay Archipelago, is the largest of the Moluccas except one. It is between Booroo and Papua, about 3° S. of the equator Its length E. and W. is nearly 200 miles, and its area about 6500 square miles. Pop. 67,000. It is partly occupied by mountains, the highest points of which rise 8000 feet or more above the level of the sea. The vegetation here is luxuriant, and the highlands are mostly covered with forests. The clove and nutmeg grow wild in Ceram, which also produces the sago-palm in abundance. The lowlands are peopled by Malays, who are bold sailors and pursue trade. The mountains are inhabited by fierce Alfooroos. The Dutch claim the sovereignty of this island.

Ceramia'ceæ, a natural order of cryptogamous plants, or a sub-order of Algæ, consisting of sea-weeds of a rose color, with fronds formed of cells arranged in rows or in a single row; the sporocarps contain cells or spores, often in fours, with a transparent perispore, and enclosed in receptacles. They are found in the seas of the northern temperate zone. Many of them are beautiful, and some species afford food, as dulse and Carrageen (which see). The edible birds' nests of the Chinese market are supposed to derive their value from a plant of this order.

Ceram'ic [from the Gr. κέραμος, "potter's clay," an "earthen vessel" or "pottery"], pertaining to pottery, fictile. The term ceramic art is applied to the department of plastic art, which comprises all objects made of baked clay, as vases, urns, bassi-rilievi, etc.

Cerami'cus [Gr. Κεραμεικός; see last article], a place near Athens and without the walls where citizens who fell in battle were buried at the public expense; the potter's field or quarter.

Ceras'tes [from the Gr. κέρας, a "horn"], or **Horned Snake,** a genus of venomous serpents of Northern Africa, having a flattened head, two rows of plates under the tail, and keeled but not spinous scales. The nostril is small and semi-lunar. Its name is derived from the horned scale which grows upon the eyelids of the male. Several deadly species of *Clotho* of West and South Africa have somewhat similar horns, and are by some included in this cognate genus.



Cerastes.

Ce'rate [Lat. *ceratum,* from *cera,* "wax"], a compound of wax with other oily and medicinal substances in such proportions as to have the consistence of an ointment. Simple cerate is made by melting together equal parts of white wax and olive oil; they are to be heated together, and carefully stirred into a uniform consistence while cooling.

Ce'ratites [from the Gr. κέρας, a "horn"], a genus of the fossil Ammonitidæ (which see) characteristic of the Trias formation, to which it is peculiar. It is distinguished by having the lobes of the sutures serrated, while the intervening curves toward the aperture are simple.

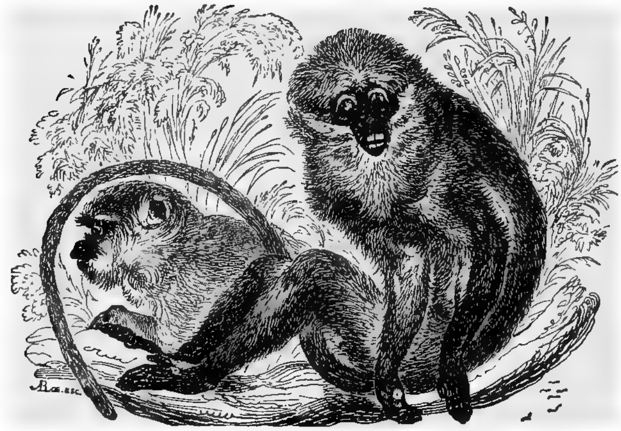
Ceratodontidæ. See Appendix.

Cer'berus [Gr. Κέρβερος], the triple-headed dog which, as the ancient Greeks imagined, guarded the portal of the infernal regions. He resisted only those who attempted to come out of Hades. Hercules is said to have overpowered him and dragged him out. The name Cerberus was given by Hevelius to a northern constellation.

Cerca'ria, the larval form of various trematode worms (*Distoma, Bilharzia,* etc.). The perfect worm deposits an egg, which hatches into a curious little sac, formerly known as *Opalina,* itself often entozoic, and once believed to be an infusorian. The opalina in turn gives birth by internal gemmation to one or more *Cercariæ*, which are oval tailed organisms which swim actively in water, and finally enter, if possible, into the bodies of insect larvæ, mollusks, fishes, etc., and are thus often indirectly, or in many cases directly, introduced into the stomachs of men and various vertebrate animals. Here they become developed into trematode worms.

Cer'cis Canaden'sis, Red Bud, or **Judas Tree,** a small tree of the natural order Leguminosæ, is a native of the U. S., and is cultivated as an ornamental tree. It has cordate, pointed leaves, and red-purple flowers in umbel-like clusters. It flowers early in the spring, before its leaves are opened. (See JUDAS TREE.)

Cercoce'bus [from the Gr. κέρκος, a "tail," and κῆβος, a "monkey"], a genus of long-tailed African monkeys, collectively called "mangabeys" by Buffon. They are remarkable for their ludicrous antics, their almost constant grotesque grinning, and their general good temper. The sooty monkey (*Cercocebus fuliginosus*) is the best known.



Cercocebus fuliginosus.

Cercopithe'cus [from the Gr. κέρκος, a "tail," and πίθηκος, an "ape"], a genus of small, long-tailed African monkeys of the family Simiadæ. The species are very numerous. They have mostly long hair, and long and large tails, which they carry over the back. They are collectively called guenons by some authors. One of the best known is the malbrouck (*Cercopithecus cynosurus*), or dog-tailed monkey.

Cercopithecus cynosurus.

Cère, a river of Southern France, noted for the picturesque beauty of its valley, flows through Cantal and Lot, and enters the Dordogne. It is about 55 miles long.

Cere'a, a market-town of Italy, in the province of Verona, in Lombardy, 19 miles S. S. E. of Verona. It has the ruins of an ancient castle. Pop. 5518.

Ce'real [Lat. *cerealis*, from *Ceres*, the goddess of agriculture]. Originally, *cerealis* signified pertaining to Ceres or sacred to Ceres. Bread or grain was called *cerealia munera* ("cereal gifts," or "gifts of Ceres"). In modern language, cereal means pertaining to edible grain or breadstuffs, as wheat, rye, maize, and barley; as a noun it denotes those articles of food.

Cerea'lia, or **Cereal Plants,** the plants which produce edible grains, and are cultivated for their seeds, which are used as breadstuffs. With the exception of buckwheat, they belong to the order Graminaceæ (true grasses), but differ widely in structure and characters. Having been cultivated from a very remote antiquity and modified by cultivation, their original forms and native countries cannot be ascertained. Difficulty is found in arranging the numerous varieties in their proper species. The most important cereal grasses are wheat (*Triticum*), barley (*Hordeum*), maize (*Zea*), rye (*Secale*), rice (*Oryza*), and oats (*Avena*). Rice is the chief food of a greater number of the human family than any other grain, but wheat is generally admitted to be superior as a material for bread to all the other cereals. Maize will thrive in regions which are too warm for wheat. The cereal grains are extensively used in the manufacture of fermented and distilled liquors.

Cerebellum. See BRAIN, by PROF. HENRY HARTSHORNE, A. M.

Cer'ebro-spi'nal Flu'id, a serous liquid, of alkaline reaction, containing a small percentage of saline and animal matters. It fills the subarachnoid space, between the arachnoid membrane and pia-mater, both within the skull and the vertebral canal. It prevents injury from concussions and shocks, and perhaps prevents undue pressure upon the brain by withdrawing itself into the spinal canal at times when the brain contains more blood than usual. In certain diseases it is secreted in great excess.

Cerebro-spinal Meningitis. See MENINGITIS.

Cereop'sis, the quasi-popular as well as scientific name of an Australian goose remarkable for its very short and thickened bill. Unlike other geese, it seldom seeks the water. It is large and easily domesticated, but is quarrelsome, and when tamed is so fierce that it has not been generally bred. The *C. Novæ Hollandiæ* is the only known species.

Ce'res, the Roman name of the goddess of agriculture, whom the Greeks called DEMETER, and to whom men were supposed to be indebted for the gift of breadstuffs. She was said to be the daughter of Cronos (Saturn) and the mother of Proserpine. Like the other children of Cronos, she was devoured by her father; but he gave her forth again after taking the emetic which Metis had given him. By her brother Zeus she became the mother of Persephone (Proserpine). The most remarkable part of the myth of Ceres was the abduction of her daughter by Pluto, and the long search which Ceres made for her. Though the details of that story vary considerably, as a whole it, nevertheless, not only suggests the main idea embodied in Demeter, but also directs our attention to the principal seat of her worship. (See PROSERPINE.)

Ceres, the name of an asteroid discovered by Piazzi at Palermo in Jan., 1801. It was the first asteroid ever discovered. Its apparent size is nearly equal to that of a star of the seventh magnitude.

Cérésole (PAUL), a Swiss statesman, born Nov. 16, 1832, son of a clergyman, studied law in Lausanne. He held several offices in the cantonal government of Vaud, and became a member of the Swiss Federal Assembly in 1870, of which he became vice-president in 1872, and president in 1873. He was identified with a movement by which the central government was greatly strengthened.

Ce'reus, a genus of plants of the order Cactaceæ, comprises about 100 species, some of which have beautiful flowers. The *Cereus speciosissimus*, a native of Mexico, is cultivated in greenhouses. Its flowers are large and of a fine scarlet color, and its fruit, when well ripened, is delicious. The night-blooming cereus (*Cereus grandiflorus*), a native of South America, bears large, beautiful, and fragrant flowers, which, however, expand and fade in the course of one night, lasting only a few hours. It has been used in medicine as an antispasmodic.

APPENDIX.

[EMBRACING SUPPLEMENTARY ARTICLES AND ARTICLES RECEIVED TOO LATE FOR INSERTION IN THEIR ORDER.]

A.

Aall (Jakob), b. at Porsgrund, Southern Norway, July 27, 1773; studied theology at the University of Copenhagen, afterward natural history and mineralogy at the mining school of Freiberg; settled in 1799 on his estate, Näs Ironworks, near Arendal, and divided his time between the development of his extensive possessions, public business, and literary occupations. He was one of the most prominent among the representatives who assembled at Eiswold in 1814 and formed the present free Norwegian constitution, and he sat in the Storthing from 1816–30. D. Aug. 4, 1844. His *Erindringer som Bidrag til Norges Historie fra 1800 til 1815* (3 vols., 1844–45) is one of the principal sources of the history of Norway during that period. He also published a translation of Snorre Sturleson's *Heimskringla* (2 vols., 1838).

Aba'no, d' (Pietro), also called Petrus de Apono or de Padua, b. in 1246 at Abano, near Padua; studied Greek at Constantinople, mathematics at Padua, and medicine at Paris, and settled at Padua, where he taught alchemy and astrology according to the methods of Averroës, and practised medicine, also according to Arabic methods, with such success that he could charge Pope Honorius IV., who called him to Rome to consult him, 400 ducats a day. Envious of his fame and riches, the clergy denounced him as a sorcerer, as possessor of the philosopher's stone, etc., and the Inquisition sentenced him to be burnt. He d., however, a natural death in the dungeon, in 1315 or 1316, and his corpse was rescued by a friend, but his image was burnt in the public square. His principal work, *Conciliator differentiarum, quæ inter philosophos et medicos versantur*, has often been reprinted.

Abbe (Cleveland), M. A., b. in New York Dec. 3, 1838; graduated in 1857 from the New York City Free College; studied mathematics, astronomy, and meteorology; taught mathematics at Ann Arbor, Mich., and Cambridge, Mass.; was employed 1860–64 by the U. S. Coast Survey; visited Pulkova, Dorpat, and other European observatories 1864–66, and was appointed director of the observatory of Cincinnati in 1868, and of the government weather bureau in 1871. Among his numerous publications and contributions to scientific papers are—*Dorpat and Pulkova* (1867), *Annual Reports at Cincinnati* (1868–70), *Weather Bulletin of Cincinnati Observatory* (1869–70), *Solar Spots and Terrestrial Temperature* (1869), *Suggestions on the Use of Weather Reports* (1871), *The Nova Scotia Hurricane of Aug. 23, 1872, The Aurora of April 7, 1874*, etc.

Abbey. (1) A celibate religious community of either males or females, separated from the world and superintended by an abbot or abbess. (See, in Cyclopædia, the articles Abbot, Abbess, Cloister, Convent, and Monachism.) The earliest known Christian monastic communities were composed of groups of huts surrounding the residence of some noted anchorite. (2) The church attached to a monastery. (See Westminster Abbey, in Cyclopædia.) (3) A house near or adjoining a monastery, used as the residence of the abbot or superior.

Ab'bot (Joel), M. D., b. Mar. 17, 1766, at Bridgefield, Conn., the son of a physician; commenced to study medicine about the year 1790; removed to Georgia, and commenced to practise in 1794; in 1809 was elected a member of the State legislature, and sat in Congress 1816–25; in 1820 was appointed by the Georgia Medical Society a delegate to assist in forming a national pharmacopœia. D. Nov. 19, 1826, at Lexington, Ga. Paul F. Eve.

Abbot (Joseph Hale), b. at Wilton, N. H., Sept. 26, 1802; graduated at Bowdoin College 1822; was tutor there 1825–27; professor of mathematics and of modern languages at Phillips Academy, Exeter, N. H., 1827–33; principal for several years of a ladies' seminary at Boston, and subsequently of the Beverly High School; was long the recording secretary of the American Academy of Arts and Sciences, to whose *Transactions* he contributed papers on pneumatics and hydraulics; wrote in favor of Dr. Charles T. Jackson in the "ether controversy," and was an assistant of Dr. J. E. Worcester in the preparation of his *Dictionary*. D. at Cambridge Apr. 7, 1873.

Ab'bott (Austin), son of Jacob, b. at Boston, Mass., Dec. 18, 1831; educated in New York City; was admitted to the bar about 1852; practised his profession in partnership with his brother, Benjamin Vaughan, and attained high reputation as a consulting attorney. He has published two novels, *Conecut Corners* and *Matthew Caraby*, in which he was assisted by his brothers, and has aided Benjamin in the preparation of his legal publications.

Abbott (Benjamin Vaughan), b. at Boston June 4, 1830, a son of Rev. Jacob Abbott; was admitted to the bar of New York in 1851, and formed a partnership with his younger brother, Austin. Conjointly, they published *Admiralty Reports* (1857), *C. P. Reports* (8 vols.), *Digest of U. S. Statutes and Reports, 1789–1867* (4 vols.), *Digest of the Law of Corporations* (2 vols., 1869), etc.

Abbott (Charles Conrad), M. D., b. June 4, 1843, at Trenton, N. J., was from his earliest childhood attracted to out-of-door studies in natural history, and all his works are characterized by a style peculiar to the born student of Nature. He graduated from Trenton Academy, and in 1865 took the degree M. D. from the University of Pennsylvania. He is a contributor to many scientific journals, and a number of his articles have been gathered together in a volume entitled *A Naturalist's Rambles about Home*. His most important work was published in 1881 under the title of *Primitive Industry*. He has brought forth evidence to prove that palæolithic man existed in New Jersey as well as in Europe. This theory, although at first violently opposed, is now accepted by most archæologists. Dr. Abbott is a member of many American scientific societies and several in Europe. In connection with Mr. Putnam he worked upon vol. vii. (Archæology) of *Survey West 100th Meridian*, himself writing about one-fourth the volume. His valuable archæological collections (over 20,000 specimens) are in the Peabody Museum at Cambridge, Mass. Ralph S. Tarr.

Abbott (Edward), son of Jacob, b. at Roxbury, Mass., July 15, 1841; educated in New York City; wrote several religious books for children, a *Paragraph History of the U. S.* (1876), and other historical treatises, and became the principal editor of the *Congregationalist* newspaper.

Abbott (Emma A.), b. in Chicago Dec. 9, 1849; appeared as a public singer when only nine years old, and her musical gifts happened to attract the kind attention of Miss Clara Louise Kellogg in Toledo, O., who sent her to New York for musical instruction under Signor Errani. Her talent gradually developed, and she was afterward engaged as soprano of Dr. E. H. Chapin's church on Fifth Avenue. To finish her education she went in 1872 to Europe, her expenses being assumed by the members of Dr. Chapin's congregation; studied in Milan under San Giovani, and in Paris under Wartel, and during the four years of absence won the praise of some of the finest critics in Europe—Patti, Gounod, Titiens, Baroness Rothschild, etc. Feb. 26, 1874, she married in London, Eng., Mr. E. J. Wetherell, a native of Massachusetts, and May 2, 1875, she made her début as a dramatic singer at the Covent Garden Theatre in London in Donizetti's popular opera, *The Daughter of the Regiment*. After visiting several of the largest cities of Great Britain, singing both in concerts and operas, she returned in Dec., 1876, to New York, and made her American *début* in Chickering Hall Feb. 7, 1877.

A'begg (Julius Friedrich Heinrich), b. Mar. 27, 1796, at Erlangen, Bavaria; studied jurisprudence at various German universities, and was appointed professor in 1821 at Königsberg, in 1826 at Breslau, where he d. May 29, 1868. He was a very prolific writer. *Lehrbuch des Criminalprocesses* (1826), *Versuch einer Geschichte der preussischen Civilgesetzgebung* (1848), *Entwurf einer Strafprocessordnung für den preussischen Staat* (1865), are his principal works. Both directly and indirectly he exercised great influence on the criminal legislation of Prussia, Saxony, Bavaria, Würtemberg, Baden, and Norway.

Aberdeen, R. R. centre, Brown co., Dak. (see map of Dakota, ref. 5–F, for location of county), on Chicago Milwaukee and St. Paul and Chicago and North-western R. Rs. Pop. about 2500.

A'bich (Wilhelm Hermann), b. in Berlin Dec. 11, 1806; studied natural science at the university of his native city; travelled in Italy and Sicily, and published *Erläuternde Abbildungen von geologischen Erscheinungen, beobachtet am Vesuv und Aetna 1833 und 1834* (1837), and *Ueber die Natur und den Zusammenhang der vulkanischen Bildungen* (1841); was appointed professor of mineralogy at Dorpat in 1842, and undertook extensive explorations in the Caucasus, Armenia, and Northern Persia, the results of which he communicated partly in the annals of the Academy of St. Petersburg, partly in independent works, the principal of which are—*Ueber die geologische Natur des armenischen Hochlandes* (1843), *Vergleichende geologische Grundzüge der kaukas.-armenischen und nord-persischen Gebirge* (1858), *Sur la Structure et la Géologie du Daghestan* (1862), *Die Schlammvulkane der Kaspischen Region* (1863).

Abilene, Taylor co., Tex. (see map of Texas, ref. 3–F, for location of county), on Texas and Pacific R. R., 161 miles W. by S. of Fort Worth, is connected by stages with Fort Concho. Pop. not in census.

Achard' (Franz Karl), b. in Berlin Apr. 28, 1753; studied physics and chemistry, and published *Vorlesungen über Experimentalphysik* (4 vols., 1791–92); made extensive researches and experiments with reference to the production of sugar from the beetroot, the results of which he published in 1799–1800, and received from the Prussian king the estate of Cunern in Silesia for the purpose of establishing there a beetroot-sugar manufactory; succeeded in 1806 in developing the true practical process of manufacturing, and brought the establishment into splendid condition, especially during the enforcement of the continental system; wrote *Die europäische Zuckerfabrikation aus Runkelrüben* (3 vols., 1809). D. Apr. 20, 1821.

Achil'les Ta'tius, a rhetorician of Alexandria, lived probably in the fifth or sixth century of our era, and wrote a love-story, *History of Leucippe and Clitophon*, which has come down to us. The story is tedious, the characters insipid, and the style affected, but the book contains much curious information on Greek life and taste at that time. Edited, with commentary, by Fr. Jacobs (2 pts., 1821), and with revised text by Hercher in 1857, translated into English by A. H. (Anthony Hodges, Oxford, 1638). There exist some fragments of an astronomical treatise whose author bears the same name, but whether he is the same person is doubtful.

Ad'albert, a descendant of the famous Saxon family, the counts of Wettin; was appointed archbishop of Hamburg and Bremen—to which diocese the whole of Scandinavia belonged—in 1043 by the emperor Henry III., and in 1050 Leo IX. made him legate to the North. Endowed with a powerful intellect and an irresistible eloquence, and possessed of a vast ambition, he formed a plan for combining Germany and Scandinavia into a northern patriarchate—a plan which, if realized, would have changed not only the history of Germany, but probably that of the Roman Catholic Church. But all his exertions were frustrated by the resistance of the Norwegian king Harald, by the intrigues of Cardinal Hildebrand, and by the death of his great patron, Henry III. He now confined himself to German politics, and gained such an ascendency over the young Henry IV. that for years he was the actual ruler of the empire. In 1066 his enemies, the archbishops of Mayence and Cologne, succeeded in expelling him from the court; the Billmeyers, a rival Saxon family, invaded his territory; and the Slavs burnt down Hamburg. But Adalbert came victorious out of all his trials. In 1069 he returned to the imperial court, and vindicated himself in his position till his death, Mar. 16, 1072. (See Grünhagen, *Adalbert, Erzbischof von Hamburg*, 1854.)

Adam of Bremen (Adam Bremensis), the author of a history in four books *Of the Propagation of the Christian Religion in North Germany and Scandinavia* (the Bremen and Hamburg archbishopric) from the time of Charlemagne down to Henry IV., to which work is added *A Geographical Description of Denmark and the Countries beyond Denmark* (Sweden, Norway, Iceland, Greenland, the Faröes, etc.). The year of his birth is not known, but he was invited from Magdeburg to superintend the high school of Bremen, and all the schools of the Bremen church, in the year 1067. He was one of the best educated men of his time. He was thoroughly acquainted with the Church Fathers, such as Hieronymus, Ambrosius, Orosius, Cassiodorus, Gregory of Tours, Gregory the Great, and Beda. He had diligently studied the heathen poets, Virgil, Horace, Juvenal, Perseus, and Lucan, who were his favorites. Among the prose-writers he gave special attention to Sallust, Cicero, Macrobius, Solinus, and Martianus Capella. With such preparation he went to work, toward the close of his life, to write the history of the Church of the North. In order to get the facts, he went personally to Denmark, where he visited Svend Estridson, "who knew the history of the barbarians by heart, as if it had been written." Adam succeeded in getting at all the facts, and produced, writing in Latin, the most complete and the most reliable work on the propagation of Christianity in the North that we have. The appendix to his work, which gives a pretty complete geographical description of the North, is especially valuable, for it contains a distinct mention of America, which had been discovered by the Norsemen; and it is not beyond the range of possibilities that Columbus, who was a close student, had read Adam's work, and in it found good reasons for undertaking a voyage to Iceland in 1477. After Adam has described Iceland and Greenland he says: "Besides he (Svend Estridson, king of Denmark and nephew of Canute the Great) mentioned another land, which had been discovered in this ocean (the Atlantic), which is called Vinland, because the vine, producing excellent wine, grows there spontaneously; and corn grows there abundantly without being sown. This we know, not from fabulous conjecture, but from positive statements of the Danes." Adalbert, archbishop of Bremen, died in 1072, and Svend Estridson in 1076. Adam of Bremen's book being written after Adalbert's death, and before the death of Svend Estridson, it must have been composed some time between 1072 and 1076. Whether Adam himself died immediately after the completion of his celebrated work is not known. According to the Church Book of Bremen, he died on Oct. 12, but the year is not given. He was buried in a grove that was once his property, but which he had donated to the cloister of Romeslo. The oldest translation of his work is into French by De Chastelus of Saumur in the year 1796. It was translated into German by Miesegaes (1825) and by Laurent (1850). The geographical appendix was translated into Swedish by Peringskjold in 1817, and into Danish by Suhm in 1790. The whole work appeared in a Danish translation in Copenhagen by P. W. Christensen in 1862. There is yet no English version of the book, so far as we know. R. B. Anderson.

Ad'ams (Charles Francis, Jr.), b. at Boston, Mass., May 27, 1835: graduated at Harvard 1855; was admitted to the bar 1858; served as an officer of cavalry in the civil war, rising to the brevet rank of brigadier-general; has since taken a prominent part in the discussion of social, economical, and political questions; has written on railroad management in the *North American Review*, and was appointed railroad commissioner for Massachusetts in 1869. Author of *Chapters of Erie* (1871). He is now (1886) president of the Union Pacific R. R.

Adams (Henry Brooks), son of Charles Francis, b. at Boston, Mass., Feb. 16, 1838; graduated at Harvard 1858; was private secretary to his father when minister to England; became assistant professor of history at Harvard 1870, and was editor of the *North American Review* from 1870 to Oct., 1876.

Adams (Julius Walker), b. in Boston, Mass., Oct. 18, 1812; entered the U. S. Military Academy June, 1830; assistant engineer of Stonington and Providence R. R. 1832, Norwich and Worcester R. R. 1836, Western R. R. of Massachusetts 1839, Albany and Schenectady R. R. 1842, U. S. dry dock, Brooklyn navy-yard, 1844, Cochituate waterworks, Boston, 1846; superintending engineer New York and Erie R. R. 1846; chief engineer Central R. R. of Kentucky 1852, Memphis and Ohio R. R. 1855; engineer for establishment of a system of sewers in Brooklyn, N. Y., 1856; engineer of New Haven waterworks 1860. Served with credit as colonel of the 67th New York Vols., and wounded at Fair Oaks. Since then has been engaged in many important hydraulic works; chief engineer city of Brooklyn; past president American Society of Civil Engineers; member of New York Academy of Science; author of various scientific papers, and consulting engineer to dept. of public works, New York.

Adams (Julius W.), son of Julius Walker, b. in Westfield, Mass., Apr., 1840; graduated at U. S. Military Academy June, 1861, and entered the army as second lieutenant of infantry; served at West Point as assistant instructor of infantry tactics till June, 1862, when he joined his regiment; at the battle of Gaines's Mill, June 27, he was severely wounded and taken prisoner; exchanged and promoted to be captain Aug., 1862, he rejoined his regiment, and served with distinction at Fredericksburg, Chancellorsville, and at Gettysburg, where he commanded his regiment, until finally struck down at Cold Harbor, Va. D. from effects of wounds and exposure Nov. 15, 1865, at Brooklyn, N. Y.

A'delaer (Cort Sivertsen), b. at Brevig, Norway, Dec. 16, 1622; served in the Dutch navy under Tromp 1637–45; entered the Venetian service, and distinguished himself greatly in many actions; broke (May 13, 1654) with a single ship through a Turkish fleet consisting of 67 galleys stationed in the Dardanelles, and sank or burned 15 of the enemy's vessels; left Venice in 1661, and was placed at the head of the Danish navy in 1663, which he remodelled after the Dutch fashion. D. Nov. 5, 1675.

Æ'gis, the shield of Zeus, from αἴξ, a "she-goat," so called because, in his contest with the Titans, Zeus wore the hide of the goat Amaltheia, which had suckled him in his infancy, together with the head of the Gorgon.

Ælia'nus (Claudius), b. at Præneste; lived in Rome; flourished in the second century, and wrote several works in Greek, of which his *Varia Historia, De Animalium Natura*, and some *Epistolæ* are still extant, edited by Hercher (Paris, 1858), the *Varia Historia*, with commentary, by Perizonius (1701), the *De Animalium Natura* by Fr. Jacobs (1832, 2 vols.).

Æpi'nus (Franz Ulrich Theodor), b. at Rostock Dec. 13, 1724; studied medicine, physics, and mathematics; became professor of physics in St. Petersburg in 1757; was appointed teacher of physics to the czarowitz Paul, and superintendent of the normal schools in Prussia. D. at Dorpat in 1802. He improved the microscope, invented the electrophorus, discovered the electrical polarity of tourmaline, and wrote *Tentamen Theoriæ Electricitatis et Magnetismi* (1759), *Réflexions sur la Distribution de la Chaleur sur la Surface de la Terre* (1762), *Description des nouveaux Microscopes* (1789), etc.

Afana'sieff (Alexander Nikolaievitch), b. at Moscow in 1826; studied at the university of his native city; was secretary to the council of magistrates there. D. Oct., 1871. In 1863 he published a collection of Russian popular tales in 4 vols., and in 1869 a representation of the views of nature entertained by the ancient Slavs (3 vols.).

Agassiz (Alexander), LL.D., an eminent American scientist, son of Louis Agassiz, was b. in Switzerland in 1835; graduated from Harvard College 1855; received B. S. from the Lawrence Scientific School 1857; went to California 1859 as an assistant on the Coast Survey; was an assistant in the museum of comparative zoology 1860–65. In 1865 he made a venture in coal-mining in Pennsylvania, and this led to the great venture of his life—the developing of the two richest copper-mines in the world, the "Calumet" and the "Hecla" mines of native copper on the shores of Lake Superior. He spent the years of 1869–70 in Europe, visiting different museums, and upon his return resumed the duties of assistant curator of the museum of comparative zoology. After the death of his father (1873) he was appointed curator, a position which he held until 1885, when he resigned on account of ill-health, in the mean time doing much to develop the museum both by his wealth and by his experience. His winters have been spent in deep-sea dredging in connection with the Coast Survey. He has written many papers upon scientific subjects; among the more important are *Marine Animals of Massachusetts Bay*, by A. Agassiz and Elizabeth Agassiz (1871), *North American Acalephæ* (1865), *Revision of the Echini* (1872), *North American Starfishes* (1877), *Report on the Echini of the Challenger Expedition*, and several extensive monographs on the deep-sea animals collected by the Coast Survey steamers.

Agobard', b., in 779, of Gallic parents settled in Spain; was ordained a priest in 804 by Archbishop Leidrad of Lyons; became his coadjutor in 813, his successor in 816. D. June 6, 840. He may be characterized as one of the men of Charlemagne, as representative of his ideas politically and theologically. His writings, which were collected and published in Paris by Masson in 1605, and by Baluze in 1666, were directed against the idea of the verbal inspiration of the Bible, against the worship of images, against the belief that hail- and thunder-storms were raised by sorcerers, against ordeals and against adoptionism, etc. A treatise by him against the Jews was translated into German, 1852. See Hundeshagen's monograph on the *Life and Writings of Agobard* (1831). The best edition of his works is that of Baluze (Paris, 2 vols., 1666).

Agoult', d' (Marie Catherine Sophie), Countess, b. in 1805 at Frankfort, whither her father, Count de Flavigny, had emigrated during the Revolution; was educated in Paris, and married in 1827 Count d'Agoult, who died in 1856. Under the pseudonym of "Daniel Stern" she wrote a number of novels and literary reviews, a volume of moral and political aphorisms, *Esquisses morales* (1849), and *Histoire de la Révolution de 1848* (2 vols., 1851).

Aguesseau', d' (Henri François), b. at Limoges, department of Haute-Vienne, France, Nov. 27, 1668; studied law, and was appointed advocate-general in 1690, and procureur-general in 1700, to the Parliament of Paris, in which positions he acquired great reputation as an eloquent orator, a consummate jurist, and a man of perfect probity. In 1717 he became chancellor, but resigned in 1718 on account of his opposition to Law. In 1720 he was recalled, but resigned again in 1722 on account of his opposition to Cardinal Dubois. Once more, in 1737, he was installed in his chancellorship, and retained it till 1750. D. Feb. 9, 1750. His collected works were published in 16 vols. in Paris (1819–20).

Ainsworth, on R. R., cap. of Brown co., Neb. (see map of Nebraska, ref. 8–E, for location of county). Pop. in 1885, 566.

Ainsworth (now **Pasco**), on R. R. and Columbia River, cap. of Franklin co., W. T. (see map of Washington Territory, ref. 4–D, for location of county). Pop. not in census of 1880.

Ai'rey (Richard), Baron, b. at Newcastle-on-Tyne, England, 1803; educated at the Royal Military Academy at Sandhurst, and entered the British army as ensign in 1821, rising through successive grades to be colonel in 1851; served on staff and regimental duty; appointed deputy adjutant-general 1838, military secretary to commander-in-chief 1852; appointed major-general in 1854, and commanded brigade in Crimean war, but after disembarkation of the army served as quartermaster-general during the campaign, and filled that office at the Horse Guards from 1857 to 1865; was governor and commander-in-chief of Gibraltar 1865–70, and adjutant-general to the forces 1870–76. In 1862 he became lieutenant-general, and general in 1871. He also held in succession the coloneley of the 17th and 7th regiments; was created a K. C. B. in 1855; further honored with G. C. B.; and in 1876 was raised to the peerage, with title of Baron Airey. D. Sept., 1881.

Albion, on R. R., cap. of Noble co., Ind. (see map of Indiana, ref. 2–F, for location of county), about 26 miles N. W. of Fort Wayne. Pop. in 1870, 476; in 1880, 926.

Albuquerque, R. R. junction, cap. of Bernalillo co., N. M. (see map of New Mexico, ref. 6–J, for location of county). Pop. in 1880, 2315.

Alcmæon'idæ, The, one of the most prominent families of ancient Athens, were expelled from the city in 596 B. C., their chief, Megacles, having committed sacrilege by allowing Cylon and his partisans to be massacred, though they had sought refuge in the temple of the Eumenides. The family went to Phocis, but its immense wealth and its connections with some of the most powerful families in Greece enabled it to return to Athens after an exile of about thirty years. Then followed the long and turbulent contest with Pisistratus, in which the Alcmæonidæ were once more driven from Athens. During this their second exile they spent a great deal of their wealth in rebuilding the temple of Apollo in Delphi, which was burnt down in 548 B. C., and the magnificence with which they accomplished this great undertaking made them so popular throughout all Greece that the Spartans finally restored them by armed force. Among the famous members of the family were Clisthenes, Pericles, and Alcibiades.

Al'cock (Sir Rutherford), b. in London in 1809; was a surgeon in the navy in Portugal 1833–34, inspector of hospitals under Sir Evans in Spain 1835–37, auditor of accounts of the English-Spanish legion 1839–44, consul at Foo-Chow, Shanghai, and Canton 1846–59, minister to Japan 1859–62, minister to China 1865–71, and published *Medical History of the British Legion in Spain* (1838), *The Capital of the Tycoon* (2 vols., 1863), and *Art and Art Industries in Japan* (1878).

Alexan'der (James Edward), b. in Scotland in 1803; served in the Burman war 1825, in the Russian war against Turkey 1829, under Dom Pedro in Portugal 1834, in Canada 1839, in the Crimean war 1858, in the Maori war 1863, and published *Travels from India to England* (1827), *Expedition into the Interior of Africa* (1838), *Incidents of the late Maori War* (1863).

Alexander (William Lindsay), D. D., b. at Edinburgh, Scotland, Aug. 24, 1808; educated at the universities of Edinburgh and St. Andrew's; became classical tutor in Lancashire College, and subsequently (1835) a Congregational minister at Edinburgh; professor of theology 1854, and a member of the Old Testament revision company 1870. Author of several doctrinal and miscellaneous works, including a *Life of Dr. Wardlaw* (1856) and *Christian Thought and Work* (1862), and was the editor of the 3d ed. of Dr. Kitto's *Biblical Cyclopædia* (3 vols., 1865–66).

Alexandria, on R. R., cap. of Hanson co., Dak. (see map of Dakota, ref. 7–F, for location of county). Pop. in 1880, 99.

Alfred Centre, Alfred township, Allegany co., N. Y.

(see map of New York, ref. 6-D, for location of county). Pop. of v. in 1880, 513.

Algazza'li (Abu Hamed Mohammed), b. at Tus, Persia, in 1058; taught philosophy, first in Bagdad, then in Nishapoor, where he d. in 1111. He was one of the most prominent philosophers of the Arabian literature, and a very prolific writer. Several of his works have been translated into French. (See Lewes's *Biographical History of Philosophy.*)

Al'ison (Sir Archibald, Jr.), Bart., son of the eminent historian, b. at Edinburgh Jan. 21, 1826; educated in the universities of Glasgow and Edinburgh; entered the army; served in the Crimea and in India, where he was military secretary to Lord Clyde; lost an arm at Lucknow, and distinguished himself as brigadier-general, second in command of the Ashantee expedition of 1873–74. He succeeded to the baronetcy 1867, and became deputy adjutant-general in Ireland Oct., 1874. Author of a treatise *On Army Organization* (1869).

Alkin'di, or **Alchindus,** a very prolific Arabian writer on medicine and philosophy, b. at Bassorah, flourished in the middle of the ninth century. Several works, translated into Latin, were much read during the Middle Ages; the most celebrated was *De Theoria Magicarum Artium.*

Allan-Kardec' (Hippolyte Léon Denizard), b. at Lyons Oct. 3, 1803; was the representative of the spiritualistic movement in France, and wrote *Le Livre des Esprits* (1857), *Le Livre des Médiums,* and *L'Imitation de l'Evangile selon le Spiritualisme* (1864). He also founded the *Revue spirite* (1858). D. in Paris Apr. 1, 1869.

Al'len (Charles), b. at Greenfield, Franklin co., Mass., Apr. 17, 1827; graduated at Harvard College 1847; was reporter of decisions of the supreme court of Massachusetts 1861–67, and attorney-general of Massachusetts 1867–72, and published 14 vols. of Massachusetts *Reports.*

Allen (Frederic de Forest), Ph. D., b. at Oberlin, Lorain co., O., May 25, 1844; was educated at Oberlin College; studied at the University of Leipsic; was appointed professor at the University of East Tennessee in 1866, and at the University of Cincinnati in 1874, and published an ed. of the *Medea* of Euripides.

Allen (George), b. at Milton, Vt., Dec. 17, 1808; studied law at the University of Vermont, and was admitted to the bar in 1831, but felt himself drawn to the study of theology both by his own interest and by the influence of Dr. James Marsh; was rector of the church of St. Alban's, Vt., 1834–37; professor of languages at the Delaware College, Newark, Del., and finally professor of Greek at the University of Pennsylvania; joined the Roman Catholic Church in 1847. D. at Worcester, Mass., May 28, 1876. He published a *Life of Philidor* (1865) and some papers in the *United States Service Journal,* but his chief work was as a teacher. (See *Penn Monthly,* July and Aug., 1876.) R. E. Thompson.

Allen (Joel Asaph), b. in 1838 at Springfield, Mass., entered the Lawrence scientific school at Cambridge, Mass., as a special student in zoology (1862); from 1865–69 was a member of various scientific expeditions to Brazil, the Rocky Mountains, and Florida, the scientific results being given in a series of papers on the birds and mammals of the different regions. In 1873 he was appointed chief of a scientific party to accompany the Northern Pacific R. R. surveying expedition, and a *Report of the Natural History* of the region traversed was published in the Proc. Bost. Soc. Nat. Hist.; elected (1870) assistant in ornithology at the museum of comparative zoology in Cambridge, his present position; received the Humboldt scholarship (1871), and same year made fellow of American Academy of Sciences, and elected to the National Academy of Sciences (1876). He has largely contributed to scientific journals, and is author of many papers on ornithology and mammals; among them are *Monographs of North American Rodentia* (with Elliott Coues, 1877), *History of North American Pinnipeds* (1880). He has edited the *Bulletin of the Nuttal Ornithological Club* (1876–80), and is now (1885) editor of *The Auk.* Ralph S. Tarr.

Allen (William), b. in 1806 at Edenton, Chowan co., N. C.; early lost both his parents, and received a poor education until he in 1822 settled at Chillicothe, O., and was enabled to study law. Having become a lawyer of reputation, he soon became an influential politician (Democrat); was a member of Congress 1833–35, U. S. Senator 1837–49, and governor of Ohio 1874–75. D. July 11, 1879.

Al'lies (Thomas William), b. at Bristol, England, in 1813; studied at Eton, where he gained the Newcastle scholarship; graduated at Wadham College, Oxford, 1832; became a fellow there; took orders in the Church of England; was rector of Launton, Oxfordshire, 1842–50, when he joined the Church of Rome, and became secretary to the (Roman Catholic) poor-school committee 1854. Author of *The See of St. Peter* (1850) and other controversial treatises, and of an unfinished work on *The Formation of Christendom* (2 vols.), a learned contribution to the philosophy of history from a Roman Catholic point of view.

Allix' (Pierre), b. at Alençon, France, in 1631; was minister to the Reformed congregation of Charenton, but emigrated to England on the Revocation of the Edict of Nantes in 1685; formed a French Reformed congregation in London; and in 1690 was made canon of Salisbury cathedral. D. in London Mar. 3, 1717. He was a prolific writer in Latin, French, and English, and intensely polemic. His principal historical works are—*Remarks on the Churches of Piedmont* (1690) and *Remarks on the Ancient Churches of the Albigenses* (1692).

Almodo'var (Ildefonso Diaz de Ribera), Count, b. in 1777 at Granada; was educated at the military academy of Segovia, and fought with distinction in the war against the French. By the reactionary government of Ferdinand VII. he was suspected of liberalism and confined in the dungeons of the Inquisition, but was liberated by the revolution of 1820. In 1823, however, he was compelled to flee to France, and did not return until after the death of Ferdinand, when he at once took rank as one of the leaders of the liberal party. In the cabinets of Mendizabal, Calatrava, and Espartero he was minister of war, but retired in 1843 from public life. D. at Valencia Jan. 26, 1846.

Alpharetta, cap. of Milton co., Ga, (see map of Georgia, ref. 2-G, for location of county). Pop. in 1870, 126; in 1880, 164.

Al'vord (Thomas Gold), b. at Onondaga, N. Y., Dec. 20, 1810; graduated at Yale College in 1828; admitted to the bar in 1832; practised at Syracuse until 1846; elected to the legislature of 1844, and re-elected nine times; Speaker in 1858 and 1864; lieutenant-governor in 1865–66; member of the constitutional convention in 1867–68; is engaged in the manufacture of coarse salt, and resides at Syracuse.

Amal'aric, b. in 501, the son of Alaric II., king of the Visigoths; succeeded his father in 507 by the aid of his grandfather, Theodoric, king of the Ostrogoths, and married in 527 Clotilde, a daughter of Clovis, king of the Franks, but in order to compel her to embrace Arianism he treated her so cruelly that her brother, Childebert, came to her rescue with a great army in 531. Amalaric was defeated and slain, and Theudis succeeded him as king of the Visigoths, while Clotilde returned with her brother to the land of the Franks, where she died shortly after.

Amalason'tha, b. in 498, a daughter of Theodoric the Great, king of the Ostrogoths; married Eutharic and bore him a son, Athalaric, who in 526, when only ten years old, succeeded his grandfather as king of Italy under the guardianship of his mother, his father having died the previous year. The government of Amalasontha was very successful, but her son grew up a debauched and dissipated drunkard, utterly unfit to reign. He died in 534, and Amalasontha now married Theodatus in order to strengthen her power, but, instigated by Theodora, the Byzantine empress, who hated Amalasontha, Theodatus imprisoned her, and had her strangled in 535.

Amal'rich of Be'na, a scholastic philosopher who taught dialectics and the liberal arts at Paris in the twelfth and thirteenth centuries, was born at Bena (Bène), near Chartres, and attempted to reconcile theology with the Averroistic and materialistic interpretation of Aristotle's metaphysics. He and his book (*Physion*) were condemned by the university and the pope; and Amalrich, after an enforced recantation, d. of grief in 1209. In 1210 his bones and his books were burned together. His followers (Almericians) appear to have been a pantheistic and mystical sect, finally blended with the Brethren of the Free Spirit. They were subjected to severe persecutions.

Amat' (Felix de Torres), an Aragonese ecclesiastic and literary historian, was b. at Sallent Aug. 6, 1772; became bishop of Astorga, and a senator under the reformed constitution of 1837. In 1808 he was charged by the government of Spain to prepare and annotate a new Castilian translation of the Bible. Of this work the first edition appeared in 1823 in 8 vols., besides a volume of notes and appendices. In the edition of 1832 the notes are chiefly printed at the foot of the pages. D. at Madrid on Dec. 29, 1840. Amat is best known abroad by his *Memorias para ayudar a formar un Diccionario critico de los escritores Catalanes* (Barcelona, 1 vol. 8vo, 1836). A supplement to the *Diccionario,* by Juan Corminas, appeared at Burgos in 1 vol. 8vo in 1849. These works are valuable contributions to the history of Catalan literature, and indispensable to all who wish to become acquainted with that literature and its bibliography. George P. Marsh.

Amelot' de la Houssaye' (Abraham Nicolas), b. at Orléans, France, in 1634; served for some time as secretary to the French embassy at Venice, but devoted himself afterward exclusively to the study of history and literature. D. in Paris Dec. 8, 1706. He wrote *Histoire du Gouvernement de Venise* (3 vols., 1676); also translated Paolo Sarpi's history of the Council of Trent, and the *Prince* by Macchiavelli.

Amelotte' (Denis), b. at Saintes, France, Mar. 15, 1606; studied theology and joined the Congregation of the Oratory in Paris, where he d. Oct. 7, 1678. He maintained for many years a very bitter contest with the writers of Port-Royal, and is said not to have disdained to use his influence at court in order to defeat them. His translation of the New Testament, of which Louis XIV. subscribed for 100,000 copies, appeared in 4 vols. (1666–70).

American Eclectic, The, or **New School of Medicine** was first known in this country as a separate school about the year 1826, although physicians entertaining its peculiar sentiments flourished from the period of the Revolution. Wooster Beach of New York in 1826 established a college in that city for the dissemination of its doctrines. He also prepared works on practice, surgery, materia medica, midwifery, and physiology for his students, which were widely popular. Among his early associates were Thomas Vaughn Morrow and Isaac G. Jones. About this time Rev. Dr. Chase, bishop of Ohio and uncle of the statesman, had obtained a charter for the Worthington University. He invited thither the faculty of the New York Reformed Medical College. Profs. Morrow and Jones accepted, and a medical department was duly organized. After ten years of successful labor, Prof. Morrow left Worthington and established a college in Cincinnati. This was incorporated by the legislature of Ohio in 1845 by the name of the "Eclectic Medical Institute." He next undertook the organization of the reformed physicians of the U. S. as a school of practice, apart from Homœopathists, Thomsonians, and Mercurialists. To this new school he gave the name "Eclectic," that being the designation of the ancient Galenists and Alexandrian academicians. State societies were organized over the country, and colleges established in Massachusetts, New York, Philadelphia, Georgia, Tennessee, Missouri, and Illinois. The death of Prof. Morrow deprived the Eclectics of their wisest leader. The new practice continued to flourish, however, chiefly in the North-western States, but the national organization ceased to exist. After the civil war the cause received a new impetus, perhaps in part due to the fact that Eclectic surgeons were excluded from appointment in the army. New colleges were established in the cities of New York, Chicago, St. Louis, and Macon, which soon became prosperous. State societies were formed in all the Northern States, and in 1870 the National Eclectic Medical Association was revived under the auspices of these institutions and societies, and was incorporated the ensuing winter by the legislature of New York. Its sessions are held annually, and it is an influential organization. The number of Eclectic physicians in the U. S. is estimated at 12,000. There are also many Eclectics in the Dominion of Canada. Conspicuous among these are Thomas R. Fraser of Halifax, N. S., and Alexander M. Ross of Toronto, both authors of ability. There is also an Eclectic association in Great Britain, holding conferences annually. Dr. William Hitchman of Liverpool, George Sexton of London, and the late J. Hughes Bennett of Scotland, are classed as Eclectics.

The distinctive tenets of the New School relate to the hygienic treatment of the sick and the rejection of mercury, antimony, and other minerals as medicines. They aim in medicine and surgery at the strictest conservative practice, performing only necessary operations and carefully husbanding and promoting the vital powers. The Eclectics have the credit of discovering and introducing into the materia medica over 100 new remedies prepared from the indigenous American flora, all which are used more or less by rival practitioners. To Dr. Robert S. Newton, now of New York, is also due the merit of having first inculcated the doctrine of cellular pathology in 1845, and also the introduction of the antiseptic treatment in surgery in 1846. Joseph R. Buchanan of Louisville, Ky., is also the author of several anthropological works, and the late W. Byrd Powell was the originator of a novel theory of human temperaments. Alexander Wilder.

American Indians, or **The American Race.** I. *General Characteristics.*—In the general ethnological divisions of the human species the natives of the western hemisphere are classed as the "American race," or the "red race." It presents in all respects, and throughout all its members, as distinct racial traits as the white or the black, the Mongolian or the Malayan, races. These traits are a peculiar reddish or coppery hue of the skin; hair, straight, coarse, and abundant on the head, but very sparse on other parts of the body; forehead, low and laterally compressed; eyes, black and straight; cheek-bones, prominent; jaws, strong, but not protruding; chin, small and rounding; and expression, usually heavy. There is no prevailing shape to the skull, and the height and weight present even greater diversity than in other races, the Patagonians yielding the highest average stature of the human species, and the Warraus of Guiana being one of the feeblest of nations. In physical strength and endurance of fatigue and exposure they are, as a rule, superior to the white race; but in resistance to acute or chronic disease, especially epidemics, in longevity, and in fertility in marriage, they are inferior to it. The prevailing similarity between members of the American race throughout both the northern and the southern continent is a proof that its members have intermarried and been subject to similar conditions of existence for an exceedingly long time. This presumed antiquity of the race is fully borne out by the discoveries of stone implements, chipped bones, and human remains in deposits dating back to the close of the glacial periods in both North and South America. Such are the "Trenton gravels," near Trenton, New Jersey, the "modified glacial drift" of the Upper Mississippi, the "lake-beds" of Nebraska, the "auriferous gravels" of California, the glacial "mud-beds" of the pampas of Buenos Ayres, all of which have furnished undoubted specimens of human workmanship dating back to the close of the Tertiary and beginning of the Quaternary epochs, and thus proving that America was peopled throughout its whole extent at that remote date.

II. *Principal Subdivisions of the American Race.*—As the differences between American tribes are too slight to permit of classifying them by physical characteristics, ethnologists have adopted a classification by linguistic stocks, grouping under one general name all tribes who speak dialects of one tongue. (See Indian Languages.) The principal of these are as follows:

The *Eskimos* people the shores and islands of the Arctic Ocean from the south-western extremity of Alaska E. to the southern portion of Labrador, near the Straits of Belle Isle. They also occupy the habitable points of Greenland. Their proper name is *Innuit*, or "Men."

The *Athapascas*, or *Tinné*, dwell S. of the Eskimos and wander over the cheerless tracts of British America which stretch from Hudson Bay to the Rocky Mountains, and from the mouth of the Mackenzie River on the N. to the valley of the Saskatchewan on the S. The Kolosch of the N. W. coast may be a remote branch of the Tinné, and it is certain that the Apaches and the Navahoes, who have wandered far down to New Mexico and Sonora, are a derivative from this stock.

The *Algonkins*, adjoining the Tinné on the S., extend from the Rocky Mountains E. to Nova Scotia and New Foundland, and once possessed the whole country E. of the Mississippi and N. of the Tennessee quite to the Atlantic Ocean, except a portion of the area of the State of New York. All the New England Indians, the Mohegans of New York, the Delawares of Pennsylvania and New Jersey, the Powhatans of Virginia, and, in the West, the Chipeways, Blackfeet, and Miamis, were Algonkins. They are the principal stock with which the whites came in contact in the settlement of the Eastern U. S. and Canada.

The *Iroquois*, or *Five Nations*, were a confederacy which owned the region on the St. Lawrence about Montreal, and most of Central and Western New York. The Hurons, or Wyandots, in Canada S. of Georgian Bay, the Susquehannocks in Pennsylvania, the Cherokees in Tennessee, and the Tuscaroras in North Carolina, were of the same family.

The *Chahta-Muskokis* occupied most of the territory of the present Gulf States and Florida. They included the Creeks, Choctaws, Chickasaws, Seminoles, Alibamas, and cognate tribes.

The *Dakotas* until recently held the western water-shed of the Mississippi from its source S. almost to the Red River of Louisiana. They are at present the most numerous stock within the area of the U. S. Their constituent tribes are the Crows, Sioux, Winnebagoes, Mandans, Osages, and many more.

The *Pawnees* are a small stock adjoining the Dakotas, with few affinities.

The *Shoshonees*, or *Utes*, were W. of the Pawnees, in the Territory of Utah. Related to them are the Comanches of Northern Texas.

The area of Oregon and California was occupied by numerous small nationalities without linguistic connection. Even the pueblo-building Indians in Arizona speak several radically diverse languages, though on the same plane of culture and in geographical contiguity.

Mexico and Central America were occupied by a multitude of separate stocks, of which the following are the most important:

The *Nahuas, Aztecs,* or *Mexicans,* occupied with their dialects the Pacific coast from the head of the Gulf of California to the river Michatoyat in Guatemala, the Gulf coast from the site of Vera Cruz to Tabasco, and much of the intervening territory. Their colonies found their way S. into Nicaragua, and even the Shoshonees of the N. show traces of the Aztec tongue.

The *Mayas* possessed the whole of the peninsula of Yucatan, most of Guatemala and Chiapas, and had a large branch, the Huastecas, on the river Panuco above Vera Cruz. They spoke some eighteen different dialects, each giving its name to a tribe.

These two stocks, the Nahuas and Mayas, developed the highest degree of civilization found on the American continent.

In South America the *Quichuas,* or Inca stock, of Peru were the most cultivated. The language and authority of the Incas extended for more than 1500 miles along the Pacific coast southward from the equator, and bounded on the W. by the Andes.

On their N. were the *Chibchas,* also a semi-civilized nation, and on their S. the warlike *Araucanians,* who controlled most of the Pacific coast of Chili and Patagonia.

The vast plains of the Argentine Republic known as the Pampas and the Gran Chaco were the hunting-grounds of roving and related tribes known generically as *Pampas Indians.*

Nearly the whole of Brazil, Guiana, the water-shed of the Orinoco, and all the West India islands were the homes of the great *Tupi-Guaranay* stock. The Guaranis and Coroados of the S., the Caribs and Arawacks of the N., were members of this widely-extended family.

III. *Social Condition.*—The American tribes were divided into those who derived their subsistence principally from the chase or from agriculture. Most of the nations in the Mississippi Valley, in Central Mexico, in Yucatan, and in Western South America cultivated the Indian corn, beans, squashes, and sometimes cotton and other plants. These sedentary tribes had fixed systems of government and established laws. The tribe was usually divided into families, or *gentes,* descent being traced through female ancestors only, and marriage in the gens being forbidden. (See TRIBE, III.) Each gens had its chief, sometimes hereditary, sometimes elective. The tribe usually had two chiefs—one for peace, one for war. An approach toward an absolute monarchy was found among the Aztecs and the Mayas, and it was almost attained by the Incas of Peru. Slavery was common in the tropical portions of the continent, but in the N. a form of adoption into the tribe was substituted in place of it. Marriages, as a rule, were negotiated by the elders of the tribe, and the bridegroom generally gave some equivalent to the parents of the bride. Polygamy was always allowable, but was not common among the poorer classes. In marriage the lot of the woman was often hard, but generally she was looked upon as the owner of the family property, as she alone gave the family-name. In religious notions and mythology there is a great deal of similarity running through the American race. With important local differences, the centre of their religion is almost always the worship of light in some personification. Their myths in reference to this are strikingly alike in both the northern and the southern continent. Other general religious conceptions refer to the four winds, the thunder, the rain, the lightning, the sun, moon, and fire, and to certain animals which they regard with superstitious awe, as the serpent, the bird, the wolf, and the like. The knowledge of arts in America was confined to those of immediate utility and decoration. Metal was practically unknown among the hunting tribes, but bronze was in use in Mexico, and an abundance of gold and silver was found in that country and in Peru. The sculpture, painting, and architecture of the more civilized nations display considerable technical skill, but very little æsthetic feeling. An approach toward a phonetic alphabet and a fairly accurate calendar were discovered among the Aztecs and the Mayas. D. G. BRINTON.

IV. *Present Circumstances.*—It is generally believed that the number of Indians living within the boundaries of the U. S. is steadily decreasing, and that the total extinction of the race is only a question of time. It is true that several tribes once powerful and flourishing have now dwindled into insignificance or become entirely extinct, but, in a paper which he read before the American Association for the Advancement of Science, Col. Garrick Mallory of the U. S. army shows that other tribes have increased and become powerful, and finally comes to the conclusion that the number of Indians now living in the territory of the U. S. probably differs very little from that living there at the first arrival of the Europeans. The census of 1880 gives the total number as 303,248, thus distributed:

Alabama	170	Minnesota	17,893
Arizona	24,753	Mississippi	1,811
Arkansas	144	Montana	20,825
California	16,581	Nebraska	4,494
Colorado	4,316	Nevada	7,728
Connecticut	230	New Mexico	22,860
Dakota	31,707	New York	5,820
Idaho	6,248	North Carolina	1,152
Illinois	104	Oregon	5,854
Indiana	186	Pennsylvania	156
Indian Territory	78,142	South Carolina	113
Iowa	801	Tennessee	238
Kansas	693	Texas	869
Louisiana	807	Utah	1,166
Maine	603	Washington	16,786
Massachusetts	341	Wisconsin	10,340
Michigan	17,045	Wyoming	2,272

With every year, however, a greater number of Indians is brought under the influence of civilization. According to the report of the secretary of the interior, there were in 1884 under the control of the government 81 boarding-schools, 76 day-schools, and 6 industrial or manual-labor schools in which Indian children were educated and instructed with a view to making them self-supporting. Besides those schools completely under the control of the government, there were 14 boarding-schools and 4 day-schools supplied with teachers and other employés by some one of the various religious denominations, the government paying a stipulated price for the care and education of the children therein (a little less *per capita* than the average cost of children maintained in government schools). Finally, there were 23 schools maintained by churches and associations without expense to the government. In the course of the year three new industrial schools were completed and put into successful operation—one at Chilocco, Indian Territory, with a capacity for 150 children; one at Lawrence, Kan., with a capacity for 300 children; and one at Genoa, Neb., with a capacity for 300 children. Under the provisions for placing Indian children in industrial schools in States at an expense not to exceed $167 *per capita,* 565 children have been placed in schools in the following States: Kansas, Nebraska, Iowa, Illinois, Indiana, Pennsylvania, North Carolina, Tennessee, Wisconsin, and Minnesota. CLEMENS PETERSEN.

American Museum of Natural History. This institution was incorporated in 1869 for the purpose of establishing and maintaining in the city of New York a museum and library of natural history, of encouraging and developing the study of natural science, of advancing the general knowledge of kindred subjects; and to that end furnishing popular instruction and recreation. The collections it has already acquired, besides many smaller gifts and purchases, consist of the following specimens of scientific and popular interest: The first choice of all the mammals and birds left by the late Edward Verreaux of Paris, who possessed at the time of his death collections from all parts of the world, which were valued at 600,000 francs. These include what are regarded as the finest specimens of the art of taxidermy that Europe has yet produced. A nearly complete series of all the birds of America N. of the Rio Grande was purchased of Mr. D. G. Elliot; also the entire museum of Prince Maximilian of Neuwied, on the Rhine above Bonn (not Maximilian, late emperor of Mexico). This prince occupied the years 1815–17 exploring Brazil from Rio Janeiro up to Bahia, and a large proportion of his specimens were never before described, and the collection is therefore particularly rich in *types.* A collection of shells made during a long, active lifetime by Dr. John C. Jay and an unrivalled library on conchology have been presented by Miss C. L. Wolfe as a memorial of her father, the first president of the corporation. The most important department yet established is that of palæontology, which comprises the great collections of Prof. James Hall of Albany, containing probably one-half of the authentically labelled specimens of palæozoic palæontology yet gathered on our continent. About 7000 of these specimens have been figured, and are types. The Tertiary beds of South Carolina are well represented by the collection of Prof. F. S. Holmes of Charleston, also gathered during many years. A department of archæology is now being formed from the specimens obtained by Hon. E. G. Squier on his Central American and South American travels, and from his labors, jointly with those of Dr. E. H. Davis, in exploring the ancient mounds of the Mississippi Valley.

These collections are the property of the corporation above mentioned, and not of the city, the corporation undertaking to furnish specimens and books and take care of them, and the city to supply the required land and buildings. For this purpose that part of the Central Park formerly known as Manhattan Square, on the W. side of the park proper, which contains 18¼ acres, has been set aside for ever. The section of the building now finished is 200 feet long by 66 feet wide, and about 100 feet high, and forms one-eighteenth part of the whole plan to be ultimately finished, which is to occupy the whole square, and be six times larger than that now in course of erection by Her Majesty's government in London, and five times greater than the Capitol at Washington. The part completed consists of a series of magnificent halls 170 feet long by 60 feet wide, and severally of 18, 30, and 22 feet in height, for exhibition, and a curator's room on each floor. Over the whole is a Mansard story 16 feet in height, divided into laboratories for the free use of scientific gentlemen who may visit our shores from other lands, and for the national and State surveys, and other scientific investigators of our own land, the aim of the museum being to be the means both of creating and diffusing knowledge. The number of its visitors during 1874 was over 1,120,490, or one-half more than that of the most popular museum in Europe.

A. S. Bickmore.

American Sunday-School Union, The, was organized at Philadelphia May 25, 1824. It was, however, the immediate successor of the Philadelphia Sunday and Adult School Union, which was organized in 1817, and had auxiliary "unions," or branches, in eleven of the States when, in 1824, it transferred its capital and schools to the new national organization. A still earlier organization, to the work of which the new national society practically succeeded, was The First Day or Sunday-school Society of Philadelphia, started in 1790. The American Sunday-School Union is under the direction of thirty-six managers, of whom at least twenty-four must reside in Philadelphia and its vicinity. All these managers are laymen, and they are selected from various Christian denominations. The Union is not a union of denominations, but of individual Christians of different denominations. The object of the Union was, at its formation, "to concentrate the efforts of Sabbath-school societies in the different parts of our country, to strengthen the hands of the friends of pious instruction on the Lord's Day, to disseminate useful information, circulate moral and religious publications in every part of the land, and to endeavor to plant a Sunday-school wherever there is a population." Various denominational Sunday-school societies have resulted from the work of the Union, but it has continued its operations without interruption, and its aim still is to improve existing Sunday-schools and to organize new ones. Its plan is, to publish books and papers suited to the wants of Sunday-schools, and to send out missionaries, lay and clerical, of various denominations, to organize new Sunday-schools wherever there is a needy population. No Sunday-schools are under the control of the Union, but its missionaries watch and help as they have opportunity the pioneer schools they have organized. Many of these schools have proved the foundation of Christian churches. Indeed, a large share of all the Protestant churches organized in the newer States within the past thirty years have had their beginning in union Sunday-schools. The Union has been the parent of most of the distinctive agencies and methods of the American Sunday-school system. Sunday-school libraries, question-books, periodicals, teachers' helps, conventions, plans for teacher-training, schemes of limited lessons uniform throughout the country, were originated by or first gained prominence through the agency of the Union or of its officers and managers. Moreover, its work created or stimulated a demand in these departments which has greatly increased the supply in them all. Its list of separate publications exceeds 2000. The value of these, circulated by sale and donation, up to Mar. 1, 1884, amounts to more than $7,000,000. Up to the same date its missionaries had organized 76,006 Sunday-schools, including, at the time of their organization, 475,177 teachers and 3,192,978 scholars. In addition to this, its missionaries have visited and helped many thousands of existing schools, including several millions of scholars. (See Sunday-Schools, in Cyclopædia.)

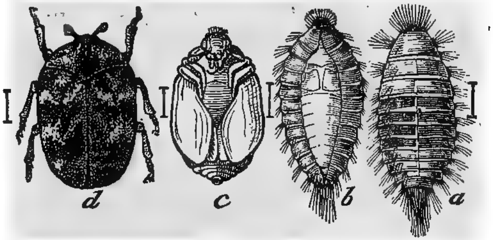
Henry Clay Trumbull.

Amyot' (Jacques), b. at Melun, France, Oct. 30, 1513; taught Latin and Greek at the University of Paris; visited Italy; became tutor to the two youngest sons of Henry II.; was made grand almoner under Charles IX., and finally bishop of Auxerre, where he d. Feb. 6, 1593. He published a number of translations of Greek authors, which are highly esteemed for the purity of their language and the simplicity of their style. The most celebrated is that of the *Lives* of Plutarch, which has been often reprinted, the last time in 25 vols. (Paris, 1801–06).

An'neke (Mathilde Franceska Giesler), b. on the estate of her grandfather, near Blankenstein, Prussia, Apr. 3, 1817. Early in life she engaged in literary pursuits, and took a deep interest in the political and social freedom of her country. When her husband, a Prussian officer and powerful leader in the revolution of 1848, was imprisoned under sentence of death at Cologne, Madame Anneke put a printing-press into her parlors, and herself edited a paper in the interests of the revolution. She had actual service on the battle-field as one of her husband's staff, of which Carl Schurz was also a member. When the revolutionists were overpowered she, with her family, sought refuge in America, where she has been one of the most earnest champions of woman's enfranchisement. She edited the *Frauen Zeitung* at Milwaukee, Wis., in 1850, where she became principal of an academy for young ladies. Susan B. Anthony.

Anniston, R. R. junction, Calhoun co., Ala. (see map of Alabama, ref. 3–E, for location of county). Pop. in 1880, 942.

Anthrenus scrophulariæ (Linn.), "carpet-bug." This insect is popularly known as "the new carpet-bug," the name having been given to it when its ravages were first detected in the State of New York in the year 1874, and its difference from the larva of the carpet-moth observed. It belongs to the destructive family of beetles known as the *Dermestidæ*. Although, if left unchecked, it overruns houses and preys upon a variety of woollen and some other fabrics, its special home is beneath the borders of carpets, where in the larva state, shown at *a* in the figures (all enlarged), it eats large holes in the carpets, or, following the joinings of the floors, cuts in straight lines through entire breadths. The cast skins of the larva, *b*, are found with the living forms in the summer months. The pupa, *c*, is formed in autumn within the split skin of the larva; and the perfect insect, shown at *d*, of a black color, marked with red along the back, and with red and white spots on the wing-covers, emerges in the winter, and may often be taken on the windows of infested rooms in the month of May. It is a very difficult insect to eradicate. Kerosene oil and benzine are probably the most efficient agents for destroying it in its earlier stages. It is of European origin, introduced many years ago in California, and by a later importation into New York. *A. lepidus* (Le Conte) is simply a Western variety of it. J. A. Lintner.



Carpet-Bug.

An'tony (Milton), b. Aug. 7, 1789, in Virginia; removed early with his parents to Georgia; studied medicine at the University of Pennsylvania; began to practise as a physician in New Orleans; removed subsequently to Augusta, Ga., and founded the Medical College of Georgia. D. of yellow fever Sept. 19, 1839. Paul F. Eve.

Apartment-Houses. Within a few years the European plan of living in apartment-houses has largely come in vogue in New York, Brooklyn, and other American cities. It is mainly the result of the increased cost of living, the enhanced value of building-lots, the greater profit to be obtained from high rather than from low buildings, and the relative economy of living in flats. It is also partly the outcome of the extraordinary development of the tenement-house system. The larger number of houses now erected are planned to accommodate several families, and the single-family dwelling is being rapidly replaced by houses which contain from three to thirty families. In 1882 plans were submitted to the New York Building Department for 577 flats, and in 1883 for 315 flats, at an estimated cost for both years of over $27,000,000. During the year 1884 more applications were received for flats and tenements than for any other class of buildings.

By the introduction of many labor-saving devices in apartment-houses, such as automatic door-openers, speaking-tubes, passenger- and freight-elevators, ash-shoots, trunk-rooms, combined laundries, and restaurants on the catering system, it is now possible to erect buildings ten, and even thirteen, stories high, which will comfortably provide for several hundred persons under one roof, and at less rental than in a proportionate number of single dwellings, yet with a higher profit to the owner.

Great ingenuity has been shown in planning apartment-houses so as to economize space to the greatest advantage and to obtain light and ventilation for every room. Some of the most extensive apartment-houses are nearly perfect in these particulars, but many others, which have been built mainly with a regard to appearances and to secure a high rental, are but little better in a sanitary point of view than ordinary tenement-houses. Under the amended law recently passed by the New York State Legislature, apartment-houses and tenements are prevented from occupying more than 65 per cent. of the building-site, and ample space is required to be left between them and adjacent houses in the rear. In European cities apartment-houses are usually built around a central court, with a driveway-entrance for carriages, but in American cities, owing to the high cost of land, they are commonly built upon a single or double city lot 25 by 100, so that the suites of rooms of necessity extend from end to end, and, unless the building is on a corner, they must be lighted by narrow courts on either side or by light-shafts sunk from above, and often wholly inadequate for the purpose. These shafts convey the odors of cooking and sounds of various descriptions from one apartment to another, even where the floors are deadened, and are thus a source of annoyance, while, in case of fire or the presence of infection in any suite of rooms, they may prove to be a serious danger. Few flats are fireproof, and several conflagrations have occurred in them. Even in those which have been most carefully constructed, and which are believed to be absolutely fireproof, the light- and elevator-shafts and stairways act like so many chimneys to diffuse smoke throughout the building, and thus suffocate the inmates.

There has been much public agitation of the necessity for limiting the height of this kind of buildings, which are found to be destructive to the value of adjoining property, and also objectionable in a sanitary point of view. One building of this class in New York is fourteen stories high, and the roof is 170 feet above the sidewalk. In case of a fire it would be impossible to reach the upper stories with the longest ladders, and recent experience has shown the possibilities of a fire getting almost beyond control in such buildings. The act passed by the legislature requires that the height of all buildings shall be limited by certain restrictions, and, unless where facing a park or other open space, it shall not exceed the width of the street in front.

Some of the most notable apartment-houses in New York are remarkable for their size. The Dakota is estimated to have cost nearly $2,000,000, and is thoroughly fireproof. It is 200 feet square and nine stories in height. There are 58 suites, containing eight to twenty rooms each, or 623 rooms in all. The suites rent from $1000 to $5600 per annum. There are 4000 electric lights, 300 electric bells, and 12 water-tanks with a supply of 2,000,000 gallons per month. The annual expenses, including taxes, will be $50,000 per year. The Central Park flats constitute eight buildings, each 130 feet high and with nine stories, having each sixteen apartments. The whole cover half a city block on 59th street; the land cost $1,000,000, and the buildings $4,000,000 additional. The latter are wholly fireproof. The Chelsea, Berkshire, Florence, and Van Corlear are other notable buildings of this class. Recently, bachelor flats, to accommodate single gentlemen, have been erected, and have proved very popular. Others are built on the duplex plan, with two-story apartments in the rear, each 8 feet high, while the front rooms are double this height.

Many apartment-houses have been erected on the co-operative plan, the occupants of each floor being independent owners of the same, while the title to the land is held in common by the associated owners, who manage the building the same as the affairs of any other corporation. Special laws have been passed by the legislature of New York regulating the control of such associations and to facilitate their management.

Where apartment-houses are located facing a thoroughfare, the lower floors will be occupied as a restaurant for the benefit of the inmates or by stores, and the upper floor will be used for storage purposes or as a laundry. Lastly, the tiled roof will afford a pleasant promenade in hot weather. In the Chelsea flat there is a hospital for isolating patients with contagious disease.

The average rental of flats in New York is from $40 to $100 per month. Equally good accommodation can be obtained in Brooklyn for just half the money. More expensive flats rent for as much as a separate house, and many of them are luxurious in their appointments.

Their great advantages on the score of convenience and economy have made flats very popular with many householders. Even the conservative Astors have been forced by the prevalent demand to erect buildings of this class. Families with children, however, complain that the latter have no playground other than the street, and that they will not be admitted into many apartment-houses. Landlords and other tenants object to them, and parents must therefore seek homes in the suburbs if they have large families. As rapid transit opens up new sections there will be a gradual abandoning of flats for separate dwellings.

Unless flats are kept in constant repair, they steadily deteriorate; an inferior grade of tenants comes in, and they soon become mere rookeries. What will be the future of some of the lofty apartment-houses recently erected should such a transformation occur and they be filled with the tenement class of tenants, no one can predict; but it is to be feared that they will prove to be hotbeds of disease and disorder.

Flats have never been popular in England; a few have recently been erected in London, but they have not become fashionable. Edinburgh and Glasgow have long been famous for their lofty tenements, some of them thirteen and fourteen stories high, with tortuous and interminable flights of stairs which are the wonderment of visitors.

In Parisian apartment-houses persons of quite different social position may reside under the same roof, but in America there is a tendency toward a gradual and marked separation of classes, and the greater exclusiveness of the apartment-houses is one reason of their popularity with fashionable people.

An architect who has erected some of the finest houses of this class predicts that in the future each suite of rooms will comprise two floors instead of one. He thinks the duplex plan is objectionable, on account of the contrast between the height of the living-rooms and that of the sleeping-rooms, and that the other plan is preferable. Plans have been recently made for buildings of this class, and it is likely that they will prove attractive. (See TENEMENT-HOUSES.) CHAS. F. WINGATE.

Ap'pleton (JAMES), b. at Ipswich, Mass., Feb. 14, 1785; was early in life elected a member of the legislature of the State, and served during the war with England as a colonel of Massachusetts militia, having been entrusted with the command of the district of Gloucester; after the close of the war he was made a brigadier-general. He subsequently removed to Portland, Me.; was also a member of the Maine legislature, but returned finally to his native town, where he d. Aug. 25, 1872. He was a very influential and energetic champion of total abstinence and a decided enemy of slavery, on which two points his speeches and publications contributed much to form public opinion. By his elaborate report to the Maine legislature in 1837 he was the first expounder of the principle underlying the Maine law.

Apron. In the Authorized Version of Gen. iii. 7, *apron* is used to render the Heb. *chagorah* (which is rendered "girdle" in 2 Sam. xviii. 11): "And they sewed fig-leaves together, and made themselves aprons"—in the margin, "or, *things* to gird about." In the Geneva (Barker) Bible (1599) it is rendered, "And they sewed figge tree leaues together, and made themselues breeches"—in the margin, "*Ebr. things to gird about them to hide their priuities.*" Because of the translation "breeches," this is called "the Breeches Bible." In Acts xix. 12 *apron* is the rendering of *σιμικίνθιον*, from the Latin *semicinctium*, a half-girdle, or belt covering half the person—an apron worn by workmen, servants, etc. T. O. SUMMERS.

Argyle, cap. of Washington co., N. Y. (see map of New York, ref. 4-J, for location of county). Pop. in 1870, 351; in 1880, 316.

Argyrop'ulos (JOHANNES), b. in Constantinople in 1416; went early to Italy, where he contributed much to the revival of letters. He taught the Greek language and literature and Aristotelian philosophy at Padua 1434-56, Florence 1456-71, and Rome, where he d. in 1486. Pallas Strozza, Politianus, and Reuchlin were among his disciples. He became a master of the Latin language, and translated the works of Aristotle into Latin. But for the Latin authors he showed a sovereign contempt; of Cicero he said that he understood neither Greek nor philosophy.

Arkansaw, cap. of Pepin co., Wis. (see map of Wisconsin, ref. 5-B, for location of county). Pop. in 1880, 212.

Arm'strong (JAMES LOUDON), M. D., b. in Greenbrier co., Va., Apr. 2, 1782. His parents came West, and he became a student of medicine under the celebrated Dr. Dudley. In 1809 he settled in Rutherford co., Tenn., and served his country as surgeon in the war of 1812. He was one of the early advocates of temperance. D. Apr. 5, 1868.

Arnold (EDWIN), b. at Rochester, England, June 10, 1832, graduated at Oxford 1854, and was subsequently appointed principal of the government Sanscrit college at Poona, in the Bombay Presidency, and fellow of the University of Bombay, which positions he resigned in 1861 and entered upon the editorial staff of the *Daily Telegraph.* His epic *The Light of Asia* (1879) has run through many editions in both England and America. He has also published *Hitopadesa*, the *Indian Song of Songs*, and other translations, *History of the Administration of India under the late Marquis of Dalhousie* (1862–64), etc.

Ar'nold (John William Schmidt), A. B., A. M., M. D., b. at Charleston, S. C., May 16, 1845; graduated at Columbia College, New York, 1868; studied medicine; was appointed curator of the Bellevue Hospital in 1871, professor of physiology and histology at the University of New York in 1874, and pathologist at the lunatic asylum of Blackwell's Island in 1875; and contributed to various medical papers.

Arrhidæ'us (Philip), a son of Philip II. of Macedon by a dancing-girl, Philinna of Larissa; accompanied his half-brother, Alexander the Great, in his campaigns in Asia, and was always kindly treated by him, but never held any civil or military command. He was imbecile, and it was said that he had become so from a potion administered to him while a boy by Olympias, his father's wife and Alexander's mother. He was present at Babylon when Alexander died, and was immediately proclaimed king by the army, though the son of Alexander by Roxana, born shortly after, was associated with him. He now married Eurydice, a granddaughter of Philip II., a daughter of Cynane, his own and Alexander's half sister. Eurydice was, like her mother, a woman of thoroughly masculine education, of many masculine talents, and of an exorbitant ambition. She wished to get rid of Roxana and her son, of Olympias, and of Alexander's generals; and after the death of Antipater (in 319) she collected an army and marched against Polysperchon. But in Polysperchon's army was Olympias, and the Macedonian soldiers declared that they would never fight against Alexander's mother. Eurydice was deserted, captured in her flight, and confined, together with her husband, in a narrow dungeon, whither Olympias sent to her a sword, a rope, and a cup of hemlock. She accepted the presents, made Arrhidæus drink the hemlock, and then hanged herself (317 B. C.).

Ar'thur (William), b. in the county of Antrim, Ireland, in 1796; graduated at the College of Belfast; emigrated shortly after to America; settled at Bennington, Vt.; studied first law, then theology; was minister of a Baptist church at Bennington, and subsequently at various other places—at New York from 1855 to 1863. D. at Newtonville Oct. 30, 1875. He was the author of the well-known book on family names.

Ar'widsson (Adolf Ivar), b. at Padasjoki, Finland, Aug. 7, 1791; studied at the University of Åbo, and was appointed professor of history there in 1817. A periodical which he founded in 1821 was suppressed in the same year by the Russian government, and in 1822 he was exiled. He went to Stockholm, where he was made director of the royal library. D. June 21, 1858. He published *Svenska Fornsånger* (3 vols., 1834–42), *Stockholm förr och nu* (1837–40), and a translation of Frithiof's *Saga*.

Asbjörn'sen (Peter Christian), b. in Christiania, Norway, Jan. 15, 1812; studied botany and zoology; visited Asia Minor and Egypt in 1849–50; spent two years at the academy of Tharand, Saxony, 1856–58, and on his return was appointed inspector-general of the forests of Norway. Besides a number of popular books on natural history and essays on forest-culture, he published *Norske Folke-Eventyr* (1842–43) in connection with Jorgen Moe, and *Norske Huldreeventyr og Folkesagn* (1845–48); which two books not only exercised a considerable influence on the development of the Norwegian literature, but also attracted much attention in the other Scandinavian countries, in Germany, and in England.

Ashland, on Oregon and California R. R., Jackson co., Or. (see map of Oregon, ref. 8–B, for location of county), has stage-line to Delta. Pop. in 1880, 842.

Asotin, on Snake River, cap. of Asotin co., W. T. (see map of Washington Territory, ref. 5–F, for location of county). Pop. not in census of 1880.

As'pinwall (William H.), b. in the city of New York in 1807; was trained as a clerk in the house of G. G. & S. S. Howland; became a partner in 1832; formed the firm of Howland & Aspinwall in 1837; retired from the firm in 1848. D. in New York Jan. 19, 1875. He was the chief promoter of the construction of the Panama R. R., the eastern terminus of which is named after him.

As'selijn (Jan), b. at Antwerp in 1610; studied painting, first in his native city under Isaiah Vandervelde, then in Rome, where Bamboccio and Claude Lorraine became his models; settled subsequently in Amsterdam, and d. there in 1660. He painted battle-pieces, animals, and landscapes, and his views of the neighborhood of Rome are much appreciated.

As'sing (Ludmilla), b. in Hamburg Feb. 22, 1827, a daughter of the poetess Rosa Maria Assing and the poet Dr. D. A. Assing; was educated in Berlin in the house of her uncle, Varnhagen von Ense; wrote for various periodicals, and edited the diaries and correspondence of her uncle. On account of the irreverence which these works show for the king of Prussia, the queen, etc., Ludmilla Assing was prosecuted twice, and sentenced to eight months', and then to two years', imprisonment, which was not executed, as she lived in Florence. D. Mar. 25, 1880.

As'ter, von (Ernst Ludwig), b. at Dresden in Nov., 1778; received a military education, and served first in the Saxon, then in the Russian, and finally (after 1815) in the Prussian service. In 1810, while still in the Saxon army, he attracted the attention of Napoleon by a plan for the fortification of Torgau, and while in the Prussian service he undertook the fortification of Coblentz and Ehrenbreitstein; was made inspector-general of all the Prussian fortresses and general of infantry in 1842. D. at Berlin Feb. 10, 1855. His *Nachgelassene Schriften* were published at Berlin, in 5 vols. (1856–61).—His brother, Karl Heinrich von Aster, b. at Dresden Feb. 4, 1782; d. there Dec. 23, 1855; colonel in the Saxon army; wrote several valuable military works, of which the most noted are *Lehre vom Festungskriege* (2 vols., 1812; often reprinted and translated into other languages) and *Die Gefechte und Schlachtene bei Leipzig* (2 vols., 1852–53).

Asteroids. At the date of the publication of our Vol. I. there had been discovered 135 of the small planets revolving in orbits between those of Mars and Jupiter, commonly called asteroids. The latest contained in the list then given was of date Feb. 18, 1874. Since that time there have been discovered (Oct. 27, 1884), 110 more, of which the dates and names (so far as they have yet been named), and the names of their discoverers, are given below. This list has been obligingly communicated by Prof. C. H. F. Peters, Ph. D., M. N. A. S., of Hamilton College, Clinton, N. Y., himself the discoverer of a large number of these bodies.

Asteroids discovered since Feb., 1874.

No.	Name.	Date of discovery.	Discoverer.
136	Austria	1874, March 18	Palisa.
137	Melibœa	April 21	Palisa.
138	Tolosa	May 19	Perrotin.
139	Juewa	October 10	Watson, U. S.
140	Siva	October 13	Palisa.
141	Lumen	1875, January 13	Paul Henry.
142	Polana	January 28	Palisa.
143	Adria	February 23	Palisa.
144	Vibilia	June 3	Peters, U. S.
145	Adeona	June 3	Peters, U. S.
146	Lucina	June 8	Borelly.
147	Protogeneia	July 10	Schulhof.
148	Gallia	August 7	Prosper-Henry.
149	Medusa	September 21	Perrotin.
150	Nuwa	October 19	Watson, U. S.
151	Abundantia	November 1	Palisa.
152	Atala	November 2	Paul Henry.
153	Hilda	November 2	Palisa.
154	Bertha	November 6	Prosper-Henry.
155	Scylla	November 8	Palisa.
156	Xantippe	November —	Palisa.
157	Dèianira	December 1	Borelly.
158	Coronis	1876, January 4	Knorre.
159	Æmillia	January 26	Paul Henry.
160	Una	February 25	Peters, U. S.
161	Athor	April 19	Watson, U. S.
162	Laurentia	April 21	Prosper-Henry.
163	Erigone	April 26	Perrotin.
164	Eva	July 12	Paul Henry.
165	Lorely	August 10	Peters, U. S.
166	Rhodope	August 10	Peters, U. S.
167	Urda	August 29	Peters, U. S.
168	Sibylla	September 28	Watson, U. S.
169	Zelia	September 28	Prosper-Henry.
170	[Myrrha]*	1877, January 10	Perrotin.
171	Ophelia	January 13	Borelly.
172	Baucis	February 5	Borelly.
173	Ino	August 1	Borelly.
174	Phædra	September 2	Watson.
175	Andromache	October 1	Watson.
176	Idunna	October 14	Peters.
177	Irma	November 5	Paul Henry.
178	Belisana	November 6	Palisa.
179	Clytemnestra	November 11	Watson.
180	[Garumna]	1878, January 29	Perrotin.
181	Eucharis	February 2	Cottenot.
182	Elsa	February 7	Palisa.
183	Istria	February 8	Palisa.
184	Deijopeja	February 28	Palisa.
185	Eunike	March 1	Peters.
186	Celuta	April 6	Prosper-Henry.
187	[Lamberta]	April 10	Coggia.
188	Menippe	June 18	Peters.
189	Phthia	September 9	Peters.
190	Ismene	September 22	Peters.
191	Kolga	September 23	Peters.
192	Nausikaa	1879, February 17	Palisa.
193	Ambrosia	February 28	Coggia.
194	Prokne	March 21	Peters.
195	Eurykleia	April 19	Palisa.

* Names in brackets are not yet universally accepted.

No.	Name.	Date of discovery.	Discoverer.
196	Philomela	1879, May 14	Peters.
197	Arete	May 21	Palisa.
198	Ampella	June 13	Borelly.
199	Byblis	July 9	Peters.
200	Dynamene	July 27	Peters.
201	Penelope	August 7	Palisa.
202	Chryseïs	September 11	Peters.
203	Pompeja	September 25	Peters.
204	Kallisto	October 8	Palisa.
205	Martha	October 13	Palisa.
206	Hersilia	October 13	Peters.
207	Hedda	October 17	Palisa.
208	Lacrimosa	October 21	Palisa.
209	Dido	October 22	Peters.
210	Isabella	November 12	Palisa.
211	Isolda	December 10	Palisa.
212	Medea	1880, February 6	Palisa.
213	Lilæa	February 16	Peters.
214	Aschera	February 29	Palisa.
215	Œnone	April 7	Knorre.
216	Cleopatra	April 10	Palisa.
217	Eudora	August 30	Coggia.
218	Bianca	September 4	Palisa.
219	Thusnelda	September 30	Palisa.
220	Stephania	1881, March 19	Palisa.
221	Eos	1882, January 18	Palisa.
222	Lucia	February 9	Palisa.
223	Rosa	March 9	Palisa.
224	Oreana	March 30	Palisa.
225	Henrietta	April 19	Palisa.
226	Weringia	July 19	Palisa.
227	Philosophia	August 12	Paul Henry.
228	Agathe	August 19	Palisa.
229	Adelinda	August 22	Palisa.
230	Athamantis	September 3	De Ball.
231	Vindobona	September 10	Palisa.
232	Russia	1883, January 31	Palisa.
233	Asterope	May 11	Borelly.
234	Barbara	August 12	Peters.
235	Carolina	November 28	Palisa.
236	Honoria	1884, April 26	Palisa.
237	Cœlestina	June 27	Palisa.
238	Hypatia	July 1	Knorre.
239	....	August 18	Palisa.
240	Vanadis	August 27	Borelly.
241	Germania	September 12	Luther.
242	Chriemhild	September 22	Palisa.
243	....	September 29	Palisa.
244	....	October 14	Palisa.
245	....	October 27	A. Palisa.

The following is a list of all the discoverers of asteroids, with their places of observation and the number of asteroids discovered by each. The arrangement of the names is in the order of these numbers, and not in the order of time:

Name.	Locality.	No. discovered.
Palisa	Pola and Vienna	47
Peters	Clinton, N. Y	42
Watson	Ann Arbor, Mich	22
Luther	Bilk and Düsseldorf	21
Goldschmidt	Paris	14
Borelly	Marseilles	13
Hind	London	10
De Gasparis	Naples	9
Pogson	Oxford and Madras	7
Prosper-Henry	Paris	7
Paul Henry	Paris	7
Chacornac	Marseilles and Paris	6
Tempel	Marseilles	5
Perrotin	Toulouse	5
Coggia	Marseilles	4
Ferguson	Washington	3
Knorre	Berlin	3
Olbers	Bremen	2
Hencke	Driesen	2
Tuttle	Cambridge, Mass	2
Piazzi	Palermo	1
Harding	Lilienthal	1
Graham	Markree	1
Marth	London	1
Laurent	Nismes	1
Searle	Cambridge, U. S.	1
Forster and Lesser	Berlin	1
Schiaparelli	Milan	1
D'Arrest	Copenhagen	1
Tietjen	Berlin	1
Stephan	Marseilles	1
Schulhof	Vienna	1
Cottenot	Marseilles	1
De Ball	Bothkamp	1

F. A. P. Barnard.

Astié (Jean Frédéric), b. in 1822 at Nerac, department of Lot-et-Garonne, France; was for some time a pastor in New York, afterward professor of philosophy at Lausanne, and wrote, besides various theological works, *Le Réveil religieux des États-Unis* (1857) and *Histoire de la République des États-Unis* (2 vols., 1865).

As′tor (William B.), b. in the city of New York Sept. 19, 1792; studied at Göttingen and Heidelberg; settled in New York; married a daughter of Gen. Armstrong, secretary of war under Pres. Madison, and was known as a good linguist and an able administrator of the enormous property in real estate left to him by his father, John Jacob Astor. D. in New York Nov. 24, 1875, and left $249,000 to the library which was founded by his father, and which bears the name of the family.

Astoria, on R. R., Fulton co., Ill. (see map of Illinois, ref. 5–C, for location of county). Pop. in 1880, 1280.

Ateliers Nationaux, ȧt-le-ȧ′ nȧ′se-o′nō′, or "National Workshops," the name of establishments organized in Paris by the republican government in 1848 for the benefit of operatives and mechanics who lacked employment. These men entertained an idea that the government was bound to find them employment. The number of workingmen who depended on the government for subsistence was about 100,000. The experiment failed, and when the ateliers nationaux were closed a bloody sedition broke out in Paris, June, 1848.

Atella′næ, Fab′ulæ, also called **Ludi Osci,** rustic comedies which were performed in ancient Rome, and derived their name from Atella, a town of Campania. The actors of these plays spoke the Oscan dialect, and amused the people with decent drollery. The *Maccus* and *Bucco* of the Fabulæ Atellanæ are said to be the origin of the modern Harlequin and Pulcinello.

A Tem′po (literally, "to time"), a musical term used to denote that after some short relaxation in the time the performer must return "to the [proper] time," or original degree of movement.

A Tem′po Gius′to ("to the correct time"), in music, a direction to the performer, after a recitative, to keep the measure true and correct, which during the recitative had been altered to suit the action and passion of the scene.

Atherosperma′ceæ [from *Atherosperma*, the name of one of the genera], the name of a natural order of incomplete aromatic exogenous shrubs found in New Holland and South America, remarkable for having their flowers in a cup-shaped involucre, and the peculiar anthers of Lauraceæ.

Atherton (Joshua), b. at Harvard, Mass., June 20, 1737; graduated at Harvard University 1762; practised law, became register of probate of Hillsborough co., N. H., and removed in 1773 to Amherst, N. H.; was for a time a loyalist, but took the oath of allegiance to the U. S., and was admitted to practice in the superior court in 1779; became a member of the convention to adopt the Federal Constitution; was afterward elected to New Hampshire House of Representatives and Senate, and was made attorney-general of the State in 1793. Died at Amherst, N. H., Apr. 3, 1809.

Ath′ole, Dukes of, and marquesses of Tullibardine (1703), and of Athole (1676); earls of Tullibardine (1606), of Athole (1629), and of Strathtay and Strathardle (1703); viscounts of Balquhidar (1676), of Glenalmond and Glenlyon (1703); Barons Murray (1604); Barons Balquhidder (1606); Barons Balvenie and Gask (1676, in Scotland); Barons Strange of Knocklyn (1628, in England); Barons Percy (1722, in Great Britain): Barons Murray of Stanley (1786, in Great Britain): Earls Strange (1786, in Great Britain); Lords Glenlyon (1821, in the United Kingdom).—John James Hugh Henry Stewart-Murray, the seventh duke, was born Aug. 6, 1840, and succeeded his father in 1864.

At′kins (John D. C.), b. in Henry co., Tenn., June 4, 1825; was educated at the University of East Tennessee, and graduated there in 1846; was elected to the lower branch of the legislature in 1849 and 1851, and to the State senate in 1855; was a Presidential elector on the Buchanan ticket in 1856, and a member of Congress from Tennessee from 1857 to 1861; then resigned and espoused the cause of the Confederates, serving in the field part of the time, as well as in the public councils. He was a member of the Confederate Congress at the time of the general surrender in 1865; was again returned to the Federal Congress 1872–74, and was re-elected to the 45th, 46th, and 47th Congresses. He became U. S. commissioner of Indian affairs Mar. 20, 1885. Alexander H. Stephens.

Atkinson (William King), b. at Portsmouth, N. H., Jan. 6, 1764; graduated at Harvard University in 1783; his name was changed from William King; commenced practising law at Dover, N. H.; was register of probate many years; attorney-general and afterward a justice of the supreme court. Died Sept. 29, 1820.

Atlee (John Light), M. D., b. at Lancaster, Pa., Nov. 2, 1799; was son of Col. William Pitt Atlee, a Revolutionary officer, and was educated in Lancaster and Philadelphia; studied medicine under Dr. Samuel Humes, and graduated from the University of Pennsylvania, in Philadelphia, in

1820; had a very high reputation in surgical operations; was one of the founders of the Lancaster City and County Medical Society, in 1843, and was twice its president; assisted in organizing Pennsylvania State Medical Society in 1848, and became its president in 1857. He was also one of the organizers of the American Medical Association, in Philadelphia, in 1857; was elected vice-president in 1865, and president in 1882. He was prof. anatomy and physiology in Franklin and Marshall College, Pa., for many years; was contributor to many medical periodicals; member of various societies, and held numerous important offices. Died at Lancaster, Pa., Oct. 1, 1885.

At′terbom (Peter Daniel Amadeus), b. Jan. 19, 1790, at Åsbo, in Southern Sweden; studied (1805) at the University of Upsala languages and literature, history and philosophy; travelled in Germany and Italy 1817–19; became tutor to the crown prince Oscar 1819–22, and was appointed docent in 1822 and professor in 1828 at the University of Upsala, where he d. July 21, 1855. In 1807 he formed the literary association *Aurora*, and in 1810 he founded the critical periodical *Fosforus;* and it was through these two institutions that the French or pseudo-classical taste which reigned in all Swedish literature and art received its first and its heaviest blows. The romantic ideas which started this whole movement were afterward developed by Atterbom in a long series of brilliant writings, poetical and historico-critical—*Lycksalighetens Ö* (2 vols., 1824–27), *Samlade Dikter* (2 vols., 1836–37), *Svenska siare och skalder* (6 vols., 1841–55), and *Poesiens historia* (4 vols., 1862); but, as can be seen from the article on SWEDISH LANGUAGE AND LITERATURE, in CYCLOPÆDIA, that form of the romantic school which was represented by Atterbom and the Fosforists did not become the model of modern Swedish poetry.

Au′dience [from the Lat. *au′dio*, "to hear"], the act of hearing; admittance to a hearing; the reception of an ambassador by a sovereign at court; sometimes used to denote an auditory or assembly of hearers. In England it is the name of a court held by the archbishop of Canterbury.

Au′ditor [from the Lat. *audio*, to "hear"], a person whose duty it is to examine and pass upon the accounts of those who have been entrusted with money, or to examine a particular account and certify the result. The U. S. government, as well as most public and private corporations, have such officers. An auditor is appointed by courts in the course of some actions to examine and state accounts, and report them to the court for further proceedings.

Audouard′ (Olympe), b. about 1830 at Aix, department of Bouches-du-Rhône, France; married a notary from Marseilles, but separated very soon from him; visited in 1859 Egypt, Turkey, and Russia, and in 1868 the U. S., where she gave a number of lectures. She wrote *Comment aiment les Hommes* (1861), *Les Mystères du Sérail et des Harems turcs* (1863), *Guerre aux Hommes* (1866), *Lettre aux Députés* (1867), *À Travers de l'Amérique du Nord* (1871).

Audry de Puyraveau (Pierre François), a French republican, born at Puyraveau in 1783. He was elected to the Chamber of Deputies in 1827, and acted a prominent and efficient part in the revolution of 1830, during which his manufactory in Paris was the rendezvous of the revolutionists. In 1848 he was a member of the Constituent Assembly.

Au′ersperg (Adolph Wilhelm Daniel), Prince, b. July 21, 1821, a son of Prince Wilhelm Auersperg and brother to Prince Carlos; entered the army very early, and was a major in Prince Eugene's dragoons when he left the military service in 1870. In 1867 he was elected a member of the Bohemian Diet, and in the same year was appointed president of the assembly on the resignation of Count Hartig. In 1869 he was nominated a member for life of the upper chamber of the Austrian Reichstag, and in 1870 was made governor of Salzburg. Finally, he succeeded Count Beust as president of the Austrian ministry, Nov. 25, 1871. Like his brother, who at an earlier date was president of the Cisleithanian ministry, he represented the German interest in Austria, and supported the present organization of the empire, established by Beust, and comprising an Austrian division, in which the German element predominates, and a Hungarian, in which the Magyars rule. D. Jan., 1885.

Augusta, city and R. R. junction, Butler co., Kan. (see map of Kansas, ref. 7–H, for location of county). Pop. in 1880, 922; in 1885, 1476.

Aurelle de Paladines, d′ (Claude Michel Louis), b. at Malezieux, department of Lozère, France, Jan. 9, 1804; received a military education; served in Algeria 1841–48; distinguished himself and was made a general of division in the Crimean war, and was commander-in-chief of the ninth military division (Marseilles) at the outbreak of the Franco-German war. In the battle of Coulmiers (Nov. 9, 1870) he defeated Von der Thann, and compelled the Germans to retire from Orleans. On Nov. 14 he was made commander-in-chief of the first army of the Loire, but his attack on the left wing of the army of Prince Frederick Charles at Beaune-la-Rolande (Nov. 28) failed; on Dec. 2 he was defeated at Artenay by the grand duke of Mecklenburg, and on Dec. 3 and 4 was driven farther back by Prince Frederick Charles, who again occupied Orléans. Gambetta now instituted a committee of inquiry into the conduct of D'Aurelle, who immediately resigned his command, and afterward declined to accept any command under the then government. He sat in the National Assembly of Bordeaux, was one of the members associated with Thiers in the negotiations of peace, and was appointed commander first of the national guard in the department of Seine, afterward of the fourteenth military division (Bordeaux). In 1872 he published *La Première Armée de la Loire.* D. Dec. 17, 1877.

Au′rifaber (the Latinized form of Goldschmidt, Johann), b. in the countship of Mansfeld, part of the present Prussian province of Saxony, in 1519; studied theology in Wittenberg; was chaplain to a Saxon regiment in the Smalcaldic war; became amanuensis to Luther in 1545; was appointed court-chaplain at Weimar in 1551, and minister at Erfurt in 1566, where he d. in 1579; edited several manuscripts of Luther's, and his *Epistolæ* and *Table-Talk.*

Austin (Alfred), b. at Headingley, England, May 30, 1835; studied at Stonyhurst and St. Mary's colleges; took his degree at the University of London in 1853, and was called to the bar in 1857. He devoted himself to literary pursuits, and published anonymously "Randolph," a poem; author also of various other works, among which are "A Vindication of Lord Byron" (1869), "Savonarola," a tragedy (1881), and "Soliloquies in Song." He has also contributed many articles for the "Standard" newspaper and for the "Quarterly Review."

Austin (Coe F.), b. at Mount Hope, Orange co., N. Y., June 20, 1831; published *Musci Appaladiani et Hepaticæ Boreali-Americanæ*, and prepared a *Synopsis of the Hepaticæ of North America.*

Austin (John), b. in England Mar. 3, 1790; prof. of jurisprudence in London Univ. 1826–32. He published "Province of Jurisprudence Determined" (1832), etc. After his death, Dec., 1859, his "Lectures on Jurisprudence; or, The Philosophy of Positive Law" were published by his widow.

Austin (William), b. at Charlestown, Mass., Mar. 2, 1778; author of "Letters from London," published in Boston in 1804; published in 1807 a volume of Unitarian views, "An Essay on the Human Character of Jesus Christ;" author of "Peter Rugg, the Missing Man," a legendary story published in the "New England Galaxy," etc. He was also a distinguished lawyer, and practised in Middlesex and Suffolk cos., Mass. Died at Charlestown, Mass., June 27, 1841.

Auzoux′ (Théodore Louis), b. at St. Aubin d'Ecroville, department of Eure, France, about 1797; studied medicine in Paris; invented the so-called *anatomie clastique,* a method of making permanent models of anatomical preparations in papier-mâché, and wrote *Mémoire sur le Choléra Morbus* (1832), *Leçons élémentaires d'Anatomie et de Physiologie* (1839), *Des Tares molles et Osseuses dans le Cheval* (1853), *Insuffisance des Chevaux forts et légers, du Cheval de Guerre et de Luxe* (1860). D. Mar. 6, 1880.

Ava, cap. of Douglas co., Mo. (see map of Missouri, ref. 7–G, for location of county). Pop. in 1880, 134.

Avent (Benjamin Ward), M. D., b. in Greenville co., Va., May 19, 1812; graduated at La Grange College, Ala., and in medicine at Transylvania University in Lexington, Ky.; was appointed surgeon-general for Tennessee 1861; after the war he held the chair of surgery in the Medical College of Memphis.

Azaïs′ (Pierre Hyacinthe), b. at Sorrèze, department of Tarn, France, Mar. 1, 1766; was educated in the Benedictine college of his native city, and became secretary to the bishop of Oléron; was condemned to transportation on account of a bitter criticism of the excesses of the revolutionists, but escaped and lived for several years in retirement; went to Paris in 1806; professor of history at the military school of St. Cyr, and afterward inspector of public libraries of Avignon and Nancy; lost this position in 1815 because he wrote a defence of Napoleon; received a pension from the government through the influence of Madame de Staël, and lived quietly in Paris, lecturing on philosophy in his garden, and publishing a great number of books. D. Jan. 22, 1845. His two most characteristic works are *Le Système de Compensation* (1806) and *Le Système universel* (1812).

B.

Baa'der, von (Franz Xaver), b. at Munich Mar. 27, 1765; studied medicine at Ingolstadt and Vienna 1781–86; then natural science, especially mineralogy, at Freiberg, under Werner, 1788–92; visited England 1792–96, and held various positions in the Bavarian mining department from 1797 to 1820. In this period he wrote *Vom Wärmestoff* (1786), *Versuch einer Theorie der Sprengarbeit* (1802), and *Anleitung zum Gebrauche der schwefelsäuren Soda oder des Glaubersalzes zur Glaserzeugung* (1815), for which he received a prize of 12,000 florins from the Austrian government. Meanwhile, he cultivated the study of philosophy and theology with great energy, became acquainted with all the leading men of the time and with their ideas, and finally brought himself to rest in the mysticism of Jakob Böhme. In 1826 he was made professor of philosophy and speculative theology at the University of Munich, and the deep enthusiasm and ingenious argumentation of his lectures and writings attracted great attention, though his ideas were mystical and the form in which he represented them aphoristical. His views tended to a reconstruction of the whole civilization on the basis of religion, of the Church, but in this new Church there should be no pope. In 1814 he presented a memorial to the sovereigns of Russia, Prussia, and Austria in which he urged the necessity of bringing politics once more into close connection with religion, but in 1837, during the troubles at Cologne, he spoke with much sharpness against the pope. He died, however, a good Roman Catholic, May 23, 1841, at Munich. His philosophical writings have been published in a collected edition in 16 vols. by Franz Hoffmann (1850–60), who also has given a general representation of his standpoint—*Vorhalle zur speculativen Lehre Baader's* (1837).

Bab'ington (Churchhill), b. in England in 1821; graduated at St. John's College, Cambridge; held the chapelry of Horningsea, Cambridgeshire, 1848–61; was Disney professor of archæology 1865, and rector of Cockfield in 1866; edited from MSS. the recently-discovered orations of Hyperides; has written largely on botany, ornithology, archæology, and numismatics for various works and Transactions, and contributed to Smith's *Dictionary of Christian Antiquities*.

Bage'hot (Walter), A. M., b. at Langport, England, Feb. 3, 1826; graduated at University College, London, and passed A. M. at London University; wrote *The English Constitution, Physics and Politics* (1872), and *Lombard Street* (1873); editor of *Economist* till his death, Mar. 26, 1877.

Bag'ley (John J.), b. in Orleans co., N. Y., July 24, 1832, and emigrated with his father to Michigan in 1840. After 1847 he was a tobacconist in Detriot, and very successful in business. He held numerous public offices in the city government, and filled places of financial trust; governor 1873–77. During his administration the educational and charitable institutions of the State received special care and encouragement. D. July 27, 1881.

Bai'ley (Silas), D. D., b. in Massachusetts about 1808; president of Granville College (now Denison University), Granville, O., and of Franklin College, Lafayette, Ind., and subsequently professor of theology in Kalamazoo College, Mich., and pastor for several years of a Baptist church in Lafayette, Ind., and author of several books; made a tour of Europe. D. at Paris June 30, 1874.

Bailey (William Whitman), B. P., b. at West Point, Orange co., N. Y., Feb. 22, 1843; was educated at Brown University, Providence, R. I., whence he graduated in 1864; was botanist of the U. S. geological survey of 40th parallel in 1867; deputy secretary of state of Rhode Island in 1868; assistant librarian of Providence Athenæum 1869–71, and contributed largely to periodical literature.

Ba'ker (John Gilbert), b. at Guisborough, England, Jan. 13, 1834; educated at the Friends' schools at Ackworth and York; assistant curator of the Kew Gardens since 1856; is lecturer on botany at the London Hospital, and an assistant editor of *Seemann's Journal of Botany;* and has written a large number of works on ferns, flora, botany, etc.

Ball (George H.), A. M., D. D., b. at Oxford, Sherbrook co., East Canada, Dec. 7, 1818; studied at the theological seminary of New York, whence he graduated in 1847; was pastor of the Niagara Square Baptist church, Buffalo, N. Y., for about twenty years; pastor of Roger Williams church, Providence, R. I., for two years; editor of the *Baptist Union*, and published *Guide to the Lord's Supper, Christian Baptism*, etc.

Ba'ring-Gould (Sabine), b. at Exeter, England, Jan. 28, 1834; was educated at Clare College, Cambridge; visited Iceland in 1862; took orders in 1865; was appointed curate of Horbury, subsequently of Dalton, and published *Iceland, its Scenes and Sagas* (1863), *Post-Mediæval Preachers* (1865), *The Book of Were-Wolves* (1865), *Myths of the Middle Ages* (1869), *The Origin and Development of Religious Belief* (1870), *Legends of the Patriarchs and Prophets* (1871), *Lost and Hostile Gospels* (1874), *Lives of the Saints* (15 vols., 1872–77), and other works.

Bar'low (Samuel Latham Mitchill), b. at Granville, Hampden co., Mass., June 5, 1826; was educated in New York City; admitted to the bar in 1848, and practised subsequently in the city of New York.

Barnesville, R. R. junction, Pike co., Ga. (see map of Georgia, ref. 4–G, for location of county), 60 miles S. by E. of Atlanta. Pop. in 1870, 754; in 1880, 1962.

Bartholdi (Frédéric Auguste), b. at Colmar, in Alsace-Lorraine, Apr. 2, 1834, first studied painting under Ary Scheffer in Paris, but afterward devoted himself exclusively to sculpture and began to exhibit in 1847. Among his best-known works are the busts of Erckmann and Chatrian, the statues *La Malédiction d'Alsace, Lafayette arriving in America*, and *Liberty enlightening the World*, the colossal figure of the goddess of Liberty (a complete lighthouse, see New York City) which the people of France presented to the U. S. Bartholdi is author of a description of this statue, published in 1885.

Bartolomme'o (Fra), whose true name was Baccio delle Porta, b. at Savignano in 1469; studied under Cosimo Rosselli and Leonardo da Vinci, and had already acquired a great reputation as a painter when the condemnation and execution of his friend, Savonarola, caused him to give up his art and retire to a Dominican convent in 1500. In 1504, however, he again took up painting, chiefly at the solicitation of Raphael, who came to Florence at that time, and he subsequently visited Rome in order to study the works of Michael Angelo. Most of his life he spent in Florence, where he d. Oct. 8, 1517, and here are his most celebrated pictures, the *Nativity, Circumcision*, and the *Virgin on the Throne*, in the public gallery; the *St. Mark* and the *Descent from the Cross*, in Palazzo Pitti; and *Last Judgment*, in chapel of Santa Maria Nuova.

Bar'ton (Clara), b. on a farm at Oxford, Mass., a daughter of Capt. Stephen Barton, and educated at Clinton, N. Y. Early in life she engaged in teaching, and founded a free school at Bordentown, the first in New Jersey, which she opened with six pupils, but which numbered nearly 600 when, in 1854, she went to Washington. Here she was appointed clerk in the department of patents, but on the outbreak of the civil war she resigned her clerkship and devoted herself to the alleviation of the sufferings of the soldiers, serving not in the hospitals, but on the battle-field. She was present at several battles, and after the close of the war originated, and for some time carried on at her own expense, the search for missing soldiers. Having lectured (1866–67) on *Incidents of the War*, she went to Europe for her health, and settled in Switzerland, but on the outbreak of the Franco-German war she accepted the invitation of the grand duchess of Baden to aid her in the establishment of her hospitals; and she afterward followed the German army, and was decorated with the Golden Cross by the grand duke of Baden, and with the Iron Cross by the emperor of Germany.

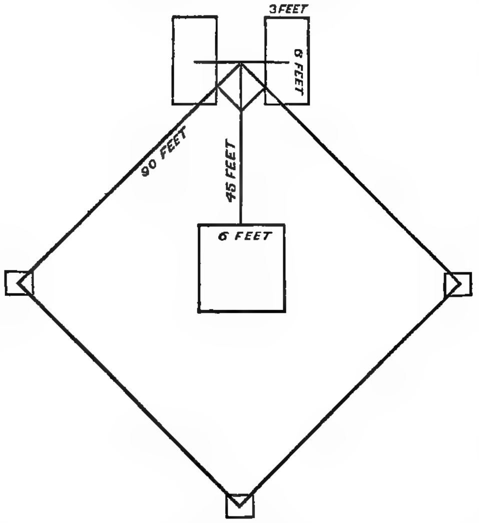
Barycen'tric Calculus, an application to geometry of the mechanical theory of the centre of gravity, executed in two distinct ways, according as metrical or descriptive geometrical properties are to be investigated. It was developed almost completely by Möbius in his *Der barycentrische Calcul* (1827).

Barye (Antoine Louis), b. in Paris Sept. 24, 1795, was apprenticed to an engraver; served in the army 1812–14; studied drawing and modelling under Bosio and Baron Gros; began to exhibit his sculptures in 1827; achieved a great reputation, especially by his statuettes and as an animalist—a deer stepping high through the grass, an elephant in full charge, a jaguar devouring a gazelle, the lion and the serpent, etc.; became a member of the Academy of Fine Arts in 1868, and d. in Paris June 25, 1875. Copious collections of his works may be seen in the Corcoran art gallery in Washington, in Baltimore, and in New York.

Base-Ball. This most popular of all the field-games in vogue in the U. S., and now known as the national game of the country, may be said to date its existence from the organization of the National Association of Base-Ball Players in 1857. Prior to this period the game was not played under any general code of rules, a different method of playing it prevailing in different sections of the country; it being known as the "New England game" in the Eastern States and as the "New York game" in the Middle States. But not long after the establishment of the National Association all other rules were superseded, and ultimately but one code of playing-rules governed the game throughout the entire country. Base-ball is of English origin, it being the American successor of the old English school-boy game of "rounders;" but to this old pastime base-ball, as now played, bears about as much resemblance as draughts to chess, the only similarity which exists being that both are played on the same plane, the two ball-games being played on a diamond-shaped field, and draughts and chess on a checkered board. This similarity between the English and American games, however, does not interfere with the legitimacy of the claim of base-ball to its existing title of "the national game of America."

In the earlier period of its history base-ball was confined exclusively to the amateur class of the fraternity, professional playing being comparatively unknown before the last decade; but as it progressed in popularity, and thousands of spectators began to be attracted to witness the leading contests of each season where only hundreds had congregated before, the opportunity for pecuniary gain in connection with the game began to exist, and as a consequence the professional class sprang into existence; and henceforth there will necessarily be two classes of base-ball players in existence—the amateur majority and the professional minority. The first regularly-organized base-ball club which sustained a permanent existence was the Knickerbocker Club of New York, which was organized in Sept., 1845. In 1876 this pioneer club celebrated its thirty-first season of playing, and many of the veteran members participated in the proceedings. It is now composed of bankers, brokers, and merchants of the city, and occupies the enviable position of being the model amateur base-ball club of America. From 1845 to 1856, inclusive, the rules of play in vogue at Hoboken—the early home of the game—were those adopted by the Knickerbocker Club, and afterward endorsed by the kindred organizations of the Gotham, Eagle, Empire, Baltic, and Harlem clubs of New York; the Putnam, Excelsior, Atlantic, Eckford, and Continental clubs of Brooklyn; and the Union of Morrisania—all organized between 1845 and 1856, the leading clubs of this list playing at the Elysian Fields at Hoboken, N. J. The rapid growth of popularity base-ball has attained within the past twenty-five years is due to the fact of its adaptability to the peculiar temperament of our people. It is a game quickly played, it is full of excitement, and it can be enjoyed with equal zest by the youngest school-boys and the trained professional; to the latter of whom it affords full scope for the exercise of those mental as well as physical qualifications which characterize the intelligent and skilful athlete.

Before the organization of the National Association in 1857 the rule of play gave the victory in a game to the club first making the score of twenty-one aces. The association changed this to the rule awarding the victory to the club scoring the largest number of runs after nine innings' play on each side. Improved as the rule of play was by the old association, these revised rules were nothing in comparison to the complete code of rules which was prepared for the Professional Association in 1872, and which has continued in force ever since with some slight amendments. There is no field-game which is more simple in its theory than that of base-ball, and yet to excel in the game as a noted expert requires not only the possession of the physical qualities of endurance, agility, and strength, with good running and throwing powers, but also the mental attributes of sound judgment, quick perception, thorough control of temper, and the presence of mind to act promptly in critical emergencies, together with courage, pluck, and nerve. The simple theory of the game is as follows: A space of ground being marked out on a level field in the form of a diamond with equal sides, bases are placed on the four corners thereof. The contestants include nine players on each side; one side takes the field and the other goes to the bat. When the field-side take their positions the pitcher delivers the ball to the batsman, who endeavors to send it out of the reach of the fielders, and far enough out on the field to enable him to run round the bases; and if he reaches the home-base—his starting-point—without being put out, he scores a run. He is followed in rotation by the others of his side until three of the batting party are put out, when the field-side come in and take their turn at the bat. This goes on until nine innings have been played to a close, and then the side scoring the most runs wins the game. A regular base-ball field occupies a space of ground of from 300 to 500 feet in width and 400 to 600 in length. At the upper end of this field the "infield" is laid out, this being formed by the diamond-shaped space, on the corners of which the four bases are located. The sides of this square are 90 feet, the home-base being located at the upper corner, the second base at the lower corner, and the first and third bases on the right and left corners. The pitcher's position is within a space of ground 6 feet square and 45 feet distant from the home-base, situated on a line between home and second bases. The catcher stands behind the home-base, either close to it or some distance behind as occasion may require. The basemen occupy positions within easy reach of their respective bases, and the short-fielder takes his position between the third and second bases, and not far from the pitcher, his duty being to "back up" the infielders. These six players comprise the "infielders" of the nine, the "outfielders" being the three players located at left, centre, and right fields. The field-side open the game—choice of first innings having been decided by a toss—by the pitcher's delivering the ball to the batsman, either by a toss, a jerk, or an underhand throw, the limit of this throw being the swinging of the arm and hand in which the ball is held below the line of the waist. If the ball be fairly hit by the batsman—that is, if it be not called "foul" by the umpire—the batsman then becomes a base-runner, and he is obliged to run to the first base; and should the ball he has hit be caught before touching the ground, or if it be held by a fielder while touching the first base before the base-runner reaches that base, the latter is out. The batsman is also liable to be put out when a foul ball from his bat is caught on the fly or on the bound, and also if he fails to hit it after striking at it three times. Also, if he refuses to strike at good balls four times he is out, or if he wilfully strike out. Base-runners are liable to be put out when touched off a base, or when forced off by the action of the batsman in hitting a fair ball, or by running out of the line of the bases to avoid the ball in the hands of a fielder, as also from wilfully obstructing a fielder in his effort to catch a ball. To score a run it is necessary for the base-runner to touch each base in regular order from home-base to first, second, and third bases, and thence to the home-base, before he is put out, and before three members of the batting-side are put out. Until three men are out the batting goes on indefinitely until darkness stops play. Each nine in the game are entitled to nine innings' play. No game can be scored unless five innings' play have been completed on each side. An umpire is mutually agreed upon to decide all disputes in the game, and from his decision there is no appeal except to the national association the clubs belong to, and then only in case of a palpable misinterpretation of the rules.



The three special departments of the game are batting, fielding, and base-running. Any one possessing muscular strength and quick sight can readily learn to handle the bat with effect; but fielding requires a special aptitude for one or other of the several positions, and constant practice and training, while base-running needs quick perception, good judgment, and prompt action. In the former a mere tyro may achieve the questionable honor of a "home-run," but none but a practised expert can excel in the other two departments. Different degrees of skill are needed for different positions. The pitcher requires powers of endurance and considerable pluck, together with the ability to pitch the ball swiftly and accurately, not forgetting the judgment required to make strategy a strong point of his attack. The catcher should be a swift and accurate thrower, a sure catch, and a plucky facer of swiftly-delivered balls. These essentials are also necessary in base-players, and the short-fielder requires to be an unusually active player besides; while the outfielders should all three be long-distance throwers and good judges of catches. To complete a nine a change pitcher and catcher is necessary, as also a field-captain. These are essentials of success alike in amateur as in professional nines, but the training and discipline characteristic of a well-managed professional team can never be at the command of an amateur nine, except perhaps in the case of a university nine, and then only to a limited extent. Hence, professional nines must always be the superiors of amateur nines in fielding and base-running, if not in batting.

In 1871 the old National Association, which had apparently fulfilled its mission after thirteen years' existence, gave place to the class organizations known as the National Association of Professional Players and the National Association of Amateur Base-Ball Players. The former was run in the interests of the professional class until 1876, when it was superseded by the League Association of Professional Clubs, the co-operative class of professionals still keeping up the National Professional Association, and the amateurs their association.

The prominent events in the history of base-ball were the grand tour made by the Excelsior Club of Brooklyn in 1860; the great Western tour of the National Club of Washington to St. Louis and Chicago in 1867; the brilliant career of the Cincinnati Club in 1869, when they played every club of note from Maine to California without losing a single game; and the trip of the Boston and Athletic clubs to England in 1874, where by their skill as base-ball fielders in the English game of cricket they were enabled to escape defeat in contests with some of the strongest elevens of England and Ireland. The most successful of the professional organizations have been the Boston "Red Stockings," which from 1871 to 1876 won the championship pennant each season. In 1884 the "Providence" team headed the list of successful contestants, with a record of eighty-four games won, followed by the "Boston," "Buffalo," "Chicago," and "New York" clubs in the order named. In 1885 the "Chicago" won the championship pennant.

HENRY CHADWICK.

Bastien-lepage (JULES), b. at Damvillers, France, in 1848; studied painting with Cabanel; entered the Salon in 1873; received there in 1874 a third-class medal on *A Song of Spring* and *Mon Grandpère*, and in 1875 a second-class on *The Communicant*, also a prix de Rome of the lower rank. He afterward painted an excellent little full-length portrait of Sarah Bernhardt which was exhibited in London in 1880. His *Jeanne d'Arc* was purchased in the U. S. by a resident of Boston, Mass. Died Dec., 1884.

Bateman (NEWTON), LL.D., b. July 27, 1822, in Fairfield, N. J.; removed to Illinois with his parents in 1833; entered Illinois College in 1840, and graduated in 1843; studied at Lane Theological Seminary a short time; travelled extensively in the U. S.; taught private school in St. Louis; professor of mathematics 1847–51 in St. Charles College, Missouri, and then became principal of public free school of Jacksonville, Ill.; was at same time superintendent of schools for the city and commissioner of schools for the county; became principal of Jacksonville Female Academy in 1858, and before the close of the year was elected State superintendent of public instruction. He served five terms of two years each, and was actively engaged in establishing the normal university. He published a valuable report each term. In 1862–64 he had charge of the correspondence of the provost-marshal-general of the State, and then resumed the State superintendency of public instruction. In 1874 he became president of Knox College, Ill.

HENRY HIGGINS.

Bat'tershall (JESSE PARK), PH. D., b. in Troy, N. Y., May 26, 1851; began his chemical education 1867 at School of Mines, Columbia College, N. Y.; in 1869 studied under Prof. Wöhler at the University of Göttingen, Germany, where he remained for a year, after which he passed a semester at the University of Leipsic with Prof. Kolbe; then continued his studies for two years under the instruction of Prof. Fittig at the University of Tübingen, Würtemberg, where, after the necessary original research and examination, he received the degree of doctor of natural sciences; his inaugural dissertation is a description of several new derivatives of naphthalene, including the aldehyde of isonaphthoic acid ($C_{11}H_8O$), its amido-compound, hydroisonaphthamide ($C_{33}H_{24}N_2$), sulphonaphthoic and isosulphonaphthoic acids ($C_{11}H_2O_5S$) and salts, and several isomeric oxynaphthoic acids ($C_{11}H_8O_3$). After attending the chemical course of Prof. Marignac in Geneva he returned to this country, where he is engaged as analytic and consulting chemist; an English translation by him of Naquet's *Legal Chemistry* has been published.

Bat'tey (ROBERT), M. D., b. in Augusta, Ga., Nov. 26, 1828; took his degree in medicine at the Jefferson Medical College~~; practised~~ his profession in Rome, Ga., and by his contributions to the journal~~s~~ ~~(one to the~~ London *Lancet* on vesico-vaginal fistula) soon acquired reputation~~; was~~ called to the chair of obstetrics in the Atlanta Medical College; claims to have first performed normal ovariotomy, and is attempting regurgitation in the alimentary canal. He became editor of the Atlanta *Medical and Surgical Journal.*

Bayborough, cap. of Pamlico co., N. C. (see map of North Carolina, ref. 4–J, for location of county). Pop. not in census of 1880.

Bayonne, city, Hudson co., N. J. (see map of New Jersey, ref. 3–E, for location of county), is situated on N. J. Central division of Philadelphia and Reading R. R., and between Newark Bay and New York Bay. Pop. in 1880, 9372; in 1885, 13,080.

Bayou Sara, on R. R. and Mississippi River, cap. of West Feliciana parish, La. (see map of Louisiana, ref. 9–E, for location of parish). Pop. in 1880, 710.

Bea'man (FERNANDO C.), b. in Chester, Vt., June 28, 1814; studied law at Rochester, N. Y., and in 1838 became a lawyer of Michigan; was prosecuting attorney of Lenawee co., judge of probate, Presidental elector in 1856, and M. C. from Michigan 1861–69. D. Sept. 27, 1882.

Beat'ty (ORMOND), A. M., LL.D., b. at Washington, Mason co., Ky., Aug. 13, 1815; was educated at Centre College and Yale College, whence he graduated in 1835; was appointed professor of Centre College in 1836 and president in 1872, and has contributed to various papers.

Beattyville, cap. of Lee co., Ky. (see map of Kentucky, ref. 3–I, for location of county), is on Kentucky River. Pop. in 1870, 123; in 1880, 146.

Beaver City, cap. of Furnas co., Neb. (see map of Nebraska, ref. 11–D, for location of county). Pop. in 1880, 153; in 1885, 133.

Beck'er (KARL FRIEDRICH), b. at Berlin in 1777; studied philosophy and history at Halle; was a teacher in Berlin, but gave up all kinds of business on account of ill-health, and d. Mar. 15, 1806. From 1801 to 1805 he published his *Weltgeschichte für Kinder und Kinderlehrer* (9 vols.), which has been often reprinted and translated into other languages. On account of a singular felicity both in arrangement and style, it was to young readers a very pleasant and useful book, but since the death of the author it has been so much augmented, continued, corrected, and changed as to become nearly valueless.

Be'dle (JOSEPH D.), b. at Middletown Point (now Mattawan), Monmouth co., N. J., Jan. 3, 1831; graduated with honor at the law school at Ballston, N. Y.; practised law in New York City; entered the law-office of W. L. Dayton at Trenton, N. J., where he completed his term of study; practised at Mattawan until 1855, when he entered upon a very successful professional career at Freehold, N. J.; was appointed a judge of the New Jersey superior court in 1865, and again in 1872, and acquired high reputation; and was elected governor of New Jersey in 1874.

Beeville, cap. of Bee co., Tex. (see map of Texas, ref. 6–H, for location of county), 127 miles S. of Austin. Pop. in 1880, 208.

Belen, cap. of Quitman co., Miss. (see map of Mississippi, ref. 4–F, for location of county), on Tallahatchee River. Pop. not in census of 1880.

Belgiojo'so (CRISTINA), PRINCESS OF, b. at Milan June 28, 1808, a daughter of Marquis Geronimo Isidoro Trivulzio; married on Sept. 14, 1824, Prince Emilio Barbian e Belgiojoso. She embraced the Italian cause with great enthusiasm; was expelled from Italy by the Austrian government in 1830, and settled in Paris, where her salon soon became the centre of a most brilliant political and literary circle. In 1848 she returned to Italy, equipped a corps of volunteers at her own expense, and took part most actively in the revolution in Milan and Rome. But in 1850 she was once more exiled; visited Greece and Turkey, and settled in 1855 once more in Paris, still working indefatigably for the cause of her country. In 1861 she finally returned to Italy, and d. in Milan July 5, 1871. Besides being a frequent contributor to various French and Italian journals, she published *Essai sur la Formation du Culte dogmatique* (1846), *Souvenirs d'Exile* (1850), *Emina, Récits turco-asiatiques* (2 vols., 1856), *Asie mineure et Syrie,* and *Scènes* *de la Vie turque* (1858), *Histoire de la Maison de Savoie* (1860), and *Réflexions sur l'État actuel de l'Italie, etc.* (1869).

Bel Green, cap. of Franklin co., Ala. (see map of Alabama, ref. 2–B, for location of county). Pop. in 1880, 81.

Bellevue, Alturas co., Id. (see map of Idaho, ref. 5–B, for location of county), on Wood River branch, Id. division (Or. Short Line), Union Pacific R. R. Pop. not in census of 1880.

Bell'mann (Karl Michael), b. in Stockholm Feb. 15, 1740; received a rather desultory education; vacillated for several years between business and literature; received in 1776 a small office in the state lottery from Gustavus III., but hired another to perform its duties and gave himself up to his passion for gay company and poetry. D. in Stockholm in poverty and melancholy Feb. 11, 1795. His works consist of songs, both words and melodies by himself, a kind of ballad in which he gives a most burlesque representation of the companions of his nightly revelries and of their exploits. But these characters are drawn with the most exquisite elegance; their extravagances are blended with something which is exceedingly sweet and innocent; and the whole picture is borne along by a stream of striking, joyous melody, in which, however, a peculiar undertone of romantic sadness now and then becomes very perceptible. These songs have made his name one of the most celebrated within the Scandinavian countries. They have been printed over and over again, and are sung at the courts and by the peasants; and in Sweden they have given rise to a very rich song-literature of considerable merit, both poetically and musically, and to innumerable and generally excellently-trained singing associations which form a characteristic feature of Swedish social life. His statue has been raised in Djurgården, near Stockholm, and May 1 is celebrated there with an annual festival in his honor. Clemens Petersen.

Bellows (Albert F.), b. at Milford, Mass., Nov. 29, 1829, studied first architecture, afterward painting; visited Europe (especially Paris and Antwerp) in 1843, and again in 1867; was in 1868 elected an honorary member of the Royal Society of Painters in Belgium, and d. at Auburndale, Mass., Nov. 23, 1883. He painted landscapes and genre-subjects in oil: *Life's Day, Sunday in Devonshire* (the Centennial Exposition in Philadelphia), *Into the Sea, The Parsonage, Coaching in New England, A Country Byway, Starting in Life,* etc.; and in water-colors: *New England Village School, The New England Homestead* (Paris Exhibition, 1878), *The Christening Party, Thames at Windsor,* etc. M. P. Janes.

Bel'ton (James S.), b. in South Carolina Sept. 7, 1833; graduated at La Grange College; joined the Tennessee conference of the Methodist Episcopal Church, South, in 1852, and was transferred to the Alabama conference; in May, 1854, went as a missionary to China, but after two years' arduous labor returned to his native land. D. in New York City, Mar. 17, 1856. T. O. Summers.

Bement, R. R. junction, Piatt co., Ill. (see map of Illinois, ref. 6–F, for location of county). Pop. in 1880, 963.

Be'miss (Samuel Merrifield), M. D., b. in Nelson co., Ky., Oct. 15, 1821; graduated M. D. in the medical department of the University of New York City 1846; was elected professor in the medical department of the University of Louisville 1858; has been professor of the theory and practice of medicine since 1866 in the University of New Orleans, which chair he still holds. He has been connected with the medical press since 1858, and is now editing the *New Orleans Medical and Surgical Journal;* has also published essays on croup, marriages in consanguinity, registration in Kentucky, etc., besides furnishing valuable contributions to our medical journals. Paul F. Eve.

Benét (Stephen Vincent), b. at St. Augustine, Fla., Jan. 22, 1827; after a preparatory course at Hallowell's school in Alexandria, Va., and at the University of Georgia, he entered the U. S. Military Academy at West Point, N. Y., on July 1, 1845, whence he graduated July 1, 1849, and was promoted brevet second lieutenant in the ordnance corps. In 1853 he published a translation of Jomini's *Political and Military History of the Campaign of Waterloo,* and in the fall of 1859 was detailed as principal assistant professor of ethics and law at the U. S. Military Academy, which position he filled until 1861, being then assigned to duty at that institution as instructor of ordnance and the science of gunnery, remaining there until 1864; was promoted captain of ordnance Aug. 3, 1861; in 1862 published his valuable treatise on *Military Law and the Practice of Courts-Martial,* which at once became the standard textbook on military law at the Military Academy. In Feb., 1864, he was relieved from the academy, and placed in charge of the cannon and projectile branch of the inspection service of the ordnance department, and continued in that branch of service until assigned to the command of Frankford arsenal at Philadelphia, Pa., in Aug., 1864, where, in addition to his duties as commanding officer, he discharged the duty also of inspector of gunpowder. At the close of the war he received the honorary distinction of major and lieutenant-colonel by brevet "for faithful and meritorious services in the ordnance department." In the year 1866 he published his work on *Electro-ballistic Machines and the Schultze Chronoscope,* and Dec. 22, 1866, was promoted to the rank of major in his corps. The office of chief of ordnance becoming vacant by death, he succeeded to that position June 23, 1874, with rank of brigadier-general. Geo. C. Simmons.

Bergen Point, Hudson co., N. J. (see map of New Jersey, ref. 3–E, for location of county), on New Jersey Central division of Philadelphia and Reading R. R., in city of Bayonne, is 8 miles S. W. of Jersey City.

Bert (Paul), b. at Auxerre, in the department of Yonne, France, Oct. 17, 1833, studied medicine in Paris; was appointed professor in the faculty of sciences at Bordeaux 1866, and professor of physiology in College de France 1869, and achieved a great reputation by his interesting physiological researches, and more especially by his bold experiments for ascertaining the conditions of human existence at different altitudes, for which he received, in 1875, the grand biennial prize of the Academie des Sciences (20,000 francs). (See his *Notes d'Anatomie et de Physiologie comparées,* 1867–70; *Recherches sur le Mouvement de la Sensitive,* 1867–70; *Leçons sur la Physiologie comparée de la Respiration,* 1869; *Recherches experimentales sur l'influence que les modificationes barometriques exercent sur les phénomènes de la vie,* 1874; *La Pression Barometrique,* 1874, etc.) He also took a very active part in politics, was prefect of the department of La Nord in 1871, was elected a member of the Chamber of Deputies in 1872, joined the union republicaine, spoke with great ardor in favor of making the whole elementary instruction compulsory and secular, and was minister of public instruction in the cabinet of Gambetta. (See his *La Morale des Jesuites,* 6th ed. 1880; *La première année d'enseignement scientifique l'Instruction civique à l'École,* 1882, etc.)

Bethel, R. R. junction, Fairfield co., Conn. (see map of Connecticut, ref. 6–B, for location of county). Pop. in 1880, 1767.

Betts (Beverley Robinson), A. M., b. in the city of New York Aug. 3, 1827; graduated at Columbia College in 1846, and at the General Theological Seminary of the Protestant Episcopal Church in that city in 1850; was ordained deacon in the same year, and admitted to the priesthood in 1851. After a short charge of Trinity church, Rockaway, he was in 1855 made rector of St. Saviour's church, Maspeth, Long Island, which position he held for nearly fourteen years; in 1865 was appointed librarian of Columbia College. Prepared for the press a full catalogue of the library of the college (1874); has been a frequent contributor to Church reviews and journals. Wrote *Sketches of Professors McVickar and Anthon,* which appeared in the *Church and the World,* July, 1873.

Bid'dle (John), b. in Philadelphia about 1790; served with distinction in the war of 1812, and became a paymaster in the army and Indian agent; delegate in Congress from Michigan Territory 1829–31, and afterward register of the land-office at Detroit. He resided for some years in Europe. D. at White Sulphur Springs, Va., Aug. 25, 1859.

Big'ney (Mark F.), b. in Cumberland co., Nova Scotia, in 1814; educated in the provincial schools; visited Europe in 1846, and settled in Louisiana, where he adopted journalism as his profession. For seven years he was managing editor of the New Orleans *Times,* and published a volume of poems in 1867, *The Forest Pilgrims.* He has also contributed largely to the literary magazines of the times, particularly the *Weekly Mirror,* of which he was editor. C. G. Forshey.

Billings, cap. of Yellowstone co., Mon. (see map of Montana, ref. 4–E, for location of county), on Northern Pacific R. R. and Yellowstone River. Pop. not in census of 1880.

Bil'lings (John Shaw), A. M., M. D., b. Apr. 12, 1839, in Switzerland co., Ind.; graduated at Miami University in 1857, and at Ohio Medical College in 1860; entered the U. S. army as assistant surgeon in 1861, and had charge during the war of hospitals and with the Army of the Potomac. Since the war he has been on duty in the surgeon-general's office at Washington; is the author of Circular 4, *Report on Barracks and Hospitals;* Circular 8, *Report on the Hygiene of the U. S. Army,* and of several medical, bibliographical, and hygienic essays. He is now in charge of the National Medical Library and of the hygienic division of the surgeon-general's office, and is medical adviser to the Johns Hopkins Hospital in Baltimore.

Birdsall (William Randall), M. D., b. at Greene, Chenango co., N. Y., Jan. 1, 1852, pursued special scientific studies at the University of Michigan; entered the medical department of that institution, and in 1876 graduated M. D.; removed to New York City the same year, and engaged in the practice of medicine; later prosecuted neurological studies in Europe, and has been engaged as a clinical teacher on diseases of the nervous system at different medical colleges and hospitals in New York; was for two years lecturer on helminthology at the American Veterinary College, New York. He is the author of a work on *Electro-therapeutics and Electro-diagnosis,* a contributor to several medical journals, principally on neurological subjects, and the writer of several articles in this Cyclopædia.

Bishop Seabury Mission, an organization of the Protestant Episcopal Church at Faribault, Minn., was founded in 1860 by Bishop H. B. Whipple and Rev. Drs. Breck and Manney, and owns the Bishop Seabury Divinity School, Shattuck School, Cathedral of Our Merciful Saviour, and buildings and grounds worth $200,000.

Bismarck Archipelago, the islands in the Pacific Ocean, E. of New Guinea, formerly called New Britain (which see).

Bit'tle (David Frederick), D. D., b. in Frederick co., Md., Nov. 19, 1811; graduated at Pennsylvania College 1835; studied theology at the Theological Seminary of the Lutheran Church at Gettysburg, Pa.; pastor in the Valley of Virginia, and afterward in Middletown, Md., until 1853, when he was elected to the presidency of Roanoke College, Salem, Va., during which he d. Sept. 25, 1876.

Black (William), b. in Glasgow, Scotland, in 1841; educated at private schools; studied for a short time in the government school of art, Glasgow, but soon engaged in journalism for the *Glasgow Weekly Citizen;* in 1864 went to London and wrote for magazines; in 1865 was attached to the staff of the *Morning Star,* and was its special correspondent in Franco-Austrian war of 1866; afterward wrote numerous novels, among which are *In Silk Attire* (1869), *A Daughter of Heth* (1871), *Macleod of Dare* (1878), *Shandon Bells* (1883). He was for several years assistant editor of the *Daily News.*

Black'ie (George Stodart), A. M., M. D., Ph. D., b. at Aberdeen, Scotland, Apr. 10, 1834; educated at the universities of Bonn, Paris, and Edinburgh, graduating A. M. and M. D. at the last in 1855, obtaining the gold medals for botany and his thesis; came to the U. S., and became professor of natural history at the University of Nashville 1856–61; served during the civil war as surgeon, medical inspector, etc.; has been professor of botany in Tennessee College of Pharmacy, and of chemistry in Nashville Medical College, since 1875; held prominent positions in Masonry, among them that of grand commander of the State; has published *Cretins and Cretinism* (Edinburgh, 1855), *Botany the Ally of Medicine* (Nashville, 1859), *Medical Flora of Tennessee* (Nashville, 1859), *History of the Knights Templar* (Nashville, 1871), besides numerous other works; and edited the *Nashville Medical Journal* 1858–70, and the *Masonic Record* 1870–71.

Blake (Lillie Devereux), b. in Raleigh, N. C., of a wealthy Southern family; educated in New Haven, Conn.; first advocated woman suffrage in 1869; addressed conventions and the legislature of New York several years in succession; a writer of novels and newspaper articles. *Fettered for Life,* published in 1874, is the best of her stories. Was a member of the delegation from the National Association who presented woman's declaration of rights at Independence Square July 4, 1876. She was twice married, and resides in New York City. Susan B. Anthony.

Blake (William), b. in London Nov. 28, 1757. In 1783 appeared *Poetical Sketches by W. B.* This was printed and published in the ordinary way, and was without illustrations. In 1789 came *Songs of Innocence;* in 1793, *The Gates of Paradise;* in 1794, *Songs of Experience,* and later several volumes of poetic rhapsody. All these were published by the author, and all were illustrated. Both text and illustrations were engraved, and when printed off Blake tinted both text and border in a style of his own, making each page a picture. Much of his loveliest and sublimest work is in these illustrations. But he produced so much that a mere list of his engravings, water-colors, and drawings in distemper would fill a page of this work. He is best known to the public by his *Canterbury Pilgrims,* his *Inventions to the Book of Job,* and his designs to Blair's *Grave.* D. in London Aug. 12, 1827. *Life* by Alexander Gilchrist; Cunningham's *Lives; William Blake,* by A. C. Swinburne. *The Poetical Sketches* and *The Songs of Innocence and Experience* were reprinted in 1874. The *Inventions to the Book of Job* have been reproduced by heliotypy by James Osgood (Boston, Mass.). Clarence Cook.

Blatch'ford (Richard M.), b. at Stratfield, Conn., in 1798; graduated at Union College, Schenectady, in 1818; taught school for a couple of years at Jamaica, Long Island, but studied law at the same time, and was admitted to the bar of New York in 1821; was appointed counsel and financial agent of the Bank of England for the U. S. in 1825; elected member of assembly in 1855, and appointed commissioner of Central Park in 1859; represented the U. S. at the court of Rome 1862–63. D. at Newport Sept. 4, 1875.

Bliss (Philip Paul), b. at Clearfield, Pa., in 1838; received instruction in music from George W. Root; became the chorister of the First Congregational church of Chicago, and superintendent of the Sunday-school; joined afterward in the lay evangelistic labors of Major Whittle, and perished at the Ashtabula railway accident, Dec. 29, 1876. His hymns "Hold the Fort," "Hallelujah, 'tis Done!" "More to Follow," etc.—of which he generally composed both text and melody—became very widely used.

Bliss (Porter Cornelius), A. M., b. on the Cattaraugus reservation of Seneca Indians, Erie co., N. Y., Dec. 28, 1838; studied at Hamilton and Yale colleges; travelled in Maine, New Brunswick, and Nova Scotia 1860–61, investigating the condition of the Indian tribes in behalf of societies at Boston; was employed for some months as clerk in the Indian bureau, and subsequently in the post-office department at Washington, 1861; took part in volunteer organizations for the defence of the capital; visited England the same year; accompanied Gen. J. W. Webb as private secretary on his mission to Brazil 1861–62; was commissioner of the government of the Argentine Republic for the exploration of the Indian country called the Gran Chaco 1863; edited at Buenos Ayres a monthly periodical, *The River Plate Magazine* (1864); was appointed by Pres. Lopez historiographer of Paraguay; became secretary to Hon. C. A. Washburne, U. S. minister to Paraguay, 1866; aided him in collecting materials for his *History of Paraguay* (2 vols., 1871); was imprisoned by command of Lopez on a charge of treason and conspiracy for his assassination Sept. 10, 1868; was rescued by an American squadron Dec. 10, 1868; was appointed translator to the state department at Washington Mar., 1869; was editor of the Washington *Chronicle* 1869–70, and sec. of legation in Mexico 1870–74, and was acting minister several months 1872–73. He afterward resided in New York, and was vice-president of the American Philolog. Society, and an editor of the New York *Herald.* D. Feb. 1, 1885.

Bloom'er (Amelia), b. in Homer, N. Y., in 1818; married in 1840, and settled at Seneca Falls, N. Y.; wrote frequently on reformatory subjects, and Jan. 1, 1849, established *The Lily,* a semi-monthly publication, of which she was editor and proprietor. It was devoted to the interests of women, and attained a circulation of over 4000. She has earnestly advocated the enfranchisement of woman through her paper, the public press, and from the lecture-stand for the last quarter of a century. Since 1855 she has resided in Council Bluffs, Ia., where she has taken active part in the woman's suffrage work of that State. Mrs. Bloomer did not originate the costume which bears her name, as is generally supposed, but after seeing it worn by Elizabeth Smith Miller, daughter of Hon. Gerrit Smith, who was the first, so far as known, to wear the dress in public, she with Elizabeth Cady Stanton, Lucy Stone, and others, adopted it, and introduced it to the public through *The Lily.* The need felt by women for some reform in dress was evidenced by letters of inquiry from all parts of the country. Susan B. Anthony.

Blossburgh, Tioga co., Pa. (see map of Pennsylvania, ref. 2–F, for location of county), on R. R. and Tioga River, 41 miles S. of Corning, N. Y., has mines of semi-bituminous coal and of iron. Pop. in 1880, 2140.

Blount (James H.), b. in Jones co., Ga., Sept. 12, 1837; graduated at the State University in 1857. He was quite a young man when the question of secession was mooted in 1860, and opposed it as long as it was an open question. But as soon as the war broke out he went with the people of his native State, and entered the Confederate army as a private in the 2d Georgia battalion of infantry; before the close of the war was promoted to the rank of lieutenant-colonel of cavalry. Soon after his graduation he studied law, and was admitted to the bar. At the close of the war he resumed the practice of his profession in Macon, Ga., where he still resides. In the fall of 1865 he was elected to the State convention for the formation of a new constitution under the reconstruction policy of Pres. Johnson. In 1872 he was elected to represent his district in the 43d Congress; re-elected in 1874 to the 44th Congress, and in 1876 to the 45th Congress. In the 44th Congress he was on the committee of appropriations. Alexander H. Stephens.

Blue Springs, Gage co., Neb. (see map of Nebraska, ref. 11-G, for location of county), on Omaha and Republican Valley branch of Union Pacific R. R. Pop. in 1880, 513; in 1885, 935.

Bluff, cap. of San Juan co., Ut. (see map of Utah, ref. 4-H, for location of county). Pop. of precinct in 1880, 107.

Blunt, Hughes co., Dak. (see map of Dakota, ref. 6-D, for location of county), on Chicago and North-western R. R. Pop. not in census of 1880.

Bolintinea′no (DEMETER), b. at Bolintina, Wallachia, in 1826; was educated at Bucharest; studied in Paris; edited in 1848 a revolutionary paper, and was banished by Prince Stirbey; settled once more in Paris, but returned home under Prince Cuza; edited another journal, and received a high governmental position after the *coup d'état*, May 2, 1864. His novel *Manila* and several of his lyrical poems have been translated into French (*Brises d'Orient*) by himself, and attracted considerable attention.

Bolivar, on R. R., Allegany co., N. Y. (see map of New York, ref. 6-D, for location of county). Pop. in 1880, 180.

Bonan′za, a Spanish word probably derived from *bueno*, "good" (adj.), and by the termination *anza* it becomes a noun signifying "goodness." In Old Spain this word is generally used in a nautical sense, indicating fair weather at sea. It is also used to indicate prosperity or success. In California and in Northern Mexico it is used as a mining term to signify an abundance of metal or an ore-body. The mines of Northern Mexico are principally what are called "pocket mines," with thin veins of poor metal connecting the pockets. When a pocket of rich ore is struck the mine is said to be in *bonanza*. When the veins run out without leading to pockets, the mine is said to be in *borra* ("useless words"), from the verb *borrar*, to "rub out" or "to blot out." In the Comstock Lode in the State of Nevada enormous bonanzas have been found. (See COMSTOCK LODE.) JOHN LE CONTE.

Boole (GEORGE), b. Nov. 2, 1815, d. Dec. 8, 1864; was professor of mathematics, Queen's College, Cork, Ireland, and published, besides treatises on mathematics, *An Investigation into the Laws of Thought, on which are founded the Mathematical Theories of Logic and Probabilities*, Lond. 1854.

Boone, cap. of Watauga co., N. C. (see map of North Carolina, ref. 2-D, for location of county). Pop. in 1880, 167.

Boot (JOHN FLETCHER), a Cherokee, a member of the executive council of the nation; he was also a brave warrior. Two years after his conversion in 1825 he was licensed to preach, and was subsequently ordained deacon of the Methodist Episcopal Church, South, in Nashville, Tenn., and elder in Lebanon. He was an eloquent and powerful preacher in his native tongue, and was the first Cherokee that administered the Lord's Supper. He was also one of the founders of the Cherokee Bible Society. D. of hæmorrhage of the lungs Aug. 8, 1853, aged about sixty years. T. O. SUMMERS.

Booth (NEWTON), b. in Salem, Washington co., Ind., Dec. 25, 1825; graduated at Asbury University in 1846; studied law in Terre Haute, and was admitted to the bar in 1850; went to California soon afterward, and engaged in business in Sacramento; returned in 1857 to Terre Haute, and practised law till 1860, when he went back to California. In 1863 he was elected to the California State senate; in 1871 was elected governor of California on an independent ticket; in Mar., 1874, was elected U. S. Senator for six years from Dec., 1875, and resigned his governorship. J. B. BISHOP.

Bo′reas, in Grecian mythology, the personification of the north wind, the brother of Hesperus, Zephyrus, and Notus; was imagined to dwell in the caves of Thrace, and represented with wings, hair, and beard dripping with snow-flakes.

Bouguereau′ (ADOLPHE WILLIAM), b. at La Rochelle, France, Nov. 30, 1825; studied in the School of Fine Arts in Paris 1843-50, and in Rome 1850-55, and began to exhibit in 1855. Among his most celebrated pictures are *Triomphe de Vénus* (1856), *La Bacchante* (1863), *Enfants endormis* (1868), and a series of historical and religious representations in the churches of Ste. Clotilde and St. Augustine in Paris. A considerable number of his works are found in the U. S.

Bo′vidæ [from *Bos*, the ancient Latin name of the ox, one of the most prominent of the genera], an important family of mammals rich in species, and including a large number of those most useful to man. The form is quite diversiform, the average type, or that represented by the greatest number of species, being exemplified in the antelopes, while extremes are represented by the oxen, the sheep, and the goats. The head is more or less contracted forward, and the nose generally naked, rarely hairy, with the nostrils large and open; the teeth are of the typical ruminant type—*i. e.* M. $\frac{3}{3}$, P. M. $\frac{3}{3}$, C. $\frac{0}{1}$ or $\frac{1}{1}$, I. $\frac{0}{3}$; the molars have mostly four crescentic lobes; in the upper jaw the canines are generally absent or small, but rarely hypertrophied; in the lower jaw the canines are approximated to and of the same form as the incisors, so that they are very often regarded as being true incisors, although quite erroneously; the combined canines and incisors form a series uninterrupted at the symphysis; the frontal appendages are persistent, common to both sexes, and developed as sheaths of true "horn" on osseous cores originating from the frontal bones; the feet are provided each with two hoofs, and generally small false hoofs, though these are sometimes absent; the skull has the palatine axis declivous from the occipito-sphenoid axis; the auditory bullæ are produced forward, especially toward the inside, and applied behind to the paroccipital processes; the styloid processes are deflected more or less forward, and enclosed in oblique folds on the outer surfaces of the auditory bullæ; the nasal bones are elongated, and straight or declivous forward, and connected by suture with the lachrymals, supramaxillaries, and sometimes with the intermaxillaries; the supramaxillary and intermaxillary bones are well developed forward; the olfactory organ is normal in size; Cowper's glands exist, and a gall-bladder, generally of considerable size. The family as thus defined excludes the genera *Antilocapra* of America and *Saïga* of the plains of the middle Palæarctic region, each of which represents apparently a distinct family. The genera still embraced are quite numerous, and are susceptible of being grouped into several sub-families; these are the (1) Bovinæ, with 6 genera; (2) Ovibovinæ, with 1 genus; (3) Caprinæ, with at least 2 genera; (4) Rupicaprinæ, with 1 genus; (5) Oryginæ, with 1 genus; (6) Budorcinæ, with 1 genus; (7) Nemorrhedinæ, with 3 genera; (8) Aleclaphinæ, with 3 genera; (9) Cervicaprinæ, with 6 genera; (10) Cephalophinæ, with 1 genus; (11) Antilopinæ or Gazellinæ, with 5 genera. The latest scheme of classification has been contributed by Sir Vincent Brooke to Wallace's work on the *Geographical Distribution of Animals* (1876). (See also the articles ADDAX, ANOA, ARNEE, BISON, BLAUW-BOC, BLES-BOC, BOVIDÆ (properly Bovinæ), BUFFALO, CHAMOIS, ELAND, GAYAL, GAZELLE, GNU, GOAT, IBEX, KOODOO, OVIBOS, SPRING-BOC, STEINBOC, URUS, YAK, and ZEBU, in CYCLOPÆDIA; and SHEEP.) THEODORE GILL.

Bowditch (HENRY PICKERING), M. D., b. Apr. 4, 1840, Boston, Mass.; graduated from Harvard College 1861, and in the fall began the study of chemistry in the Lawrence Scientific School, Cambridge, Mass., but in November entered the army as second lieutenant; rose to the rank of captain; was discharged February, 1864; in March commissioned major, and served at the front through the rest of the war, entering Richmond at its evacuation. The war over, he returned to Cambridge and re-entered the scientific school in the autumn of 1865, studying under Jeffries Wyman and attending lectures at the Harvard medical school, from which he received the degree M. D. The next two or three years were spent in study in Germany and France—part of the time at Leipzig under Prof. Ludwig. Upon returning, he was appointed assistant professor of physiology at Harvard medical 1871, and full professor 1876. He has published many papers upon physiological subjects. His physiological reports in *Boston Medical and Surgical Journal* are among the best. RALPH S. TARR.

Bowles (FRANCIS TIFFANY), b. at Springfield, Mass., Oct. 7, 1858, son of the late Benjamin F. Bowles, entered the navy as a cadet-engineer in 1875; after graduating from the Naval Academy at Annapolis with distinction entered the school of naval architecture at the Royal Naval College, at Greenwich, England, at his own application, and on Nov. 1, 1881, was appointed an assistant naval constructor in the U. S. navy; on return from England was assigned to duty as secretary to the Naval Advisory Board at Washington; is associate of Institution of Naval Architects, England.

Box Elder, cap. of Box Elder co., Ut. (see map of Utah, ref. 2-F, for location of county). Pop. of precinct in 1870, 2080; in 1880, 2184.

Boy′den (URIAH ATHERTON), b. at Foxboro', Mass., Feb. 17, 1804, descended from a family of skilful mechanics and manufacturers, and acquired early, at the workbench and the forge, an intimate knowledge of materials and considerable skill as a workman, with which he connected, as a natural gift, a great power of concentration. Having worked as an engineer on the construction of the railroad from Boston to Nashua, he was for many years employed in hydraulic engineering at Lowell and at Manchester, and here he found opportunity to make a comprehensive study of the theory of the turbine water-wheel, which resulted in a practical reconstruction of the engine. The old theory was comparatively simple, but many of its statements differed widely from the facts, and were worse than useless as guides for practice. To correct these errors demanded an exhaustive knowledge of the laws of force of motion and very laborious computations. Mr. Boyden, however, accomplished the task, and his work received practical confirmation by the tests of some of his turbines, which utilized about 95 per cent. of the total power of the water expended, while the water-wheels of the old construction utilized hardly 76 per cent. He donated $1000 to his native town, known as the "Boyden Fund," the interest being expended for educational purposes; the interest was afterward applied to the public library, named the Boyden Library, established in the Soldiers' Memorial Building of the same town. In 1850 he withdrew from business, settled in Boston, and devoted himself to the study of physics and chemistry, which sciences received much encouragement and support from him. D. Oct. 17, 1879. EDWARD SAWYER.

Boy'land (GEORGE HALSTED), M. D., b. in Cincinnati, O., Jan. 19, 1845; graduated at Yale College 1864, and in medicine at Leipsic, Germany, 1874. Is the author of *Six Months under the Red Cross with the French Army*, also of "Salicylic Acid" in London *Lancet*, Nov. 28, 1874, etc. Decorated for services in the French army during the late Franco-Prussian war. Became a practitioner in Baltimore, Md. PAUL F. EVE.

Braddock, Allegheny co., Pa. (see map of Pennsylvania, ref. 5–A, for location of county), on R. R. and Monongahela River. Pop. in 1870, 1290; in 1880, 3310.

Bran'dreth (BENJAMIN), M. D., b. at Leeds, England, June 22, 1808, grandson of Dr. Wm. Brandreth, who introduced Brandreth Pills in 1751 in Liverpool, Eng.; came to America 1835; started a laboratory at Sing Sing, N.Y.; State senator 1849 and 1858; proprietor of "Allcock's Porous Plasters" and Brandreth Pills; in 1874 presented to Dr. Robert S. Newton and his associates the building used by the Eclectic Medical College of the City of New York. D. Feb. 19, 1880.

Bray [in ancient Gallic, *Bray* meant "marsh"], a fashionable watering-place of Ireland, at the mouth of the river Bray, 12 miles S. E. of Dublin, partly in the county of Dublin, but chiefly in the county of Wicklow, is connected by 2 railways with Dublin; has 2 hotels, 6 churches and chapels, a bank, a court-house, a dispensary, a savings bank, a newspaper, and some trade by sea. P. 6086.

Bray, a small parish in Berks co., England, 22½ miles W. of London. P. about 4000. Famous for its vicar, who changed his religion three times during the reigns of Henry VIII., Edward VI., Mary, and Elizabeth, that he might "live and die the vicar of Bray."

Brehm (ALFRED EDMOND), b. at Renthendorf, Saxe-Weimar, Feb. 2, 1829; studied natural history under his father, the famous ornithologist, Christian Ludwig Brehm; travelled in Egypt, Nubia, and the Soudan; visited Spain and Norway; went once more to Africa in 1862 in company with Duke Ernst of Saxe-Coburg-Gotha; was made director of the zoological garden in Hamburg 1863, and removed in 1867 to Berlin, where he founded the great aquarium. He published *Illustrirtes Thierleben* (6 vols., 1863), which was translated into French, and of which a new edition in 10 vols. appeared in 1868; *Das Leben der Vögel, Die Thiere des Waldes*, etc. Died Nov. 15, 1884.

Bre'mer (CHARLES), b. in Germany in 1814; was at first a Pietist, but was licensed to preach in the Methodist Episcopal Church, South, by Rev. Dr. Winans in New Orleans in 1842; organized the first two German M. E. churches in New Orleans. D. Sept. 14, 1847. T. O. SUMMERS.

Brew'er (THOMAS MAYO), A. M., M. D., b. in Boston, Mass., Nov. 21, 1814. His grandfather, Col. James Brewer, was a well-known patriot of the Revolution and a leader in the "Boston tea-party" of 1773. Dr. Brewer graduated at Harvard College in 1835, and at the Massachusetts Medical School in 1838. After two years of professional labor, in 1840 he became editor of the Boston *Atlas*, then a leading Whig paper; in 1857 became a partner in the publishing-house of Brewer & Tileson. Dr. Brewer was actively engaged for a lifetime in professional and business duties, but was best known as a thorough and enthusiastic ornithologist. In 1839 he edited a new edition of Wilson's *Ornithology*, for which he prepared a synopsis of all North American birds then known. He was a personal friend of Audubon. One volume of a fine work of his on the *Oölogy of North America* was published by the Smithsonian Institution, but the publication was suspended on account of its great cost. He also wrote most of the biographical portion of the *History of North American Birds*, of Baird, Brewer, and Ridgway, 3 vols. of which were published by Little, Brown & Co. in 1874. D. Jan. 23, 1880.

Brewton, on R. R., cap. of Escambia co., Ala. (see map of Alabama, ref. 7–C, for location of county). Pop. not in census.

Brick Church, on R. R., Essex co., N. J. (see map of New Jersey, ref. 2–D, for location of county), is situated in East Orange tp. Pop. not in census of 1880.

Bridge of Allan, so named from the bridge across the river Allan, which bounds it on the W., is situated at the southern base of the western termination of the Ochil Hills in Stirlingshire, Scotland. P. 3055. It has several elegant churches, fine hotels, and numerous lodging-houses. About 50,000 visitors frequent it annually on account of its mineral waters and mild and salubrious climate.

Bridgeport, cap. of Mono co., Cal. (see map of California, ref. 4–C, for location of county). Pop. not in census of 1880.

Brieg, or **Brig,** small town of Switzerland, canton of Valais, at the junction of the Saltine and the Rhone, and at the commencement of the road across the Simplon; carries on a considerable transit-trade. P. about 1200. Near by is the Brieger Bad, whose mineral springs formerly enjoyed a great reputation for their curative power, and which are still much used.

Briggs (CHARLES AUGUSTUS), D. D., b. in New York City Jan. 15, 1841; studied at the University of Virginia 1857–60, the Union Theological Seminary of New York 1861–63, and the University of Berlin 1866–69; was pastor of the Presbyterian church at Roselle, N. J., 1870–74, and in 1875 was chosen professor of Hebrew and the cognate languages in the Union Theological Seminary of New York. The College of New Jersey gave him a D. D. in 1875, and the University of Edinburgh gave him the same in 1884. He is now senior editor of the *Presbyterian Quarterly Review* (established in 1880), for which he has prepared many learned articles. He has also published *Biblical Study* (1883).

Brinton (DANIEL GARRISON), M. D., b. in Chester co., Pa., May 13, 1837; graduated at Yale College in 1858, and M. D. at Jefferson Medical College in 1861. After spending about a year in Europe he entered the army, and served throughout the war, being discharged in 1865 with the rank of brevet lieutenant-colonel. In 1867 he became editor of the *Philadelphia Medical and Surgical Reporter* and of the *Half-Yearly Compendium of Medical Science*, and in 1884 he was appointed professor of ethnology and archæology at the Academy of Natural Sciences in Philadelphia. He is the author of *The Floridian Peninsula, its Literary History, Indian Tribes, and Antiquities* (1861), *The Myths of the New World* (1867), *The Religious Sentiment* (1876), etc., besides a great number of monographs on the language, mythology, etc. of the American Indians. He is also editor of the *Library of Aboriginal American Literature*.

Bristol, cap. of Liberty co., Fla. (see map of Florida, ref. 1–C, for location of county), on Appalachicola River. Pop. in 1880, 387.

Bris'tow (BENJAMIN H.), b. at Elkton, Todd co., Ky., in 1833; studied law, and practised his profession successfully in Kentucky till 1861, when, on the outbreak of war, being of strong Union sentiments, he volunteered his services, and as major of the 25th Kentucky Vols. was engaged at Fort Donelson and Shiloh, being wounded in the last-named battle. Afterward, as colonel of the 8th Kentucky Cavalry, he served throughout the war with distinction. About the close of the war he received the appointment of U. S. district attorney for the Louisville district. The ability here exhibited led to his appointment as solicitor-general on the organization of the department of justice in 1870. After two years' service he resigned and became attorney of the Texas Pacific R. R., which position he held but a short time when he returned to the practice of his profession at Louisville, Ky.; was appointed at-attorney-general in 1873; was secretary of the treasury in 1874–76. GEORGE C. SIMMONS.

Britan'nicus, a surname which, on account of some alleged victories in Britain, the Roman senate bestowed in 42 A. D. on the emperor Claudius and his newly-born son by Messalina, Claudius Tiberius Germanicus, and which afterward became the distinguishing appellation of the latter. In 48, Messalina was executed, and Agrippina, the second wife of Claudius, induced him to exclude Britannicus from the throne and appoint Nero, her son by her former husband, successor. After the accession of Nero, however, Agrippina used Britannicus as a means of intimidating him, and to get rid of this rival, Nero poisoned him Dec. 15, 55.

Broken Bow, cap. of Custer co., Neb. (see map of Nebraska, ref. 10–E, for location of county). Pop. in 1885, 212.

Brom'ley (ISAAC H.), b. at Norwich, Conn., Mar. 6, 1833; entered Yale College in 1849, remaining there two years, and was admitted to the bar in 1854; in Dec., 1858, established the Norwich *Bulletin*, and was its editor till the spring of 1868, when he became editor of the Hartford *Evening Post;* was a member of the State legislature from Norwich in 1866; in 1862 was captain in the 18th Connecticut Vols., and was provost-marshal for two years during the late war. In July, 1872, he left the Hartford *Post*, and assumed a position on the editorial staff of the New York *Tribune* in the following February. J. B. Bishop.

Brönd'sted (Peter Olaf), b. at Horsens, Danish province of Jutland, Nov. 17, 1780; studied at the University of Copenhagen, then in Paris 1806–08, and undertook comprehensive explorations in Greece and Asia Minor from 1808 to 1813. In the latter year he was made professor of Greek in Copenhagen, but went in 1818 to Rome, and resided there till 1832, visiting Sicily, the Ionian Islands, Greece, and France. Returning to Copenhagen in 1832 as director of the royal museum of antiquities and professor of archæology, he d. there June 26, 1842. His principal work, *Reise i Grækenland* (2 vols., 1826–30), was published at once in Danish, French, and German. He also wrote—*Bidrag til den danske Historie af Nordfranske Manuscripter fra Middelalderen* (1817–18), *Description of Thirty-two Ancient Greek Painted Vases* (1832), *The Bronzes of Syria* (1836), and finally made a very fine translation into Danish of Æschylus's *Orestias*.

Brooks (William Keith), Ph.D., b. at Cleveland, O., 1848; graduated from Williams College 1870; took the degree Ph.D. at Harvard University 1874; was assistant in the Boston Society of Natural History 1874–75, and became associate Johns Hopkins University 1876, a position which he now holds. Dr. Brooks is a member of the National Academy of Sciences and of several minor American and one or two foreign scientific societies. In 1878 he organized the Johns Hopkins marine summer laboratory, which has won such a reputation for itself by the class of students who study there and the publications which are the result of their work. His most important works are *Handbook of Invertebrate Zoology* (1881, 400 pp., 300 cuts), *Heredity* (1883, 300 pp.), and *The Development and Protection of the Oyster in Maryland* (192 pp. quarto, 13 plates, 3 charts). Besides these, he has published a number of very important papers upon development and anatomy of marine forms. Ralph S. Tarr.

Bross (William), b. at Montague, Sussex co., N. J., Nov. 4, 1813; graduated at Williams College, Mass., in 1838; lived several years as a teacher; settled in 1848 in Chicago; was associated from 1849 to 1851 with Rev. J. A. Wight in the publication of the *Prairie Herald;* established in 1852, in connection with the late J. L. Scripps, the *Daily Democratic Press*, which was consolidated with the *Tribune* July 1, 1858, and was for several years president of the *Tribune* company. He published a *History of Chicago*, and was lieutenant-governor of Illinois 1865–69.

Brown (Olympia), b. in Kalamazoo co., Mich., Jan. 5, 1835; educated at home; commenced teaching a district school at the age of fifteen, at intervals attending the village academy, Mount Holyoke Seminary, and Antioch College, O.; graduated in 1860; entered the theological school, under the auspices of the Universalist denomination, at Canton, N. Y.; graduated and was ordained in June, 1863; in Feb., 1864, installed over her first parish in Weymouth, Mass.; in 1869–76 preached at Bridgeport, Conn., in the mean time being married to Henry Willis.

Susan B. Anthony.

Brownsville, on R. R., Saline co., Mo. (see map of Missouri, ref. 3–F, for location of county). Pop. in 1880, 1182.

Bryn Mawr College is situated in the village of Bryn Mawr, on the Pennsylvania R. R., 9 miles W. by N. of Philadelphia. It was founded by the late Joseph W. Taylor, M. D., a prominent member of the Society of Friends of Burlington, N. J., who bought the land, about 32 acres, and began the erection of the college buildings in 1879. He died in 1880, and left an endowment of $800,000 for the continuance of the work he had begun—a college for women. The trustees are members of the Society of Friends, but the students may be of any denomination. The college is intended to give to women of intelligence and refinement the best opportunities for culture, combined with Christian influences and social amenities. There are five fellowships to college graduates who have already distinguished themselves in particular branches of study—namely, Greek, English, mathematics, history, and biology. A scholarship of $500 is offered yearly to a graduate of Bryn Mawr College to enable her to pursue studies in some European university. Dr. James E. Rhoades is its president.

Buchanan, cap. of Haralson co., Ga. (see map of Georgia, ref. 3–F, for location of county). Pop. in 1880, 158.

Buchan'an (Joseph Rodes), M. D., b. at Frankfort, Ky., Dec. 11, 1814; graduated in medicine at Louisville University in 1842; in 1846 became professor of physiology in the Eclectic Medical Institute of Cincinnati; was for several years dean of the faculty; edited the medical journal connected with this school; published for several years *Buchanan's Journal of Man*, and gave in 1854 a synopsis of his lectures.

Buch'tel Col'lege, Akron, O. Its corner-stone was laid July 4, 1871, and it was opened for the reception of students Sept. 11, 1872. It was founded by the Universalists of Ohio and Pennsylvania, and named Buchtel College in honor of John R. Buchtel, who consecrated his wealth to its support. It is a first-class college, offering to students of both sexes equal opportunities for a thorough practical and liberal education. S. H. McCollester.

Buck (Gurdon), b. in New York City May 4, 1807; graduated at the College of Physicians and Surgeons in 1830; studied in Paris, Vienna, and Berlin, and began to practise in New York in 1833; visiting surgeon of New York Hospital 1837; was, during the latter part of his life, intimately connected with all the most prominent medical organizations in the city of New York. D. Mar. 3, 1877. He was successful in the most difficult surgical operations. In 1876 he published an elaborate treatise, *Contributions to Reparative Surgery*.

Buck'hout (Isaac Craig), b. in Morrisania, N. Y., 1830; studied civil engineering at New York College; held several important positions in the Harlem R. R. Co., and designed the Grand Central R. R. dépôt in New York City. He also designed the plan for sinking the tracks of the railroads entering New York through Harlem; also a plan for an underground railway beneath New York City, and a dépôt for the city of St. Louis. D. at White Plains, N. Y., Sept. 27, 1874. J. B. Bishop.

Buck'ley (Samuel Botsford), Ph. D., b. in Torrey, Yates co., N. Y., May 9, 1809; graduated at Wesleyan University in 1836; has travelled extensively, chiefly in the Southern States, as a student of botany, malacology, geology, geodesy, etc.; was assistant naturalist and geologist in the State survey of Texas 1860–61; was connected with the U. S. Sanitary Commission 1862–65; State geologist of Texas 1866–67, and was 1871–72 editorially connected with the *State Gazette*, Austin, Tex.; is author of many scientific and other papers, and has prepared a work on the trees and shrubs of the U. S. He discovered the flowers and fruit of the shrub or small tree *Buckleya distichophylla*, named in his honor by Dr. Torrey.

Buena Vista, R. R. junction, cap. of Chaffee co., Col. (see map of Colorado, ref. 4–D, for location of county). Pop. in 1880, 2141; in 1885, 1146.

Bull'dozing, Bulldoser, or **Bulldozen,** a slang term in process of adoption in Louisiana, having as yet a variable significance. Its first use was in the parishes of Feliciana and Baton Rouge, in the spring and summer of 1876, in describing the doings of a band of a dozen Regulators styled the "Union Stop," who undertook, in the absence of law, to check the stealing and killing of stock, which was destroying the cattle and hogs of that region. The punishment of offenders was with the well-known bull-whip—a hickory handle of 12 or 15 inches and a plaited thong of 3 to 5 feet. A dozen lashes (or the dozen composing the band) gave the name to the process or dose of strapping, and it was called "bulldosing" or "bulldozing." It soon was applied to all summary punishment not authorized by law. More recently, since August and September, 1876, it has become a political term, particularly as applied to the influencing of negro voters by those of their own color. It is now charged and denied that it was used by the whites, but bulldozing has become a term used to describe all the various kinds of intimidation, real or imaginary, used at elections. It has very rapidly grown into use since the Presidential election by editors and political writers. (See the investigation in Louisiana by the House committee of Congress.) The first use of the term is claimed in Clinton, East Feliciana, and imputed to a German soldier of fortune, who was awakened from a drunken sleep in the street by a sudden dash of the Regulators. He exclaimed, "Hurra for the bulldozers!" It is also traced, with more ingenuity than probability, to the pulldoo, a Southern water-fowl, that arrives in the night and surprises by his numbers. Bulldozing is supposed to be a corruption of pulldoo, the mysterious arrival by night lending plausibility to the theory. Its rapid adoption by political writers of every class in the U. S. to describe all sorts of political influence warrants this analysis of its origin. Its meaning, however, is not yet well determined. C. G. Forshey.

Bü'low, von (Friedrich Wilhelm), Baron, b. on the paternal estate of Falkenberg, Prussian province of Brandenburg, Feb. 16, 1755; entered the army in 1769, and was a lieutenant-general at the opening of the war of independence in 1813. Twice he defeated Oudenot in minor encounters, and by his victory over Ney at Dennewitz (Sept. 6, 1813) he prevented the French from pushing onward to Berlin. In the battle of Leipsic he took a conspicuous part, and drove then the French out of Westphalia, Holland, and Belgium, joining the allies in Paris, where the Prussian king made him count of Dennewitz and gave him estates worth $200,000. He also distinguished himself at Waterloo. D. at Königsberg Feb. 25, 1816.

Bülow, von (Hans Guido), b. at Dresden Jan. 8, 1830; studied law in Leipsic and Berlin, but determined, under the influence of Richard Wagner and Liszt, to devote himself exclusively to music; studied under Liszt at Weimar 1851–53, and settled in 1854 in Berlin, where he was made professor of the piano at the Conservatory of Music in 1855. Having made several concert-tours in Germany and Russia, and acquired a great reputation as a pianist, he removed in 1867 to Munich, where he became chapel-master to the king. He has composed several pieces both for the pianoforte and orchestra, and written much for the *Neue Zeitschrift für Musik*, and both his compositions and his writings show the enthusiasm with which he has embraced the ideas of Wagner.

Bu′reau Ver′itas, an institution for the classification of the steamships and sailing vessels of all nations, for use by underwriters, maritime insurance agents, etc., with head-quarters at Brussels in Belgium. It was founded at Antwerp, Belgium, in 1828, by Charles Bal, Esq. During the revolution of 1830, which separated Belgium from Dutch rule, the Bureau Veritas was removed to Paris, France, where it was long known as the French Lloyd's. In the Franco-German war of 1870–71 the bureau was finally located at Brussels. Its surveyors and agents are found in the seaports of all maritime countries, and their ratings of vessels are the fruit of the utmost severity in examination. H. H. McFarland.

Bur′gess (John William), LL.D., b. at Cornersville, Giles co., Tenn., Aug. 26, 1844; educated at Cumberland Univ., Lebanon, Tenn., and Amherst College, Mass., whence he graduated in 1867; studied law, and was admitted to the bar of Mass. in 1869; was appointed professor of English literature and political economy at Knox College, Galesburg, Ill., in 1869; went to Europe in 1871; studied history and public law at Göttingen, Leipsic, and Berlin; was appointed professor of history and political science at Amherst College in 1873, and professor of political history and public law at Columbia College, New York, in 1876.

Business Colleges are of comparatively recent growth in the U. S., although schools for instruction in book-keeping, writing, and arithmetic have been in vogue for the past 50 years. Among the pioneers in this field were James Arlington Bennett of New York, R. M. Bartlett of Cincinnati, G. N. Comer of Boston, and Peter Duff of Pittsburg. Mr. Bartlett first appropriated the term "college," and first issued "diplomas" upon graduation. In 1853, Bryant & Stratton established, in the city of Cleveland, the first of a series of "mercantile colleges" afterward known as the "Bryant & Stratton International Chain of Business Colleges," which in 1866 comprised some 50 separate schools in the principal cities of the U. S. and Canada. The co-working of so many schools under one management, and the employment of the best talent as teachers did much to elevate the work, while the identification of the "Spencerian system of penmanship" with the enterprise gave it a peculiar prominence and zest. In 1867 the colleges of the "chain" passed into the hands of the resident partners, and have since been conducted independently, though with harmony and reciprocity. Outside of this combination are many excellent and prosperous schools, the number at present being, in all, about 140, with an approximate daily attendance of 25,000 students. The course of study varies in different schools, but embraces generally, besides the studies named, commercial law, commercial geography, political economy, modern languages, phonography, telegraphy, practical grammar, etc. The main feature of the more important schools is the business practice which comes through actual correspondence between the students of the several institutions. This is done in a manner and with a degree of efficiency and thoroughness which cannot be approached through any isolated school. The peculiar work of these institutions has necessitated the production of a large number and variety of textbooks, which have greatly added to our technical literature. S. S. Packard.

Butler, R. R. junction, De Kalb co., Ind. (see map of Indiana, ref. 2–G, for location of county). P. in 1880, 1056.

Butler (William), b. in Prince William co., Va., in 1759; graduated as student of medicine at South Carolina College; became a lieutenant in Gen. Lincoln's army in 1779; was engaged at Stono, and served in Pulaski's corps until the death of the latter; afterward served with Gens. Pickens, Lee, and Greene; became commander of a body of mounted rangers, and was engaged in many battles with the Tories. Shortly after the war he was appointed brigadier-general, and in 1796 major-general, of militia; was member of convention in 1787 to decide on the adoption of the Federal Constitution, and was afterward member of convention which adopted the constitution of South Carolina; member of the Legislature; M. C. 1801–11; commanded South Carolina troops in 1812. D. at Columbia, S. C., Nov. 15, 1821.

Butler (Zebulon), b. at Lyme, Conn., in 1731; served in the French war and in the expedition to Havana, and became captain in 1761; settled at Wyoming, Pa. in 1769; was lieut.-col. of Conn. troops serving in New Jersey 1777–78, and became col. Mar. 13, 1778. He commanded the small garrison at Wyoming, Pa., at the time of the massacre, July 3, 1778 (see Wyoming Valley, in Cyclopædia), and served bravely in General Sullivan's expedition against the Indians of the Six Nations at Newtown (now Elmira), N. Y., in 1779, and during the whole of that Indian war. D. at Wilkesbarre, Pa., July 28, 1795.

But′ton [Fr. *bouton*, "bud"], the name applied to an article of dress of various forms used either for ornament or for fastening together the parts of a dress by means of a loop or worked buttonhole. Buttons are used for various articles of male and female apparel, and for hats, bonnets, shoes, and gloves. The word is also applied in *carpentry* to a flat oblong piece of wood or metal, turning on a nail or screw, to fasten doors and the like; and in *assaying* to a round mass of metal remaining in the cupel after fusion; but the use of the word in relation to articles of dress is the one of most importance. The button is generally considered a sign of civilization. The savage fastens his blanket or tunic, his leggings and moccasins, with strings, and has no idea of buttonhole or button; and it is only when a considerable degree of civilization is attained that we find buttons taking the place of strings or lacings, while fashion, in the artificial condition of society in great cities, requires a profusion of buttons, not so much for use as for ornament. Except the occasional use of a gem to fasten the toga at the neck, the Greeks and Romans seem to have had no idea of buttons, as indeed their flowing robes did not require them. They were first applied to dresses (probably in the thirteenth or fourteenth century) for purposes of ornament only, but somewhat later the buttonhole, an expansion of the idea of the loop, was invented, and the button became indispensable for the dress. In the beginning of the seventeenth century the manufacture of buttons had attained some importance in England, Birmingham being then, as now, its principal seat. These buttons were of cloth, covering a wooden disk, of gold, steel, and ivory, the last three the work of the goldsmiths, who were very expert in the arts of chasing and carving metals. Some of the steel buttons made at the Soho works about this time were sold at 140 guineas the gross, or almost $5 the button. About 1745, Matthew Boulton made many improvements in inlaid and steel buttons. Gilt buttons came into use soon after the accession of George III. in 1760, and John Taylor of Birmingham, originally a cabinetmaker, patented many improvements in gilt, plated, and lacquered buttons. The making of the shanks or eyes of these buttons was improved by Ralph Heaton, also of Birmingham, not far from 1800. This is still a separate branch of the business at Birmingham. From 1760 to the present time the manufacture of buttons has been a constantly-growing industry in England, France, Switzerland, and the U. S. All descriptions of buttons may be classed under three distinct heads—viz. shank buttons, hole buttons, and covered buttons—but each kind is made of a great variety of materials and an almost infinite diversity of forms. The shank buttons, those having a wire loop, eye, or shank to attach them to the dress, are made of gold, silver, brass gilt or bronzed, copper or bronze, nickel, iron, steel, ivory, bone, mother-of-pearl, and other shells, Whitby jet and other forms of coal, glass, jade, malachite, amber, tortoise-shell, horn, vegetable ivory, wood, papier-mâché, bois brulée, India-rubber, gutta-percha, steatite, clay, etc. The hole buttons (two, three, or four holes) are made of iron, sheet iron, sheet brass, sheet tin, wood, paper—of both these combined with brass or sheet tin—ivory, bone, porcelain, or white glazed ware, glass, mother-of-pearl, papier-mâché, clay, etc. The covered buttons, having a basis of wood, brass, zinc, or tin, have their covering of farmers' satin, prunella, broadcloth, brocade, velvet, silk, mohair, grenadine, twist, linen, cotton, and, in short, every description of textile fabric. Both the shank and the covered buttons are to a considerable extent made on the *shell* plan—*i. e.* the face of the button is stamped out of a thin sheet of metal—and may have a flat, oval, or round surface as desired; and the back or under surface is also stamped, and its edges being turned, it is pressed into the upper shell and locked there by the pressure. The principle on which all shell buttons are made was first devised by B. Sanders, a Dane who had lost most of his property in Copenhagen in the bombardment of that city in 1807, and removed to Birmingham, England, where he commenced the manufacture of buttons. He applied it only to covered buttons, which he made of sheet brass or tin in two parts, the upper blank or disk having its edge turned up and being covered with cloth, silk, or lasting, and the under blank, which was smaller than the upper and convex in form, having a wire shank, and the cloth and paper or cardboard which was to keep it in place put inside of it, and the two were pressed together, the turned edges interlocking so as to make a perfect button. An improvement was made in these by a son of Mr. Sanders, the lower blank having a circular hole in it (and receiving in consequence the name of "collet"), through which in the act of pressing the two blanks together a portion of the cloth or textile inside of the collet was thrust, so as to make a flexible cloth shank in place of the wire one. Other modifications were made by other inventors which reduced the price and greatly increased the facility of production. One of these was the production of what is known as the silk-back button, which dispenses with the collet, though it substitutes for it a round piece of sheet iron smaller than the upper blank. The so-called silk-back is a very thick heavy cloth having a silk face, which is cut out, of the proper size, by a die, its back having first been coated with a heavy sizing; a filling of soft spongy paper is placed upon this sizing, and the back is then gathered over the small blank of sheet iron and pressed into the upper blank or shell, which had previously been covered with the proper material, and the button is completed, no metal appearing upon either surface. In the shell covered buttons sheet iron is now used for the blanks, and where the metal shows, as in the ordinary flexible shank buttons, it is lacquered. The process for making the metallic shell buttons is different, though the principle is the same. These buttons, whether of flat or oval surface, and whether figured or plain, are made from rolled brass plate; originally, the flat buttons were solid and struck out as blanks from a thick plate, the eye or shank soldered on, and the whole finished, polished, and gilt or silvered by the old cream-of-tartar process for silvering or the mercury amalgam for gilding. It was said that by this latter process six cents' worth of gold would suffice for gilding a gross of buttons. Both processes have been superseded by electro-plating. (See Gilding and Electro-plating, in Cyclopædia.) When buttons began to be made on the shell-plan the upper blank was forced by the falling of a heavy weight into a finely-engraved die of hardened steel, which gave it the oval form and the beautifully-ornamented surface, and the under blank into another die, which stamped upon it the maker's name or trade-mark, and at a later date riveted the shank (which before had been soldered to it) into this plate; a filling of stout paper or binder's board was then placed upon it. The two plates were then pressed together by a fly-press, and the button was trimmed and ready for the gilding. When gilt it was burnished and set on cards containing a dozen, when it was ready for market. Subsequent improvements have combined and simplified these processes, so that now a single machine completes the button except the gilding, burnishing, and carding; and the last process is also performed by a machine. Embossed buttons have been made of horn softened by heat, dyed and pressed in a die, of *bois brulée* (sawdust and shellac heated), and of India-rubber and gutta-percha vulcanized, which were for some years very popular. These have now mostly given place to oval and flat buttons of ivory, bone, vegetable ivory, mother-of-pearl, and celluloid. The ivory, bone, and vegetable ivory buttons are engraved and dyed in a variety of patterns and checks. The mother-of-pearl may be either of the ordinary color of pearl or what is known as smoked pearl. The celluloid buttons are made in moulds and dies like the vulcanite and horn. Those made of Vegetable Ivory (see in Cyclopædia), at present very popular, are cut from slabs sawed out of the vegetable ivory-nut by bits attached to spindles and made to turn very rapidly, and are then turned, polished, dyed, and worked in figures in a lathe. They are then carefully sorted and put upon cards. The hole buttons, when made of ivory, vegetable ivory, pearl, malachite, onyx, etc., are cut by a tubular saw or bit revolving with great rapidity; the eyes are made by fine revolving drills. Pearl shirt buttons are made in great quantities both in this country and Europe, and many of them are made of cheap substitutes for pearl. Agate or feldspar buttons for under-clothing, as well as clay buttons, are made in moulds and baked and glazed like porcelain. They are mostly imported, requiring very cheap labor for their production. The greater part of the pantaloon buttons in use are made either from japanned iron stamped out by a heavy die or embossing swedge, or are made as shell buttons, with the back of paper or wood, and the whole button made by one machine and almost by a single blow. They are afterward japanned. Fancy and ornamental buttons for ladies' dresses are sometimes made of combinations of cloth and glass or papier-mâché, pearl, metal, or choice woods, sometimes of vulcanite, glass, pearl, or Whitby jet, but oftener at the present day of silk, velvet, silk cords and figures, or what is known as passementerie, or of brocade and embroidered silk. These are usually made upon a wood foundation, especially if they are oval or of fanciful shape. Their manufacture is often carried on in connection with other dress trimmings.

The manufacture of covered buttons in this country, except in its simpler forms of hand-made covered buttons, was not attempted earlier than 1825 or 1826. Samuel Williston, who was the founder of the covered-button business in this country, commenced covering buttons by hand at Easthampton, Mass., in 1826, and by the gradual introduction of machinery and a consolidation of his methods and machines with those of the Haydens at Haydenville in 1834 (the Haydens had been making buttons in a small way after the Sanders patterns from 1831), laid the foundations of the extensive works of the National Button Co., which employs 175 hands and can turn out 2500 gross per day. Waterbury, Conn., was one of the early seats of the manufacture, but has been largely occupied with the production of metal buttons. There are numerous button-factories in Waterbury; 18 factories were reported in New York State in 1880, the larger part making ornamental dress buttons, 18 in Pennsylvania, 28 in Massachusetts, 26 in Connecticut, and 25 in New Jersey. In Great Britain five-sevenths of the manufacture are concentrated in Birmingham, 4980 hands being employed in the business there, and not quite 2000 elsewhere. London has 58 factories; Germany, 65; Austria, 39; Hamburg and Lubeck, 7; Brussels, 5; Switzerland a large number, though most of them on a small scale. France has great numbers of shops where dress buttons are made in connection with other dress trimmings, and also many engaged in the production of pearl buttons. The statistics of the button manufacture in the census report of 1880 give 124 establishments, employing 5825 hands (2128 men, 3052 women, 645 children), with a capital of $2,013,350, paying $1,645,130 in wages, using raw material to the amount of $1,792,891, and producing annually buttons to the value of $4,449,542. C. B. Johnson.

Byerly (William Elwood), Ph. D., b. Dec. 13, 1849, in Philadelphia, Pa., graduated from Harvard College 1871; received Ph. D. from same 1873; was appointed assistant professor of mathematics at Cornell University 1873–76; held the same position at Harvard 1876–81, and was appointed full professor 1881. In 1878 he was elected fellow of the American Academy of Sciences. He has published *Elements of Differential Calculus* (1879), *Elements of Integral Calculus* (1881), and several syllabi of mathematical courses given at Harvard. Ralph S. Tarr.

Byfield (Nathaniel), b. at Long Ditten, Sussex, England, in 1653; came to Boston in 1674 and became a prominent merchant; was the principal settler of Bristol, R. I.; returned to Boston in 1724; became speaker of the House of Representatives; was judge of the Bristol co. court of common pleas for thirty-eight years, and of Suffolk co. 1730–32; was member of the council and judge of the vice-admiralty 1704–15 and 1729. D. in Boston, June 6, 1733.

Byng (George), b. at Wrotham, England, in 1663, went to sea at the age of fifteen, and in 1703 became rear-admiral of the red. Served in 1704 under Sir Cloudesley Shovel, and reduced Gibraltar; was also distinguished for his services at battle of Malaga and elsewhere. He was afterward made rear-admiral of Great Britain, member of privy council, Baron Byng, Viscount Torrington, and knight companion of the Bath. In 1727 he became first lord of the admiralty. D. Jan. 15, 1733.

Byrd (Harvey Leonidas), M. D., b. in Salem, S. C., Aug. 8, 1820; received his degree in medicine from the University of Pennsylvania 1847; was first professor of materia medica and therapeutics in the Savannah Medical College; then professor of principles and practice in the Oglethorpe Medical College, Ga.; professor of obstetrics in the Washington University, and professor of the diseases of women and children in the College of Physicians and Surgeons of Baltimore; was also dean of the three first named, and president of the last; served as surgeon during the civil war, and has written largely for the medical journals. D. Nov. 29, 1884. Paul F. Eve.

C.

Ca'bell (James Lawrence), A. M., M. D., LL.D., b. in Nelson co., Va., Aug. 26, 1813; studied medicine at the universities of Virginia, Maryland, and Pennsylvania, and finally in Paris; was appointed professor of anatomy and surgery in the University of Virginia in 1837; published a volume on the unity of mankind and numerous minor essays and monographs, and is president of the State board of health and vital statistics of Virginia. Paul F. Eve.

Ca'dy (Daniel), b. in Columbia co., N.Y., in 1773; admitted to the bar in 1795, and practised with great distinction for over sixty years; was several times a member of the legislature of New York and of Congress, and for eight years judge of the supreme court and the court of appeals of New York. His wife was a daughter of Col. James Livingston, an officer in the army of the Revolution, and one of his five daughters is the celebrated Elizabeth Cady Stanton. D. at Johnstown, N. Y., 1859. A sketch of his life by his son-in-law, Henry B. Stanton, is contained in vol. xviii. of Barbour's *S. C. Reports*.

Caldwell, city, Sumner co., Kan. (see map of Kansas, ref. 8–G, for location of county), on Caldwell branch of Atchison Topeka and Santa Fé R. R., 53 miles S. by W. of Wichita. Pop. in 1880, 1005; in 1885, 1970.

Cal'laway (Elisha), b. in Delaware Jan. 8, 1792; joined the South Carolina Methodist Episcopal conference Jan., 1818, and was a most laborious minister, laboring in extensive fields in South Carolina, Georgia, Alabama, and Mississippi. He represented the Alabama conference in the Louisville convention, at which the Methodist Episcopal Church, South, was organized. He belonged to the North Mississippi conference at the time of his death, June 21, 1870. T. O. Summers.

Cam'eron (Angus), b. at Caledonia, Livingston co., N. Y., July 4, 1826; studied law in Buffalo, and in 1857 removed to La Crosse, Wis.; served two years as representative, being Speaker one year, and four years as senator in the legislature of Wisconsin; was regent of the University of Wisconsin 1866–75, and was U. S. Senator from that State 1875–85. J. B. Bishop.

Cameron (Sir Duncan A.), b. about 1808; entered the British army as ensign in 1825, and in 1854 became colonel; commanded the 42d regiment at the battle of Alma; the Highland brigade at the battle of Balaklava, in the expedition to Kertch, the siege and fall of Sebastopol, and assault of the outworks; was created a C. B., officer of the Legion of Honor, and received a medal with three clasps from his own government, besides the Sardinian and Turkish medals. He was in command of the forces in New Zealand during the war of 1863–65, with the local rank of lieutenant-general, where he distinguished himself; was appointed colonel of the 42d Highlanders in 1863, lieutenant-general in 1868, and general in 1874; governor of the Royal Military Academy at Sandhurst 1868–75; was nominated a K. G. C. B. in 1873.

Cameron (Henry Clay), Ph. D., D. D., b. at Shepherdstown, Jefferson co., Va., Sept. 1, 1829; graduated at the College of New Jersey in 1847, and at the Princeton Theological Seminary in 1855; was appointed adjunct professor of Greek in 1855, and professor in 1861, at the College of New Jersey; was licensed to preach in 1859, and ordained as an evangelist in the Presbyterian (O. S.) Church Feb. 1, 1863; was appointed a member of the board of visitors of the U. S. Military Academy at West Point in 1876, and has contributed largely to various magazines and periodicals.

Cameron (James Donald), eldest son of Hon. Simon Cameron, b. at Harrisburg, Pa., May 14, 1833; graduated at Princeton College in 1852, and has since been interested and identified with the development of the coal, iron, lumber, and manufacturing interests of Pennsylvania, residing at Harrisburg; was cashier, and afterward president, of the Middletown Bank, and in 1861 was made vice-president, and in 1863 president, of the Northern Central R. R., which position he held until his resignation in 1874, being then succeeded by Hon. Thomas A. Scott. This road was of great service to the government during the war (although several times cut by the Confederates) as a means of communication between Pennsylvania and the national capital *viâ* Baltimore, and after the war, under Mr. Cameron's administration, it was extended to Elmira, so as to realize its original purpose of forming a direct communication from the lakes to tide-water at Baltimore. He has always been an active Republican; on May 22, 1876, was appointed secretary of war in Pres. Grant's administration, and in 1877 succeeded his father in the Senate; re-elected 1885.

Campello, Plymouth co., Mass. (see map of Massachusetts, ref. 4–I, for location of county), on Old Colony R. R., 21 miles S. of Boston, is now a part of Brockton.

Canal Dover, R. R. junction, Tuscarawas co., O. (see map of Ohio, ref. 4–H, for location of county), has several mills and iron-furnaces. Pop. in 1870, 1593; in 1880, 2208.

Can'dler (Milton A.), b. in Campbell co., Ga., Jan. 11, 1837; received a classical education, graduating at the University of Georgia in 1854; studied law, and was admitted to the bar in 1856, commencing practice in De Kalb co., Ga.; was elected to the lower house of the State legislature, occupying a seat in that body 1861–63; was elected to the State constitutional convention in 1865, and to the State senate 1868–72; was elected to the 44th Congress, and re-elected to the 45th. Alexander H. Stephens.

Canos'sa, small town of Italy, 24 miles S. W. of Modena, contains the ruins of the famous castle belonging to Matilda of Tuscany, before whose gates the German emperor, Henry IV., stood three days bareheaded and barefooted before Pope Gregory VII. would admit him to his presence.

Canton, on R. R., Bradford co., Pa. (see map of Pennsylvania, ref. 2–G, for location of county). Pop. in 1870, 710; in 1880, 1194.

Capel (Thomas John), b. at Brompton, Kent, England, Oct. 28, 1835; was educated at Layston and Hastings; assisted in 1852 in the foundation of the normal school at Hammersmith, London; was appointed vice-principal of that institution in 1856, but resigned his office in 1859 on account of ill-health; lived from 1859 to 1869 at Pau in the Pyrenées, where he founded a mission for English Catholics, and became private chaplain to the marquis of Bute in 1869. The pope has conferred on him the title of *monsignore*. He visited the U. S. and lectured there in 1883.

Ca'pen (Elmer Hewitt), b. at Stoughton, Norfolk co., Mass., in 1838; graduated at Tufts College in 1860, studied law one year in the Harvard Law School, and was admitted to the bar in 1863; was elected to the legislature in 1859, while still in college. After practising law for a short time in his native town, he began the study of theology, and was ordained in Gloucester in 1865, where he preached for four years; then preached for one year at St. Paul, Minn., and in 1870 accepted a call to the First Universalist church in Providence, R. I. In 1875 he became president of Tufts College. J. B. Bishop.

Ca'pers (Rev. Samuel Wragg), b. in Georgetown, S. C., Mar. 5, 1797; after receiving a classical education entered the legal profession, which he abandoned for the ministry, and joined the South Carolina Methodist Episcopal conference in 1828. He was a member of the Louisville convention at which the Methodist Episcopal Church, South, was organized. D. in Camden, S. C., June 22, 1855. T. O. Summers.

Carnesville, cap. of Franklin co., Ga. (see map of Georgia, ref. 2–H, for location of county). Pop. in 1870, 266; in 1880, 184.

Car'nochan (John Murray), M. D., b. at Savannah, Ga., in 1817; studied medicine at Edinburgh and various places on the European continent; began to practise in New York in 1847, and soon gained distinction for his bold and successful surgical operations. Thus, he excised the whole trunk of the second branch of the fifth pair of nerves for the cure of neuralgia depending upon disease in the nerve. This nerve was cut out from the infraorbital foramen to the foramen rotundum, and consequently involved an operation through the malar bone to the base of the skull. In 1852 he tied the femoral artery, and thus ingeniously cured a disease of exaggerated nutrition, *elephantiasis arabum*, which operation has been accepted in Europe and extensively practised. He also tied the primitive carotid artery on both sides for the cure of elephantiasis of the head-base and neck. He exsected the entire radius in 1853, the entire ulna in 1854, and has also exsected the entire lower jaw and the calcaneum. In 1851 he became professor of surgery at the New York Medical College and surgeon-in-chief to the State Immigrant Hospital. He has published many valuable professional monographs and lectures, a treatise on *Congenital Dislocations* (1850), a translation of Rokitansky's *Pathological Anatomy*, etc.

Carrington, R. R. junction, cap. of Foster co., Dak. (see map of Dakota, ref. 2–E, for location of county). Pop. in 1885, 450.

Carrizo, cap. of Zapata co., Tex. (see map of Texas, ref. 8–G, for location of county). Pop. not in census.

Carrizo Springs, cap. of Dimmit co., Tex. (see map of Texas, ref. 6–G, for location of county). Pop. not in census.

Carruth'ers (Robert), b. at Dumfries, Scotland, Nov. 5, 1799; was apprenticed to a bookseller; became in 1828 editor, and in 1831 proprietor, of the Inverness *Courier;* published with Robert Chambers the *Cyclopædia of English Literature*, and alone an annotated edition of Boswell's *Journal of a Tour to the Hebrides*, etc. D. May 26, 1878.

Ca'ry (Samuel Fenton), b. in Cincinnati, O., Feb. 18, 1814; graduated at Miami University 1835, at the Cincinnati Law School 1837; retired from law-practice in 1845, and became a farmer; was in Congress 1867–69, serving on important committees, and was the only Republican in the House of Representatives who voted against the impeachment of Pres. Johnson; was nominated by the Independent party at Indianapolis, May 18, 1876, for Vice-President of the U. S., with Peter Cooper as President.

Ca'sey (Thomas Lincoln), b. at Madison Barracks, N. Y. (a U. S. infantry station near Sackett's Harbor), May 10, 1831; was graduated at the U. S. Military Academy in 1852, and assigned to the corps of engineers as brevet second lieutenant, rising through successive grades to be a colonel in his corps 1884; served as assistant engineer on fortifications and river and harbor improvements Delaware Bay and River until 1854; assistant professor (1854–57) and principal professor of engineering at the Military Academy 1857–59; in command of engineer troops department of Oregon 1859–61; on staff of general commanding department of Virginia season of 1861; in charge of construction of fortifications on coast of Maine and New Hampshire 1861–67, except while on special duty with fleet during the first expedition to Fort Fisher 1864; assistant to chief of engineers 1867–79; in charge of public buildings and grounds District of Columbia 1877–81; of construction of building for state, war, and navy departments; of Washington Monument 1877 till its completion, in 1885.

G. C. Simmons.

Casselton, R. R. junction, Cass co., Dak. (see map of Dakota, ref. 3–F, for location of county), on Northern Pacific R. R., 21 miles W. by N. of Fargo. Pop. in 1880, 361; in 1885, 1365.

Castanhe'da, de (Fernão Lopez), b. probably about the year 1500; d. in 1559; went to India with his father in 1528, and devoted many years to study, personal examination of local records and scenes of important events, and to the composition of his valuable *Historia do Descobrimento e Conquista da India pelos Portuguezes*, the several books of which were printed in different years from 1551 to 1561. The publication of the first and second books preceded that of the first decade of the *Asia* of De Barros, but by so short an interval that the work of Castanheda could hardly have been used by De Barros, who no doubt derived his material chiefly from original sources. For some not obvious reason, the *Historia* of Castanheda seems to have made a greater impression on the European public than the more attractive labors of De Barros, for the first book of the *Historia* was translated into French in 1553, and the whole work into English some years later, while De Barros, we believe, has never been translated into either language, and even Camoëns is said by Portuguese critics to have drawn his historical facts altogether from Castanheda. Castanheda has the merits of fulness of detail, clearness of exposition, and fidelity to the best authorities, and, though inferior as a writer to his distinguished rival, he is, by no means, superseded as a source of information on his subject. The best edition of the *Historia* is that of Lisbon (1833 *seq.*), in 7 vols. sm. 4to, which conforms to the original orthography.

George P. Marsh.

Castile, on R. R., Wyoming co., N. Y. (see map of New York, ref. 5–D, for location of county). Pop. in 1870, 712; in 1880, 965.

Cat'alan Language and Literature. After the consolidation of the different political jurisdictions of Spain into a single state was consummated under Ferdinand and Isabella, near the close of the fifteenth century, the predominance of Castile completely overshadowed the other provinces, and gradually threw into obscurity their languages and their literature. The local dialects were sooner or later abandoned to the populace, and Castilian became the almost universal language of culture and of public life. But the independent and insubordinate Catalans long held tenaciously to their native tongue; it was not till the close of the seventeenth century that Castilian supplanted it, and there are instances of its employment, not only for literary but for official purposes, for a century later. It has now, however, followed the fate of the other provincial dialects, and though still spoken in a great variety of forms by the inferior classes over a wide range of territory, and not unfrequently employed as a vehicle for *belles-lettres* dilettanteism, it can no longer be said to have a living status in the literature of Europe.

Considered simply as an object of linguistic study, the Catalan shares with the other dialects of the Hispanic peninsula the advantage of having an approximately known origin and date. For, notwithstanding the opinion of Pers, who holds it to be an indigenous speech, there is no room for doubt that it originated in the dialect of the Roman camps and public offices, and of course its history begins with the Roman conquest. Hence, it, as well as the other Spanish provincial tongues, is essentially younger and less primitive than the numerous local dialects of Italy, many of which are probably as old as Latin itself. Of course, Catalan, as well as Castilian, Galician, and the other provincial tongues, was developed under circumstances peculiar to itself, and like them has maintained in all its multifariousness a marked individuality. The linguistic—or at least the rhetorical—affinities of the Catalan, or as, since the end of the fourteenth century, it has often been called, the Lemosin, with the Provençal, and in some points of structure even with Northern French, are greater than with Castilian, although its vocabulary, with certain wide orthoepical, orthographical, and inflectional differences, is the same as that of this latter dialect. The frequent dropping or contraction of the inflected endings shortens the words to that degree that a Catalan original ordinarily covers not more than three-fourths as much letter-press as a literal Castilian translation, and monosyllables are so common that Ballot cites a poem in ninety-six verses, each of seven words of a single syllable. The brevity of the words and their frequent consonantal endings in Catalan necessitate an abruptness of utterance and an *accent* or rhythmic modulation much less agreeable to the ear than the pronunciation of the sonorous Castilian, but this disadvantage is compensated by a simplicity, a directness, and a logical precision of periodic structure which give to it, at least as a vehicle of prose composition, a decided superiority over the periphrastic and cumbrous language of Castile.

So large a proportion of the early monuments of the Catalan and Valencian speech—for the shades of distinction between the two are slight, and we must treat them as practically one—remain still unpublished, and have not yet been subjected to thorough critical examination, that the chronology of the dialect and its literature is not definitively established. Doubtless, it existed for centuries only as a spoken tongue, but its most ancient written relic yet discovered is said to be a document of the year 1037, in which Catalan words and phrases are intermixed with the Latin text. As a literary language it cannot be said to have become fairly established until toward the close of the thirteenth century. At the beginning of the fourteenth century the various very closely-allied dialects then grouped under the general name of Catalan composed the vernacular of so large a population in Northern Spain and Southern France that Ramon Muntaner, writing in 1325, can hardly be charged with exaggeration in affirming (*Cronica*, cap. xxix.) that "in no nation are there so many who use one and the same language as of the Catalans." The important commercial and political relations of the Aragonese kingdom with the other Spanish Moslem and Christian states, with France, with Italy, with Sicily, and finally with Greece, brought the Catalans constantly into friendly or hostile contact with all these nations, and their literary men imbibed more or less of the intellectual culture of all of them. The writings of Ramon Lull and other writers show traces of a familiarity with Arabic, and the Italian poets were studied, imitated, and translated by Catalans in the very infancy of Italian literature. But though the native character, sentiments, and habits of thought were never entirely obliterated, yet most of the Catalan poets have too little individuality and originality to make them really worthy of study for the general purposes of literary culture.

In our survey of this literature our limits of space must confine us to its published and generally-accessible monuments, and as the works of Catalan and Valencian poets who either wrote in Provençal or followed Provençal models belong rather to the history of that school than to that of the native literature of North-eastern Spain, we shall but very briefly notice their productions.

Apart, then, from the linguistic interest of Catalan as a distinct and peculiar offshoot from the ancient Italic stock, its prose, and especially its historical literature, forms its chief and almost only claim to attention of the foreign general student. The oldest published work of this class we possess is the *Cronica del Rey En Pere e dels seus antecessors*, by Bernat d'Esclot. This very interesting and valuable chronicle covers the period between the early part of the twelfth century and the death of King Don Pedro in 1285, in which year it is supposed to have been written. (See D'Esclot.) The spirited and justly-celebrated *Cronica Catalana* of Ramon Muntaner embraces the same period, but comes down to 1328. (See Muntaner, in Cyclopædia.) Of not inferior interest to either of these, supposing it authentic, is the *Libre dels Feyts . . . d'En Jacme lo Conqueridor*, or autobiography of King Don James the Conqueror, which, though considered genuine by the patriotic criticism of most native investigators, is thought by many foreign scholars to be a production of about the middle of the fourteenth century. (See Jacme, in Cyclopædia.) The *Cronica del Rey En Pere* (Peter the Cruel, Peter the Punctilious), by himself, is, we believe, of undisputed authenticity, and carries the history down to 1380. The *Libre dels Feyts d'Armes de Catalunya*, by Mossen Bernat Boades, continues the military annals to 1420. Many original historical documents of earlier and later periods are contained in the *Coleccion de Documentos ineditos del Archivo-general de la Corona de Aragon*, now in course of publication at Barcelona, of which about forty octavo volumes have appeared. The principal Catalan historians since the invention of printing are Tomich, *Historia dels Reys de Arago é Comptes de Barcelona* (Barcelona, folio, 1495); Carbonell, *Chronica de Espanya* (folio, Barcelona, 1546); and Pujades, *Chronica General de Catalunya* (parte prim., Barcelona, 1609, folio; the following parts are in Castilian). The Catalan prose-writer whose name is oftenest noticed abroad is Ramon Lull (A. D. 1235–1315), a very voluminous philosophical and mystical author, best known by his *Ars Magna*, or *Lulliana*, in Latin. A Latin religious romance by him was translated into Catalan and published at Valencia in 1521 under the title *Blanquerna, qui tracta de cinq estements de persones*, etc., etc. Many of the Latin writings of Lull are contained in an edition published at Mayence (1721–42) in i.–vi., ix.–x volumes. His works in his own tongue remain chiefly in manuscript, though Konrad Hofmann printed in the *Transactions* of the Royal Bavarian Academy (xii. B. iii. Abth. 1812) an apologue by Lull in the original, with a German translation. This is one of 365 tales narrated in a huge work entitled *Libre de Maravelles*, and is a new, or rather old, version of the story of *Reynard the Fox*, agreeing, however, with the French and Dutch fables only in subject. (See Lull, in Cyclopædia.) Translations of parts, at least, of the Bible into Catalan were made at an early date, and there exist several romances of chivalry in the same dialect, one of which, *Tirant lo Blanch*, professedly translated from English into Portuguese, and from Portuguese into Valencian, by Juan Martorell, was published at Valencia in 1480.

To what we have said of the general character of Catalan poetry the works of Ausias March (*circa* 1400–60) form a conspicuous exception. They were indeed, if not inspired, certainly suggested, by the poems of Petrarch and the Provençals, but they are generally simple, unaffected, tender, and graceful, and not wanting in originality. (See March, Ausias, in Cyclopædia.) The *Libre de les Dones* of Jayme Roig also possesses interest, if not high literary merit.

In the present generation much has been done by private individuals and by literary associations to revive the cultivation of the native tongue by the republication of old works and by original composition, and French and German scholars have essentially aided this movement. Buchon published in 1841 a translation of Muntaner, and in the same volume the original text of D'Esclot; Lanz printed an edition of Muntaner in Catalan at Stuttgart in 1844; Bofarull, an edition of the same chronicler at Barcelona in 1860, and of the *Cronica de Don Pedro el Ceremonioso* at Barcelona in 1850. The beautiful *Biblioteca Catalana*, now in course of publication by Verdaguer at Barcelona, is devoted to the publication of old rare or inedited works, and deserves warm encouragement. Briz has printed (Barcelona, 1867) a *Llibre dels Poetas*, or anthology of poems of the twelfth to the eighteenth centuries, an edition of Ausias March (Barcelona, 1864), and with Caudi and Salto a collection of *Cants Populars Catalans* in 4 vols. 8vo (Barcelona, 1866–74). Of modern original authors in this dialect we may cite Ros Carlos, *Rondalla de Rondalles* (Valencia, 1776); Balaguer, *Poesias Catalanas* (2 vols., Barcelona, 1814); *Los nous Trovadors* (a collection), by Bofarull (Barcelona, 1858–59, 2 vols.), and the Proceedings of the Catalan Academy, *Jochs Florals* (Barcelona, 1859–73, 15 vols. 8vo).

For more detailed information see, besides general works on Spanish literature, Fuster, *Biblioteca Valenciana* (Valencia, 1827–30, 2 vols. folio); Torres Amat, *Memorias para ayudar a formar un Diccionario critico de los escritores Catalanes* (Barcelona, 1836, 1 vol. 8vo), and supplement by Corminas (Burgos, 1849, 1 vol. 8vo); Ballot, *Gramatica y Apologia de la Llengua Cathalana* (Barcelona, 1814, 12mo); Bofarull, *Estudios Sistema Gramatical y Crestomatia de la Lengua Catalana* (Barcelona, 1864, 12mo); Pers, *Historia de la Lengua y de la Literatura Catalana* (Barcelona, 1857, 8vo); Camboulint, *Essai sur l'Histoire de la Littérature Catalane* (Paris, 1858, 8vo); and especially Helfferich, *Raymund Lull und die Anfänge der Catalonischen Literatur* (Berlin, 1858, 8vo). The various French and German journals devoted to Romance literature may be consulted with advantage. Perhaps the best dictionary is that of Labernia, Catalan, Castilian, and Latin, and Castilian, Catalan, Latin (Barcelona, 1839, 4 vols. 8vo).

George P. Marsh.

Catastom'idæ [from *Catastomus*—κατά, "below," and στόμα, "mouth"—the typical genus of the group], a family of fishes of the order Teleocephali and sub-order Eventognathi, containing the fresh-water suckers of North America. The body varies between an elongated subcylindrical and an oblong more or less compressed contour; the scales are of medium or rather large size, and cycloid; the lateral line is generally present and decurved, but sometimes absent; the head is diversiform; the opercular bones normally developed; the nostrils double; the mouth more or less inferior, and provided with fleshy and generally papillose or crenated lips; the upper jaw is formed in the middle by the small and lamelliform intermaxillaries, and on the sides by the supramaxillaries; teeth are wanting in the jaws; the pharyngeal bones are developed in a falciform manner, and provided with a row of numerous comb-like teeth; the branchial apertures are restricted to the sides; branchiostegal rays three on each side; dorsal variable in development; anal posterior, and generally short and high; caudal large, and more or less emarginated; pectoral fins low down, but lateral and with their rays branched; ventral fins abdominal; the intestinal canal is very long; the stomach simple and destitute of pyloric cæca; the air-bladder is large, unprotected by an osseous capsule, and divided by transverse constrictions into two or three regions. The family is a very characteristic one, and is richly developed in the fresh waters of the North American continent, but a few species are also found in Northern Asia (Siberia, China, and Japan). The species are generally known in the U. S. under the name of sucker, but some of the forms are also called chub, carp, etc. About eleven or twelve genera may be recognized, which represent three quite distinct groups of perhaps sub-family rank; these are—(1) Catastominæ, including the genera *Catastomus*, *Hypentelium*, *Ptychostomus*, *Moxostoma*, *Placopharynx*, *Pantosteus*; (2) Bubalichthyinæ, comprising the genera *Carpiodes*, *Bubalichthys*, *Ichthyobus*, and *Myxocyprinus*,* and (3) Cycleptinæ, represented by the single genus *Cycleptus*. (1) The Catastominæ are elongated fishes, provided with a moderate dorsal fin of from ten to twenty rays; its species are the ordinary suckers and chubs of the inland inhabitants. (2) The Bubalichthyinæ are deep, compressed fishes, with a long dorsal, generally more or less elevated and falciform anteriorly; its species are known as carps, carp-suckers, buffalo-fishes, etc. (3) The Cycleptinæ are very elongated fishes, with an elongated falciform dorsal; the typical species is recognized in the West under the names of black horse, long buffalo, etc. About fifty species of the family have been described. They are among the most abundant fishes in the regions where they occur, and sometimes, in favorable localities, and when they are exempt from the attacks of enemies, they literally swarm, and cover the bottom of the waters with their compact masses. The mouths of the typical species are small and protractile, and well fitted for sucking in the aliment upon which they feed. Such species do not often bite at a hook; there are, however, species, especially of the sub-family Bubalichthyinæ, which can readily be caught with bait. Many of the species are quite apathetic, and remain basking in the sun or suspended almost motionless in the waters for a long period of time; and this habit is taken advantage of by boy-anglers, who attach a stiff loop at the end of a pole and drawing it over a fish toward the middle, suddenly jerk it from the water. (See Sucker, in Cyclopædia.)

Theodore Gill.

Cathar'tidæ [from *Cathartes*—καθαρτής, "one that purifies," *i. e.* by the consumption of the impure—the typical genus], a family of birds of the so-called order or super-family Raptores or Ætomorphæ. It comprises the vultures of the New World, or the turkey-buzzards, carrion-crows, condor, etc. These are at once distinguishable from all others of the group by the imperfect or perforated nasal septum, which enables one to see anything on the opposite side through the perforation. In form the species contrast considerably with the typical birds of prey, such as the hawks and owls; and they resemble some of the gallinaceous birds, such as the turkeys, almost as much as they do the typical Raptores; this likeness is indicated by one of the names ("turkey-buzzard") applied to some of the species. The feathers are destitute of after-shafts, and the oil-gland has no circlet of feathers; the head is rather narrow, and the skin of the head as well as neck is naked; the eyes stand outward prominently, and are not overarched by superciliary shields; the bill is more or less elongated and compressed, and its base provided with an elongated and much-depressed cere; the upper mandible is boldly decurved and hooked; the nostrils have longitudinal apertures, and are confluent together through the perforated nasal septum; the wings are elongated, and pointed at the third or fourth primaries; the legs are moderate; the tarsi rather thick, and the inner edges rounded and not much thinner than the other; the toes three anterior on a uniform plane; the posterior somewhat elevated, not reversible, short, and with the second and third phalanges together at least as long as the basal phalanx; the middle anterior toe is very long, and a web is developed between its base and that of the inner one; the claws are rather feebly developed in comparison with those of the Falconidæ, and much less curved. The anatomical characters distinctive of the group are important, and amply corroborate the differentiation of the family from the vultures of the Old World; these, according to Huxley, are as follows: The skull is provided with basi-pterygoid processes; the valley between the lamellar maxillo-palatines is deep as well as wide; the lachrymal bones are so completely ankylosed with the frontals, as well as with the broad prefrontal processes, that all traces of their primitive distinctness are lost; the sternum has, at most, a mere rudiment of the manubrial process, and its posterior margin exhibits either four slight excavations, or two holes externally and two notches internally; the proximal ends of the clavicles are greatly expanded and recurved, and their outer sides present a deep and wide excavation, at the bottom of which lies the pneumatic foramen; a great part of this excavated surface is left uncovered in front of the clavicular process of the coracoid when the bones are articulated together; the scapular process of the coracoid is not prolonged forward to meet the clavicles; the posterior or ischio-iliac edge of the os innominatum presents a deep notch, which is not found in the other Ætomorphæ; no lower larynx is developed. The family is entirely restricted to America, and its head-quarters are the tropical and warm regions of its two continents, although wanderers extend more or less beyond the warm temperate regions both to the northward and southward. The species fulfil an important function in the economy of nature, especially in the tropics, by devouring the putrid flesh of animals that have been for some time dead, although they by no means disdain fresh meat. They are to some extent gregarious in their nature, inasmuch as they assemble in large numbers around the carcasses of animals, and on them gorge themselves to repletion: afterward they rest in the neighborhood. "When thus gorged," says Coues, "they appear heavy and indisposed to exertion, usually passing the period of digestion in the laziest attitude, with their wings half spread." They are, however, birds of very powerful flight, and on the wing they are easy and graceful in their motions; they are fond of circling high up in the air. On the ground they walk with a somewhat stilted gait, but rarely leap. The species are not numerous, at most only ten being known. These, however, represent several decidedly distinct types of structure of generic value. According to Ridgway, the genera are—(1) *Sarcorhamphus*, with two sub-genera—*Sarcorhamphus* proper, represented by the condor, and *Cathartes*, typified by the king of the vultures; (2) *Pseudogryphus*, formed for the large Californian vulture (*P. Californianus*); (3) *Rhinogryphus*, including the red turkey-buzzard of the Southern States (*R. aura*) and a related species of Brazil (*R. burrovianus*); and (4) *Catharista*, restricted to the carrion-crow or black vulture (*C. atrata*) of the Southern States. (See also CONDOR, CATHARTES, VULTURE, in CYCLOPÆDIA.) THEODORE GILL.

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* *Myxocyprinus* is a name proposed for the *Carpiodes asiaticus* of Bleeker, which is distinguished by the multiradiate dorsal and anal fins (*e. g.* D. 52, A. 13).

Catron (JOHN), b. in Wythe co., Va., in 1778; was admitted to the bar in Tennessee in 1815; served under Gen. Jackson during one campaign; became State attorney for his circuit; removed to Nashville, Tenn., in 1818, and was prominent as a chancery lawyer; became judge of State supreme court in 1824; was chief-justice 1830–36; in 1837 became a justice of U. S. supreme court. He opposed secession in 1860–61, and was driven from the State, but returned in 1862. D. at Nashville, Tenn., May 30, 1865.

Cavendish (THOMAS), b. at Trimley St. Mary, Suffolk, England, in 1560; studied at Corpus Christi College, Cambridge, but left it without a degree, fitted out a ship and went to Virginia in 1586 with the expedition commanded by Sir Richard Grenville. After his return to England, Cavendish sailed from Plymouth, July 21, 1585, with three small vessels, destroying, on the coasts of Chili, Peru, Mexico, and California, nineteen ships, including the Santa Anna, which belonged to the king of Spain and had an immensely valuable cargo. Cavendish returned to England by way of the Cape of Good Hope, having thus become the third circumnavigator of the globe. He undertook another expedition of the same kind in 1591 with five ships, but was unsuccessful. His crews mutinied; he was forced by them to set sail for England after leaving the Straits of Magellan, and died in 1592, on the voyage home. He discovered the harbor of Port Desire, on the east coast of Patagonia.

Cavendish (WILLIAM), SIR, b. in England about 1505, was liberally educated; became gentleman-usher of the chamber for Cardinal Wolsey, and was with him at his death; entered the household of King Henry VIII., who made him treasurer of his chamber, privy-councillor, and a knight. He was the founder of Chatsworth and the immense fortunes of his descendants the dukes of Devonshire, and was the author of "The Life and Death of Cardinal Wolsey." D. in 1557.

Celluloid, a plastic material composed of gun-cotton and camphor. The gun-cotton, or nitro-cellulose, is made by treating tissue-paper with a mixture of nitric and sulphuric acids. The product is mixed with camphor and various pigments to produce the desired color, and the materials are thoroughly incorporated by means of heated rolls. It is subsequently submitted to great pressure. It is afterward moulded into form by means of heated dies, under pressure. Celluloid is applicable to the greatest variety of purposes, such as imitation ivory for billiard-balls; handles for hair-brushes, mirrors, umbrellas, etc.; piano-keys, etc.; imitation coral for jewelry, imitation tortoise-shell for combs, and for rims for eye-glasses, etc.; imitation amber for beads and mouthpieces for pipes: imitation porcelain for dolls' heads, for mounting artificial teeth, in place of hard rubber, for imitation collars, cuffs, and shirt-fronts, which are waterproof. It is very hard and elastic, and takes a high finish. Liquoid is a similar material. (See ZYLONITE.) C. F. CHANDLER.

Central City, Lawrence co., Dak. (see map of Dakota, ref. 6–A, for location of county), in the Black Hills, about 4 miles N. W. of Deadwood. Pop. in 1880, 1008.

Centrarch'idæ [from *Centrarchus*—κέντρον, "spine," ἀρχός, "anus"—one of the genera], a family of fishes of the order Teleocephali and sub-order Acanthopteri, peculiar to North America. They constitute a very characteristic type in at least the Eastern and Mississippi regions. The body is oblong and compressed, and divided into nearly equal and corresponding halves by a longitudinal axis coincident with the commencement of the lateral line and the middle of the caudal fin; the scales are well developed, and generally ctenoid, but in some cycloid; the lateral line is continuous; the head is compressed, and covered with scales on the opercula and cheeks; the eyes are lateral; the opercular bones normally developed; the preoperculum generally entire, sometimes feebly serrated; the operculum has a more or less developed membranous extension around the posterior spine; the nostrils double; the mouth is cleft laterally and obliquely; the upper jaw more or less protractile; teeth are developed in bands on the jaws and, to a variable extent, on the palate; the branchial apertures are ample and continuous below; branchiostegal rays generally six—exceptionally seven—in number; the dorsal fin is elongated, and consists of an anterior spinous and a posterior rayed portion of varying extent; the anal fin in its soft portion corresponds to that of the dorsal, and is armed in front with a variable—frequently large—number of spines; the caudal fin distinct, and generally emarginated; the skeleton has a slightly increased (beyond the normal) number of vertebræ (*e. g.* D. 14 + C. 16–18). The species are quite numerous (about fifty having been described), and generally among the most common fishes of the waters which they frequent. They are all carnivorous, and mostly quite bold and gamy fishes. In the breeding season they generally select a spot which they clear of weeds and obnoxious substances for depositing their eggs; these the male and female guard with zealous care, rushing boldly forward to drive away any intruder not too large for their powers. It is to this family that the black bass, as well as rock-bass, sun-fish, crappie, etc., belong. Several distinct types of structure are exemplified by the species: these are (1) Centrarchinæ, (2) Lepominæ, and (3) Micropterinæ. (1) The Centrarchinæ are fishes with very compressed bodies, and the dorsal and anal fins are correspondingly developed and obliquely opposed to each other; each is armed with approximately equal numbers of spines: to this group belong the many-spined bass (*Centrarchus irideus*), the grass-bass or crappie (*Pomoxys hexacanthus* and *P. annularis*), etc. (2) The Lepominæ are fishes with the soft portions of the dorsal and anal fins almost vertically opposed to each other, and with the spinous portion of the dorsal much longer than that of the anal: it includes the sun-fishes or pond-fishes (*Pomotis* and *Lepomis*), the rock-basses (*Ambloplites*), as well as a number of less conspicuous genera (*Acantharchus, Archoplites, Chænobryttus, Bryttus, Hemioplites, Enneacanthus*, and *Mesogonistius*). (3) The Micropterinæ are oblong fishes, with the soft portions of the dorsal and anal fins vertically opposite, as in the former, but with the spinous portion of the dorsal long and low; and the spines of the anal only three in number and of small size: these are restricted to the celebrated black basses of the U. S. (*Micropterus salmoides* and *M. nigricans* or *floridanus*). (See also SUN-FISH, etc., in CYCLOPÆDIA.) THEODORE GILL.

Ceratodon'tidæ [from *Ceratodus*—κέρας, κέρατος, "horn," and ὀδούς, "tooth"—the chief representative genus], a family of fishes of the order Sirenoidei, supposed, until recently, to be extinct, but lately discovered to be represented by living species in certain Australian rivers. The discovery of these living forms is one of the most important, if not actually the most important of modern additions to ichthyology. The body is elongated, and of nearly equal height from the head to the post-ventral region, but thence tapers backward toward the tail; the scales are large, oblong, and are regularly imbricated; they have the surfaces sculptured with several concentric lines of growth, and the margins are rounded, entire, and membranaceous; the lateral line is slightly decurved from the shoulder, and thence straight and concurrent with and nearer to the abdominal than the dorsal outline; the head is conic in profile, and depressed and oval above; the eyes are lateral, and much nearer the snout than the operculum; the opercular region is covered with scales, and the bones are scarcely apparent externally; on dissection, however, the operculum is seen to be well developed; the other opercular elements are wanting; the anterior nostrils open on the margin of the snout just outside of the oral aperture, the posterior in the roof of the mouth; the mouth is transverse, and the lateral cleft very shallow; no separate maxillary bones are differentiated, as in ordinary fishes; the lips are thick; teeth are developed in pairs upon the mandible, palate, and vomer; the vomerine teeth are small, broad, and rather low laminæ, with convex and trenchant margins, the outer or posterior parts of which are slightly serrated; the palatal and dentary plates are oblong, with a convex entire inner side and a concave outer side, armed with a number of compressed trenchant teeth-like processes; the palatal and mandibular teeth are traversed by numerous medullary canals terminating in punctate impressions on the surface of the crowns; the branchial apertures extend from the sides of the occipital region to below the pectoral fins, and are covered by the broad cutaneous fringes of the opercula; the dorsal and anal fins are confluent with the caudal, and form together an undistinguishable whole, pointed behind and sustained by indefinitely numerous fine rays; the dorsal fin commences somewhat in advance of the posterior half of the length, and the anal considerably behind it; the pectoral fins are elongated, paddle-like elements, pointed backward, covered with scales, except near the margins, with the dorsal margin slightly convex and the inferior sigmoidally sinuated; the ventral fins are also elongated paddles, pointed behind, and of a somewhat hastiform shape. The anatomical peculiarities are numerous, but cannot be here signalized; suffice it to say, that, as in the other members of the order, the notochord is persistent—that is, there is no differentiation into vertebræ, but a single cartilaginous element extends from the head backward. Some of the elements of the skull, as well as the ribs, are more or less ossified. The pneumatic apparatus, according to Günther, "may be described either as a single lung, with symmetrical arrangement of its interior, or as two lungs confluent into a single sac, without any trace of a septum. The sac is wide, and extends from one end of the abdominal cavity to the other." Its external surface shows numerous small rounded prominences corresponding to the minor cells of its cavity, except in the stripe running along the middle of its ventral surface, which stripe is indicative of the differentiation of the lung into two lateral halves: "the right half is contracted at its anterior extremity, slightly bent toward the right side, and opens by a very short duct, terminating in a glottis, into the ventral side of the œsophagus, somewhat to the right of the median line;" the interior of the lung is divided into a number of compartments formed by well-developed transverse septa. The heart in its internal structure resembles, in some respects, the typical ganoids, rather than the previously-known dipnoians: "there are two pairs of (ganoid) valves, narrow and rather long, with stiff, non-collapsing walls, thicker along the middle than on the sides, and without tendinous chordæ, in a single transverse series; their tunics are continued in four narrow raised strips behind their bases:" sometimes small papillary prominences exist in a line between the series of stripes and the special valves immediately in front of the latter. Such are some of the most noteworthy characters of the living Ceratodontidæ. Previous to the discovery of these it had been supposed that the representatives of the family were characteristic of the Secondary epoch, and that they had not survived beyond the Triassic period. It was with great astonishment, therefore, that the discovery of living species in the fresh waters of Australia was hailed. The living forms have even been generally regarded as actually congeneric with the Triassic species, but this seems to be questionable, and the differences between the dental laminæ of the living and extinct species are sufficiently great to warrant generic differentiation, independent of any hypothetical considerations. For the living forms the name *Neoceratodus*, proposed by Count Castelnau, may be retained. The only *certainly* known living species (*N. Fosteri*) was first discovered in 1870 by Mr. Girard Kreft, curator of the Australian Museum at Sidney, in a river of Queensland, but has since been found in other streams. The fish is said to frequently leave the water and go on the land at night. It feeds chiefly, if not entirely, on vegetable matter, such as the leaves, etc., of various plants. It attains a length sometimes of about six feet. The extinct species of the family flourished chiefly during the deposition of the Jurassic and Triassic formations in Europe and America, and were among the most abundant and characteristic of the fishes of those epochs. Until the discovery of the living forms they were supposed to have been shark-like animals; thus, the finding of the Australian species has not only greatly extended the range in time of an ancient type, but has enabled us to recognize the affinities of the later, and, in connection with them, of a long series of other extinct forms. THEODORE GILL.